On-Farm Trials on Salinity and Submergence Tolerant Rice Varieties in the Gulf of Mottama, Myanmar

Bachelor's Thesis by Benjamin Pablo Jungblut
Submitted to Christoph Studer
Zollikofen, 1.2.2018

Bern University of Applied Sciences - BFH
School of Agricultural, Forest and Food Sciences HAFL

BSc – International Agriculture

Declaration of independent authorship and granting of usage rights

I hereby declare that

- I have read and understood the 'Guidelines regarding the handling of plagiarism at BFH' and am aware of the consequences of not respecting these rules;
- I have written this piece of assessed coursework in compliance with these principles;
- this piece of assessed coursework is my own work and has not been written for me, in whole or in part, by any other person(s);
- I accept that my piece of assessed coursework will be checked by plagiarism recognition software and subsequently stored in the BFH database;
- I grant HAFL free-of-charge, unlimited, non-exclusive usage rights to my piece of assessed coursework.

Place, date ……………………………………………………………………………

Signature ……………………………………………………………………………....

Information regarding the use of assessed coursework submitted by students at the School of Agricultural, Forest and Food Sciences HAFL

All rights to term papers, minor reports and bachelor or master theses are in the ownership of the author of the assessed coursework. However, HAFL has free-of-charge, unlimited, non-exclusive usage rights to the assessed coursework of its students.

Term papers, minor reports and bachelor or master theses are constituent parts of the educational programme and are independently authored. HAFL disclaims any responsibility for possible mistakes in these pieces of assessed coursework and is not liable for any possible consequent damage.

Zollikofen, December 2015
School Management

Table of Contents

List of Abbreviations

0T – Zero Treatment, Pawsanyin
BANCA – Biodiversity and Nature Conservation Association
DAR – Department of Agricultural Research
DOA – Department of Agriculture
DOAI – Department of Agriculture and Irrigation
F1 – Flooding Tolerant Variety Number 1, Swarna Sub1
F2 - Flooding Tolerant Variety Number 2, Mekyut
F3 - Flooding Tolerant Variety Number 3, IR-84649.1295.30
HIS – Helvetas Swiss Intercooperation
IRRI – International Rice Research Institute
IUCN – International Union for Conservation of Nature
L1 – Local Variety Number 1, Baygyar
L2 - Local Variety Number 2, Kyarpyan
L3 - Local Variety Number 3, Taungpyan
NAG – Networck Activities Group
S1 – Salt Tolerant Variety Number 1, Pyimyanmarsein
S2 - Salt Tolerant Variety Number 2, IR-11T255
S3 - Salt Tolerant Variety Number 3, Sinthwelatt

List of Tables

List of Figures

Abstract

JUNGBLUT, Benjamin Pablo. On-Farm Trials on Salinity and Flooding Tolerant Rice Varieties in the Gulf of Mottama Myanmar

The productivity of rice farmers in the Gulf of Mottama is endangered by salt-water intrusion, that causes salinity levels to rise in the soil, and flooding, caused by erratic rainfall. This paper aims to assess the performance of different varieties in the conditions present in the Gulf of Mottama and to recommend varieties that might improve the yields in this area. To do this, trials were established in cooperation with the Community-Led Coastal-Management in the Gulf of Mottama Project (CLCMGoMP). Ten varieties were selected and grown on farmer fields in two project-villages (Boyargyi – Kyaikhto Township; Zokekali – Bilin Township). Three salt tolerant varieties were selected alongside three flooding tolerant and three local genotypes. Pawsanyin, the variety that is usually cultivated in those two villages, was used as a zero treatment. This would allow for a comparison of the newly introduced varieties to the status-quo.
Boyargyi was struck by a flood reaching peak levels of over 1m above field-level only 2 weeks after transplanting. Zokekali on the other hand was mostly affected by salinity and rodents. Various differences regarding growth and yield parameters were observed, but it is difficult to draw conclusions from this data, as it is not detailed enough to clearly relate values to biotic or abiotic stresses. Some new varieties with multiple stress resistances (salinity/flooding; salinity/drought) but also complex flooding tolerance (tolerance to submergence as well as stagnant-flooding/partial submergence) are being or have been developed ion recent year. These varieties might be interesting as both villages showed a combination of salinity and flooding issues.
Sinthwelatt, one of the salt tolerant varieties, performed best throughout the trials and was able to average higher yields than the local varieties. Some farmers expressed concerns regarding the eating-properties of Sinthwelatt, which must be considered before promoting its adoption. A demonstration plot that was establish in cooperation with an innovative farmer from Boyargyi enabled the observation of the varieties in more favourable conditions than in the trial fields. Together with farmers from different villages the main reasons for the improved performance in the demonstration plot were defined as soil preparation/levelling, transplanting by hand and water management through drainage. Most farmers acknowledged the improvements possible through these changes in practice but also stated various issues regarding the adoption of these techniques. The main constraints mentioned were mechanisation, financing, labour, know-how and infrastructure.
Further research is needed to assess the exact influence of cultivation practice and intensity to evaluate the optimal approach. Furthermore, the feasibility of changes in cultural practice need to be considered before promoting a certain agricultural system.

Keywords: Myanmar, Gulf of Mottama, Rice, Salinity, Flooding, Submergence, On-Farm Trials

1 Introduction

The livelihoods of the coastal communities in the Gulf of Mottama (Myanmar) are being endangered by reclining fish catches and climate change. These communities are highly dependent on marine resources for their income. Fishers have been reporting decreasing stocks, most probably due to illegal fishing practices that are used in the Gulf. More and more households are looking for alternative incomes outside of the fishery value-chain. Rice is the staple crop in these regions, but the productivity of fields close to the coastline is low and further threatened through increasing salt water intrusion and erratic rainfall that leads to floods that can submerge the rice plants. Most of the farmers in the coastal villages use traditional rice varieties due to lack of knowledge or access. Those varieties are moderately adapted to the conditions in the area but are usually low-yielding with a very long growth period inhibiting multiple crops in one year.

The Community-Led Coastal Management in the Gulf of Mottama Project (CLCMGOMP), implemented by Helvetas Swiss Intercoorperation (HSI), Networks Activity Group (NAG) and the International Union on Conservation of Nature (IUCN), tries to address the issues present in the Gulf from different perspectives together with a multitude of stakeholders. The projects goal is:

“The unique biodiversity of the GoM is conserved and sustainably developed in order to benefit human communities that depend on it.“ (HSI Myanmar 2015, 4)

This is achieved through three different outcomes, each under the lead of one of the three partners:

Table 1 Outcomes of CLCMGoMP (Source: Adapted from HSI MYanmar 2015,4)

Outcome 1 (NAG):	Benefits of sustainable fisheries management in the Gulf of Mottama are shared through effective value chains and equitable market access
Outcome 2 (HSI):	Vulnerable coastal communities have increased income and resilience through livelihood diversification and improved access to non-fisheries resources
Outcome 3 (IUCN):	The special habitats of the GoM are sustainably and equitably managed on the basis of scientific evidence through integrated local, regional and national institutions/management bodies.

The subject of this paper is situated in outcome 2 of the project. It aims at strengthening the non-fishery income by improving the performance and resilience of rice production. This is to be achieved by evaluating the performance and the applicability of three salinity and three submergence tolerant rice varieties in on-farm trials. These on-farm trials have been conducted in two villages in Mon-State (Boyargyi – Kyaikhto Township; Zokekali – Bilin Township) with five farmers in each village, comparing the newly introduced varieties to locally grown ones. The goal of this research is to show which of the tested varieties performs the best under farmer practice and whether the introduction of new stress-tolerant rice varieties can improve the yield in the salt and flooding affected fields of these two villages.

The research-question of this paper is: which of the tested rice varieties are best adapted to the conditions and cultivating practice in the two selected villages and similar environments and are thus able to improve the livelihood of local communities? This will be answered by observing the plants morphology and ultimately their yield. These observations will be compared to gradings carried out by local farmers during the cropping season, to consider the preferences of the target community.

2 Current State of Research

The following chapters will summarise the current knowledge and breeding success regarding salinity and flooding tolerant rice varieties and give a short overview of research and the conditions in Myanmar.

2.1 Salt tolerance

2.1.1 Importance of Salinity in Rice Production

Salinity is one of the major environmental stress factors that influences rice yields (Wattana and Maysaya 2008; Thomson et al. 2010). Over 6% of the global land area is affected by salt (Munns and Tester 2008). Twenty-seven million ha of land in Asia have limited productivity due to salinity (IRRI 1986). The issue has a considerable impact on rice production as more than 20 million hectares of land used for rice cultivation in South- and South-East-Asia are affected by salinity (Singh et al. 2010).
Rice is known as rather sensitive plant regarding salinity (Platten et al. 2013; Munns and Tester 2008). Growth and productivity of rice are considerably lowered by salinity stress (Gregorio 2013). The yield reduction in saline soils compared to more favourable areas can reach up to 80% or even 100% (Singh et al. 2010). In most cases improving the conditions in saline soils is too complicated or economically not feasible, so breeding for salinity tolerance is a promising approach to improving the yield in these areas (Ray and Islam 2008).

2.1.2 Effects of Salinity on the Rice Plant

The rice plant has a changing tolerance to salinity throughout its development. It is most susceptible to salinity during seedling and reproductive stage with a considerably lower impact during germination and tillering (Singh et al. 2010; Rad et al. 2011; Yoshida 1981; IRRI 1986, 267)
The two major issues rice is facing in saline soils are ionic stress and osmotic stress. Osmotic stress can be observed after an increase of salt levels in the soil around the roots. Water uptake is limited due to changes in osmotic potential and stomatal closure. Reduced evaporation leads to a reduction in photosynthesis and ultimately dehydration. This shows partly in reduced relative water content of leaves, reduced shoot growth and increased root length. Ionic stress only appears at later stages of a longer lasting exposure to salinity when ions such as Na^+ accumulate and exceed the cell-threshold, leading to disturbed protein synthesis, enzyme activity and photosynthesis (Horie et al. 2012; Wattana and Maysaya 2008). Osmotic stress gets visible through reduced shoot growth while ionic stress can be recognized by increased mortality of older leaves. The lower number of young leaves and their reduced surface will also indirectly limit photosynthesis without necessarily being linked to ionic stress (Munns and Tester 2008).
Before heading the number of tillers is negatively affected by salt, which leads to a reduced number of panicles with often reduced weight. It also leads to a delay of flowering and ripening. The reduction of the photosynthesis rate during flowering leads to an increased number of unfilled/empty grain. The effects of soil-salinity and the increased accumulation of Na^+ is visible on the plant and can be observed by visual scoring. This type of scoring has shown to have a strong correlation to Leaf Na^+ concentration and could thus be used for selection during breeding (Platten et al. 2013).
Overall there is a considerable decrease in yield with increasing salinity levels (Rad et al. 2011; IRRI 2015).

2.1.3 Mechanisms of Salinity Tolerance in Rice

The osmotic stress that affects the plants shortly after an increase in soil salinity can be alleviated by osmotic adjustments, namely the accumulation of ions or solutes in the root areas responsible for water uptake. This helps the plant to avoid dehydration but will still lead to reduced growth (Yoshida 1981; Horie et al. 2012; Wattana and Maysaya 2008). This process takes several hours to days, but the plant reacts immediately through metabolic changes. It also starts adapting the water permeability of the roots up to the point of changing the structure to allow sufficient water intake (Horie et al. 2012). The plants also have genetically controlled mechanisms to limit the inhibition of cell elonga-

tion and stomatal closure. This helps to partly compensate for growth reduction due to salinity (Munns and Tester 2008).
Ionic stress on the other hand is managed by mechanisms like Na^+ extrusion or reabsorption, summarised under the term ion-homeostasis. A reduced transportation of Na^+ into the shoots or an increased accumulation of K^+ are observed to increase plant survival during salinity stress and are mechanisms used by salt tolerant varieties. The accumulation of K^+ in the shoots allows maintaining a high K^+/Na^+ ratio enabling the cells to continue their functions uninhibited (Horie et al. 2012). The reduced transportation of Na^+ can be achieved by sequestration of Na^+ in the root vacuoles and altering transport processes to avoid accumulation. Certain genes have also been identified that relate to a higher tolerance of tissues, delaying ion toxicity in the chloroplasts or sequestrating the Na^+ into the leaf vacuoles. (Munns and Tester 2008).
The K^+/Na^+ ratio in plant tissues and salinity tolerance seem to be strongly linked and this ratio can also be used as an indicator for yield in affected areas (Ray and Islam 2008). At high salinity levels tolerance seems to be strongly related to the plant's capacity of keeping low Na+ concentrations in essential tissues (Platten et al. 2013). One study also found that the overexpression of certain proteins (OsMYB48-1) improves the tolerance of rice to salinity but the scale of the impact is still debated (Xiong et al. 2014). Research so far focusses on three main mechanisms for salinity tolerance: Osmotic adjustments, cellular Na^+ exclusion and the tolerance of tissues to accumulated ions (Munns and Tester 2008).

2.1.4 Breeding for Salinity Tolerant Rice Varieties

Three decades ago the fundamentals of salinity tolerance like its relation to K^+/Na^+ ratios within the plant and the susceptibility at different stages were already known. A lack of knowledge regarding genetics and the physiology of salt tolerance slowed down the progress of breeding programs, but there was already some focus on using local adapted varieties to include these traits into high-yielding varieties (IRRI 1986, 265 f.). Many studies have improved the knowledge base regarding salt tolerance and enabled the development of rice cultivars that are tolerant to salinity. The mechanisms being responsible for this tolerance have not yet been fully understood (Wattana and Maysaya 2008).
The heritability of salt tolerance has been observed to be low to medium. This suggests that a breeding population should be large with a selection in later generations (Ray and Islam 2008).
Poor correlation between tolerance at seedling stage and tolerance at reproduction stage suggests that different genes are responsible for tolerance in the two stages. Both are required for varieties that are widely adapted to saline soils (Singh et al. 2010; Thomson et al. 2010).
The Saltol QTL (Quantitative Trait Locus) has been identified as a major regulator regarding Na+ uptake, but there are multiple QTLs and genes involved in the complex mechanisms of salinity tolerance. Current screening, although much larger in scale than some years ago, still has potential outside of conventional gene donors used in breeding. Traditional or even wild varieties might contain genes responsible for tolerances that are not known yet (Platten et al. 2013; Thomson et al. 2010). The Saltol QTL might be the most relevant regarding shoot Na+/K+ ration, especially during seedling stage, but does not provide sufficient tolerance by itself. It will rather be one factor in a breeding strategy involving multiple genes and tolerance mechanisms (Thomson et al. 2010).
Progress has been made in mapping the SalTol QTL facilitating the fast introduction of this quantitative trait locus into varieties. A few other genes, like the SKC1 gene controlling K+ homeostasis, have been identified and mapped. Using good markers and combining marker assisted breeding programs with discoveries made in molecular genetics, that help to identify the mechanisms of salt tolerance and single genes that can be inserted into intolerant varieties, has the potential to speed up the breeding process considerably (Gregorio et al. 2013; Thomson et al. 2010). This knowledge is being applied by integrating the SalTol QTL into varieties from Bangladesh and other countries and testing them on farmer fields in coastal areas (Islam and Gregorio 2013). The interest in molecular breeding methods is very high as many of the tolerance-donor varieties have unwanted characteristics that pose problems for conventional breeding tolerance (Thomson et al. 2010).
Many other candidate genes and their relation to salt tolerance have been identified, but the knowledge about their influence on tolerance and the mechanisms that they control varies greatly (Munns and Tester 2008).
The ability of the plants to reduce Na+ concentration in important cellular structures seems to be related to the HKT1;5 allele. Although salinity tolerance is clearly a polygenic trait, future screening and

breeding should consider genotyping for this gene (Platten et al. 2013). The OsHKT1;5 has furthermore been identified as an important gene for K+ accumulation in the shoots (Horie et al.). Another study suggests that only expression of OsHKT1;5 in the roots is beneficial to salinity tolerance as a conditional and local overexpression led to reduced growth showing the importance of cell-type specific expression of genes controlling Na+ transportation (Plett et al. 2010). Further mapping of QTL's and their correlation to salinity tolerance could create advances in breeding programs and improve productivity in salt-affected soils (Platten et al. 2013; Gregorio et al 2013).
The International Rice Research Institute (IRRI) successfully crossed the wild rice species *Oryza Coarctata*, that grows in salty brackish water, with the IR56 variety of *O. sativa*. This cross is extremely difficult as the resulting embryos would usually die off due to the genomes of the two species being on the opposing ends of genome sequence. *O.coarctata* can tolerate salinity concentrations up to twice as high as the ones tolerated by current salinity-tolerant varieties. Being unsuitable for edible rice production the cross with a cultivated variety could create very interesting results through backcrossing. Out of 34'000 crosses one single plant has been successfully germinated and this plant holds great value for further research on salt-tolerance in rice (IRRI 2013).
High yielding varieties developed in experimental conditions might not be accepted by the farmers in the target area as it might not suit their quality preferences. To ensure adoption of new varieties the local communities should be involved in the breeding process by approaches like the participatory varietal selection (PVS) (Singh et al. 2010).

2.2 Flooding Tolerance

2.2.1 Importance of Flooding in Rice Production

Climate change causes erratic rainfall leading to increased drought and/or flooding in agricultural areas (Fukao et al. 2011; Tamang and Fukao 2015; Hom et al. 2015; Jackson and Ismail 2015; Denning et al. 2013). Estimates go as high as 30% of the global agricultural surface being affected by flooding. Many of the rice farmlands in the world are rain-fed and their productivity is endangered by environmental events, submergence being one of the main yield limiting factors (Zhang et al. 2015; IRRI 2017; Akinwale et al. 2015; Singh et al. 2013; Sarkar et al. 2009). Over 20 million ha of rice are grown in flood prone areas in Asia alone.
Rice is one of the only crops that can be grown in these fields, as rice can be grown without issues in waterlogged soils and can tolerate levels of submergence that would lead to the death of any other plant (Gregorio et al. 2013). Locations where the drainage system is limited and connected to nearby rivers are often affected by flooding as the rivers and canals are often not able to cope with the heavy rainfall during rainy season (IRRI 1986). It is key to develop varieties that produce high yields with good quality and are still tolerant to submergence to improve production and the resilience of rice systems in affected areas (Thi Lang et al. 2015).

2.2.2 Effects of Flooding on the Rice Plant

There are two main types of flooding that can be distinguished. The first one is long-term or deepwater flooding, with water levels up to 4 m for a duration of 2-4 Months. The second one is flash-flooding, where there is usually a rapid rise in water level for some days. Both types of flooding can result in the submergence of the plant depending on the growth stage (Setter and Laureles 1996). The potential damage caused by flooding is biggest during booting and heading-flowering stages. Usually leaf discoloration, reduction of leaves, roots and growth can be observed in submerged plants. These effects can cause underproduction or even lead to a complete loss of harvest (Zhang et al. 2015). The limited supply of O_2 and CO_2 leads to a stop of the electron flows and an energy deficiency that can prove very damaging to the plant (Jackson and Ismail 2015).
If the water submerging the plants is muddy it will block the light from reaching the leaves. This will further reduce photosynthesis and clay deposition on the leaves may have additional negative effects on the performance of the crop (Singh et al. 2013). This stop in photosynthesis restricts nutrient absorption from the soil resulting in deficiencies within the plant with the risk of toxic products when continuously being limited to the anaerobic metabolism. Once water reclines the sudden exposure to oxygen and light can lead to toxic oxidative products and photo oxidative damage. These stresses cause an increased susceptibility to diseases but on the other hand seem to reduce damages by in-

sects (Tamang and Fukao 2015). Some different internal and external stresses of submergence and the following desubmergence are listed in Table 2.

Table 2 Effects of Submergence and Desubmergence on the Rice Plant (Source: Adapted from Tamang and Fukao 2015)

Effects on Plant	Submergence	Desubmergence
External Stresses	- Gas diffusion limited - Low Light impact - High risk of infection (humidity) - Salinity (coastal areas)	- Higher oxygen exposure - Higher light exposure - High risk of Infection (humidity + weak plant) - Nutrient leaching - Salinity (coastal areas)
Internal Stresses	- Oxygen/Nutrient deficiency - Transportation limited -> Starvation - Toxic metabolic products - Osmotic/Salt-stress (coastal areas)	- Oxidative stress - Dehydration/Photo inhibition - Nutrient deficiency - Osmotic/Salt-stress (coastal areas)

The production of panicles per m^2 has been reported to be the yield component most affected by submergence. A big part of the differences in tillering ability during submergence is related to reduced light interception and thus photo assimilation (Kato et al. 2014). Most rice cultivars react to submergence with shoot elongation with the goal to overgrow the water surface to restore aerobic photosynthesis. This process is regulated by stress hormones released due to reduced light or oxygen availability. The reactive chain is started by the hormone ethylene (Kawano et al. 2008).

2.2.3 Mechanisms for Flooding Tolerance in Rice

The rice plant is generally suited for flooding-prone areas as it can tolerate waterlogged soils and roots. Being completely immersed by water for more than a week will still result in the death of most varieties. The plant has multiple mechanisms to react to submergence ranging from fermentative metabolisms to development of adventitious roots, internode elongation and conservation of energy for re-emergence after floodwaters recline (Tamang and Fukao 2015).
As there are different types of flooding there are also different types of flooding tolerance. Depending on the type of flooding a different response mechanism in the plant is desired. Deepwater rice reacts to submergence by elongating the shoots to outgrow the water as this is the only possible way of survival if water levels stay high for are longer period. Varieties that use a strategy known as quiescence (slow shoot elongation) on the other hand restrict shoot development as a reaction to flooding and are better adapted to short flood durations. The survival of cultivars after flash floods is negatively correlated with shoot elongation during complete submergence. This seems to be related to the higher energy reserves present in the tolerant varieties which enables them to sustain maintenance for longer and start production of new leaves shortly after desubmergence (Fukao etl al. 2011; Setter and Laureles 1996; Kato et al. 2014). The conservation of carbohydrates and the maintenance of physical structure during submergence seem to have the strongest effect on submergence tolerance (IRRI 1986, p.179; Kawano et al. 2008).
These mechanisms are both controlled by proteins that bind to specific loci that trigger the desired reaction. SNORKEL 1 and 2 (SK1/SK2) are the two loci responsible for enhanced shoot elongation and SUBMERGENCE1 (SUB1) is the locus responsible for reduced elongation. This locus influences ethylene responses and through a cascade of responses limits energy consumption. This genetic mechanism properly coordinates physiological and molecular responses within the plant (Fukao et al. 2011; Tamang and Fukao 2015; Kawano et al. 2008). The SUB1A gene found in some *indica* and *aus* varieties enables plants to survive complete submergence of up to 16 days. The SK genes on the other hand can only be observed in deep-water rice (Tamang and Fukao 2015). Submergence-tolerant varieties usually express the SUB1A gene (Kawano et al. 2008). It has been observed that the SUB1A gene, being the most important regulator of submergence tolerance, is also a key actor in the reaction to post-submergence stress. Genotypes with the SUB1A gene show faster recovery from dehydration, lower

leaf water loss and reduced lipid peroxidation (Tamang and Fukao 2015). Varieties expressing the SUB1 gene are only performing optimally under circumstances where the water level drops after no more than 15-20 days. In cases of slow drainage or so called stagnant flooding it is possible that the SUB1 gene reduces productivity of the plant as it supresses shoot elongation. This results in the plant not being able to outgrow the water to reach air and sunlight (Singh et al. 2013; Sarkar et al. 2009). It has been reported that some naturally submergence tolerant varieties are insensitive to ethylene and thus avoid the energy loss trying to outgrow the water surface by not or barely reacting to the hormonal stress after submergence (Kawano et al. 2008).

2.2.4 Breeding for Submergence Tolerant Rice Varieties

Submergence tolerance has been considered a crucial breeding objective in rice for decades, especially for rainfed lowland areas. When introducing tolerances into varieties it is important to know the inheritance patterns of traits influencing the desired trait. For submergence, there are quite a few studies that mainly describe dominance of tolerance over non-tolerance, but also a few additive and non-additive gene effects influencing the inheritance (Akinwale et al. 2015). Great advancements have been achieved regarding submergence tolerance, especially due to the implementation of molecular markers and combination of different crossing methods (Thi Lang et al. 2015).

Three genes (SUB1A, SUB1B and SUB1C) have been identified within the SUB1 QTL that are responsible for encoding ethylene response factors. SUB1A, which was later also identified as a major cause for submergence tolerance, was mapped using a landrace called “FR13A” that is widely studied and now used as a source of submergence tolerance (Singh et al 2013, Sarkar et al. 2009).

The discovery and extraction of the SUB1A gene, together with other QTLs, was a huge step towards introducing tolerances to abiotic stresses into high yielding varieties. These traits built the basis for marker-assisted selection (MAS) that has accelerated the development of new varieties reducing the risks of rice producers in areas affected by environmentally limiting factors.

In 2003 IRRI started an initiative to introduce the SUB1A gene into very popular varieties from south Asia. Bangladesh, India, Indonesia, Nepal and the Philippines have also started releasing new submergence tolerant varieties using the introgression of the SUB1A gene into very popular and commonly used varieties. The first, most popular and most successful of these varieties is Swarna-Sub1. Submergence tolerance in rice is one of the big success stories of MAS as it was possible to increase the yield following total submergence by 1 to 1.3 t/ha purely by introducing SUB1 into the varieties (Gregorio et al. 2013; Singh et al. 2013; Sarkar et al. 2009).

Under certain conditions it might be interesting to combine submergence tolerance, in the form of reduced elongation when fully submerged, and tolerance to stagnant floods, by enabling elongation in cases of partial submergence. No varieties that combine these characteristics have been found yet (Setter and Laurels 1996). These linked tolerances could be very beneficial for flood-prone areas in Asia, as submergence is usually started or followed by stagnant flooding. Marker-assisted backcrossing of SUB1-varieties and traditional flooding resistant varieties could lead to improved tolerance and identification of genes that complement SUB1 (Jackson and Ismail 2015).

Introduction of SUB1 into varieties with taller seedlings might help to mitigate the issues observed with stagnant flooding when integrating SUB1 into very short growing varieties like Swarna (Sarkar et al. 2009).

2.3 Deltas and Coastal Areas

The average yield in coastal deltas in Myanmar and other South-East-Asian countries is far below the respective national average. This is partly due to salinity and submergence often appearing within short timeframes or even at the same time. On the other hand, it is due to continuous cultivation of traditional landraces that have a lower yield potential than their modern counterparts but show decent tolerances to abiotic stress. Knowledge and financing are limiting factors and force the farmers to use a low risk low reward strategy. Combined with other abiotic stresses these issues can lead to a total failure of the crop, especially when rainfall is unstable. In rainfed lowland areas that are prone to flooding, and especially coastlines affected by saltwater intrusion, the inclusion of submergence tolerance into salinity tolerant varieties is important as new varieties would otherwise risk total failure and would not be adopted by the local population (Singh et al. 2010; Gregorio et al. 2013; Tamang and Fukao 2015).

Recently some varieties that are tolerant to salinity as well as submergence have been developed by introducing the *SalTol* and the *Sub1* QTL's into a high-yielding IR-variety. The increasing frequency and simultaneous appearance of abiotic stresses, partly caused by climate change, forces breeders to combine multiple tolerances in one genotype. It is very complicated to create this omni-tolerant genotype as the complexity of traits involved in certain tolerances will slow down the development process (Gregorio et al. 2013). How complete submergence, combined with high levels of salt, affects ion transport within the rice plant is still poorly understood what further hinders progress in breeding (Tamang and Fukao 2015).
It is very difficult to increase adoption of improved varieties in these regions due to a multitude of factors. The often remote location of farmers hinders extension to reach these areas, resulting in a lack of information about new varieties and cultivation practices. Another issue is that research is mostly done on-station, which is often not representative for the conditions of the fields the rice will be grown in. Furthermore, the input from farmers is often only sought at the latest stages of the breeding process, resulting in a lack of understanding of the farmer's needs and varieties that are sometimes not adapted due to taste or texture issues (Paris et al. 2011, p.2).
Examples have shown that in complex conditions participatory approaches, like participatory varietal selection (PVS) or participatory plant breeding (PPB), can show improvements compared to purely research-based methodologies regarding variety development and adoption. By improving the communication between researchers and farmers, and reducing their gap respectively, the situation of the people affected by these environmental stresses can be significantly improved (Singh et al. 2010; Walker 2007, p.7ff; Paris et al. 2011, p.2).

2.4 Myanmar

2.4.1 Rice in Myanmar

Myanmar has dropped from once being the biggest rice exporter in the world to being a small player on the international market. The countrie's potential is still high due to its big land surface and sufficient water resources. Recent changes in policies, international investment and an improving infrastructure show a positive tendency that could lead to favourable development of the rice market (Denning et al. 2013, p.1). The livelihood of more than 60% of people in Myanmar depends on agriculture. The country was placed second on the Germanwatch's Climate Risk Index for 1994-2013 and was hit by a category-4 cyclone called Nargis in 2008 (IRRI 2016a). The main crop remains lowland rainfed rice alongside green gram (Wongthong and True 2015a). Floods have been one of the main natural disasters affecting Myanmar. Kayin and Mon State are prone to heavy rains that can generate dangerous floods, especially when combined with tidal surges and inadequate drainage. The Sittaung and the Ayeyarwady River regularly overflow and flood the adjacent areas (Hom et al. 2015; Naing et al. 2008).
The increased frequency of late or early monsoon seasons, changes in rainfall and temperature patterns with tendencies to more extreme events and longer dry periods caused by climate change have been challenging the farmers in Myanmar. Over 30% of the land's rice surfaces are considered unfavourable area. Of these, the majority are prone to drought or submergence. Large surfaces are affected by salinity, namely 60'000 ha in the Ayeyerwady Delta and more than 5'000 ha in Mon State (Hom et al. 2015; IRRI 2016b). More and more fields become unsuitable for green gram production due to saltwater intrusion during summer. This also causes losses in the rice crops if occurring during the critical stages of growth (Wongthong and True 2015a). Myanmar seems to have more issues with flooding caused by rainfall then by rising sea levels (McKinley et al. 2015).
Rice is mostly produced by smallholders owning an average of 1ha of paddy land, but there is a wide array of production systems ranging from subsistence farming to specialised production destined for export. The public sector is responsible for infrastructure, policies, research, development and extension, while the private sector is mostly active in the markets of input supply, production and processing. Some companies have started providing contract work with good machinery to the farmers to improve planting and harvesting. In some regions the use of machinery is limited due to small parcel size and limited access to the fields. Sale at farm-gate level is not preferred by small-scale farmers, but often necessary due to the immediate need for income and their limited resources for transportation. Better prices can be achieved by storing the rice to be sold a few months after harvest. Many farmers cannot benefit from this to due insufficient storage facilities or the need for liquidity to pay

the workers for the next crop (Wongthong and True 2015a; Htay 2017). Most farmers have stated themselves as source for seed. The production in lower Myanmar, especially in the south, is extensive with little herbicide and fertilizer use and little to no weeding. Insecticides are applied by some farmers, but only the wealthier farmers on better soils can afford to do so (Naing et al. 2008; Htay 2017).

The Department of Agricultural Research (DAR), under the Ministry of Agriculture and Irrigation (MoAI), is the main governmental institution conducting Research and Development in the agricultural sector. Its focus lies on improved seed, crop management, crop protection and cropping systems. Yezin Agricultural University (YAU) is the institution of agricultural higher education where most scientist and governmental staff graduated. There is only very little research and development done by private companies in Myanmar. There is some degree of collaboration among the national agencies and there are some international research institutions and universities that are in exchange with their respective Myanmar counterparts. Quality and quantity of educated personnel in research and development are still low and constrain the ability to cope with the severe economic, environmental and political stress situations. The Department of Agriculture (DOA) is the institution responsible for the implementation of policies regarding extension and support (Stads and Kam 2007; Yi et al. 2010).
The weak institutional and technological infrastructure in Myanmar poses challenges regarding climate change adaption. Gaps of knowledge and information have to be filled in order to benefit decision making on a local level and development of technology. The climate information available in Myanmar is too general and needs to be adapted specifically for every location including uncertainties and the scale of climate change impacts (McKinley et al. 2015).
In 2011 the International Rice Research Institute (IRRI) started a collaboration with the DAR with the aim to develop suitable varieties for the marginal areas of Myanmar. Together with 60 farmers the newly produced varieties were compared to other varieties from IRRI close to Mandalay to identify high-yielding salt-tolerant varieties that would cope with the abiotic stress in Myanmar's dry zone. Pyi Myanmar Sein, one of the newly created varieties, performed best during these trials and farmers were interested in getting the seeds for the next wet season (IRRI 2016b).
Two years later, in 2013, IRRI evaluated varieties together with farmers from the Ayeyarwady Delta. This was the first time implementing an extensive participatory approach in Myanmar to evaluate varieties regarding the farmers' as well as the consumers' needs. The selected varieties were quickly adopted and the process helped disseminate the change throughout the region (Rahman et al. 2015).
The main areas for improvement of rice production in Myanmar seem to be seed selection, land preparation, crop emergence, soil-/water-/pest-management, crop rotation and post-harvest processing (Denning et al. 2013, p.9). Further assessments of the rice production and its issues are necessary to efficiently target investment into the agricultural sector. A centre enabling collaboration between national and international organisations, under the lead of IRRI and the DOA could help to improve the situation in Myanmar (ibid, p. 20 ff.)

2.4.2 The Gulf of Mottama

Due to the enormous masses of sediments from the three rivers (Ayeyarwady, Sittaung and Thanlwin) flowing into the Gulf of Mottama (GoM) it is the biggest and most significant intertidal mudflat in Southeast Asia. It is source of livelihood for many people living in the golf and supports a unique ecosystem of aquatic species and wintering shorebirds. Being difficult to access it is also not well studied. Tidal peaks of 7m keep a zone of up to 45'000 km^2 turbid. The Gulf has been proposed, and now acknowledged, as a Ramsar site to protect the birds in the Gulf, particularly the Spoon-billed sandpiper. Most people in the coastal villages depend on agriculture, being rice in the wet-season (April-November) and legumes in dry-season (December-March). Productivity heavily depends on seed quality, agricultural technique, soil quality (salinity) and possibility of irrigation (Wongthong and True 2015b). The biggest crop losses in the coastal areas are due to flooding or saltwater intrusion while the generally lower production is probably due to the lack of irrigation and proper water management. Tackling these issues is essential for the region (Hom et al. 2015; Naing et al. 2008).
The main challenges reported by rice-value chain actors in Mon State are as follows (Wongthong and True 2015a):

- Lack of organisation among producers
- Poor condition of infrastructure (roads/irrigation)
- Limited access to: information, financing, resources
- Limited capacity for value addition to products and post-harvest processing
- Environmental insecurity, climate change
- Little cooperation between private and public sector
- Market controlled by big actors (Rice mills, exporters)
- Unethical contracting and labour conditions

The lacking know-how of input suppliers leads to problems for the farmers acquiring agrochemicals. Improper use of inputs, labour shortage, lack of financing/mechanisation/livestock, low farm-gate prices and low-quality seed lead to reduced income or even the complete failure of the crop. Access, to goods, information and markets, can be identified as the main constraint for agricultural livelihood in Mon State (Wongthong and True 2015a; Htay 2017).

3 Material and Methods

3.1 Material

3.1.1 Site/Time-period

The Trials used as a basis for this work were conducted in two villages in Mon State during monsoon season (Mai-November) 2017. As can be seen in figure 1, Boyargyi (Kyaikto Township, Nr 19) is located close to the Sittaung Rivers entry into the sea and Zokekali (Bilin Township, Nr 27) is located on the coast. Both villages were selected due to their cooperation with the project and the location close to the sea. The villages have both issues with salinity and flooding, the prior being stronger in Zokekali and the latter more frequent in Boyargyi. In each village 5 farmers were selected using the following criteria in said order:

1. Owns land affected by either salinity or flooding, preferably both;
2. Grows Rice during monsoon season on said land;
3. Owns enough land to give some of it to the projects disposal;
4. Fields are accessible without excessive effort.

Figure 1 Community-Led Coastal Managment in the Gulf of Mottama: Project Village Location (Source: adapted from IUCN 2015)

The fields of each respective farmer will be refered to as “plots” or “trial-plots”. When talking about a specific plot of one variety, the term “sub”-plot will be used, whereas the areas where data collection took place will be labelled “sample” plots. For more detail see chapter 3.2.1. The plots were selected to be as uniform as possible. The salinity of the soils was tested using an EC-Meter and a soil sample obtained at 5cm depth at the centre of each trial plot, resulting in five measurements per village. The soil types that were assumed for the calculation were selected based on information Mr. Tun Zaw Htay. The conversion factors stated by Watling (2007, p. 1) were used to then calculate the EC based on a measurement taken from a 1:5 sollution of soil and distilled water. When doing this type of EC-measurement, the soil is supposed to sediment before measuring the conductivity. This did not happen for plots 1,4 and 5 in Boyargyi and plot number 5 in Zokekali. Because of this, the values listed in Table 3 are expected to be too low, as the lack of sedimentation will result in lower measurement values. The salinity values observed are as follows:

Table 3 Levels of Salinity in the Different Trial-Plots

EC_{SE} = (EC 1:5 x conversion ratio based on soil type)	Boyargyi	Zokekali
Plot Nr.1	4.2 (0.3x14) = Moderately Saline	7 (0.5x14) = Highly Saline
Plot Nr.2	17 (1.7x10) = Extremely Saline	14 (1.4x10) = Highly Saline
Plot Nr.3	7 (0.5x14) = Highly Saline	13 (1.3x10) = Highly Saline
Plot Nr.4	2.8 (0.2x14) = Moderately Saline	12 (1.2x10) = Highly Saline
Plot Nr.5	8.4 (0.6x14) = Highly Saline	4.2 (0.3x14) = Moderately Saline

3.1.2 Varieties

Ten varieties were selected for the trial, ranging from local traditional varieties to new IR varieties produced by IRRI that are still in the certification process. The varieties have been selected based on literature and the recommendations of CLCMGoMP's Livelihood Officer, Mr. Tun Zaw Htay. As can be seen in Table 4, three salinity tolerant and three submergence tolerant varieties have been selected, together with three traditional varieties from areas with similar conditions. Pawsanyin, the variety used by most farmers in the chosen villages, was used as control/zero treatment. For reasons of comprehensibility the acronyms mentioned in the table will be used throughout the presentation of the results and the discussion.

Table 4 Varieties Selected for the Trial

Type	Acronym	Name	Source	Origin	Seasonal
Zero Treatment/ Control	0T	Pawsanyin	Farmer	Mon State, local	Yes
Traditional/Local	L1	Baygyar	Farmer	Ayeyarwady	Yes
	L2	Kyarpyan	Farmer	Ayeyarwady	Yes
	L3	Taungpyan	Farmer	Mon State, different area	Yes
Flooding/Submergence Tolerant	F1	Swarna-Sub1	DoA Bago Region, Kawo Township	IRRI	No
	F2	Mekyut	DoA Mon State, Kyaikhto Township; multiplicated by project-farmer	DAR	Yes
	F3	IR-84649	DoA Mon State, Kyaikhto Township; multiplicated by project-farmer	IRRI	No
Salt Tolerant	S1	Pyimyanmarsein	DoA Mon State, Paung Township	DAR	No
	S2	IR-225	DoA Mon State, Paung Township	IRRI	No
	S3	Sinthwelatt	DoA Ayeyarwady	DAR	Yes

3.1.3 Farmers'-Practice

To represent the situation of the local farmers as authentically as possible the Trials were conducted using farmers' practice. Everything, aside from transplanting and fertilisation which were both guided by the project, crop and field management was left to the farmers' choice. Transplanting was done in one day, instructed by Mr. Tun Zaw Htay with assistance of paid labour (Figure 2). Fertilisation was only limited regarding quantity. The time of application was left to the farmers. The nursery, where the plants stay until transplanted, was collective for the five farmers in each village. In Zokekali sowing was done on June 3 with transplanting done on July 3. The nursery was fertilized with 25 kg/ha of urea twice, once 12 and once 24 days after sowing, resulting in a total of 23 kg/ha of nitrogen. The trial field received another 50 kg/ha of urea and 25 kg/ha of compound fertilizer (15-15-15) adding up to 26.76 kg of nitrogen and 3.75 kg of phosphorous and potassium per hectare after transplanting. These quantities were based on discussions with the farmers and represent averages of the participating farmers. The timing and

Figure 1 Transplanting with Traditional Stick in Zokekali

distribution was left to the farmers. The trial followed the same schedule in Boyargyi, with one week of delay due to a later onset of the rainy season.

3.2 Methods

3.2.1 Trial Design

The varieties were first sown into nursery seedbeds that measured 21x21 ft. Within these fields, 5 small plots of 1ft² were marked to measure the emergence rate of the varieties. The sample plots, as can be seen in Figure 3, were aligned diagonally to get samples from the centre as well as the outside of the fields. As sowing density and quantities generally are referred to in volume in Myanmar, the exact seeding density was later calculated by counting the amount of seeds in 125ml and upscale this number to the volume sown. The emerging plants were then counted three times a week until transplanting, which was done 30 days after sowing. The plants were transplanted using the traditional technique from Mon State, which is using a stick that has trident-like tool at its end. This speeds up the process, relieves pressure on the back compared to conventional transplanting and avoids injuries through waste in the fields.

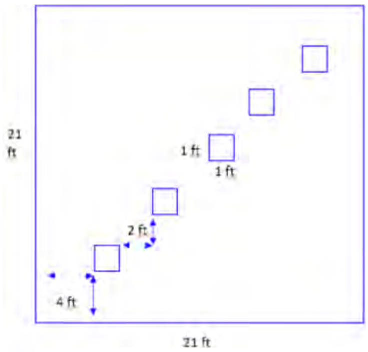


Figure 2 Layout of Nursery Plots with Sample Plots

The trial consisted of ten 4x5m plots per farmer. These plots were arranged in two rows of 5 to create uniform conditions throughout the plots. Between the sub-plots small paths of 2ft had been left out to allow observation of the plots without damaging the plants. A Random Complete Block Design was used for assigning the varieties within the farmer fields. Within the sub-plots 10 plants were selected and marked for data collection by placing bamboo sticks next to them. The selected plants were, as illustrated in Figure 4, all 1m away from the plot-border and from each-other.

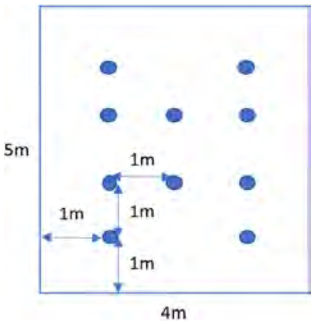


Figure 3 Layout Plant Selection for Data Collection

3.2.2 Data Collection

While being in the nursery the number of plants within the sample plots were counted three times a week to observe the development of the varieties over the first month (Figure 5). The Emergence percentage was then calculated by dividing the amount of plants counted by the total amount of seed in the sample plot and multiplying by 100. Before transplanting the height of 10 plants per sample-plot was measured, to be able to estimate the average height at transplanting. During the growing period the following data was collected on a weekly basis: Plant height, leaf colour and number of tillers (Figure 6). Once the plants entered flowering stage the number of panicles, the length of the biggest panicle and the number of spikelets were registered as well. Plant height was measured from soil level to the tip of the longest leaf. Leaf colour was assessed using leaf colour charts provided by IRRI and the DOA.

Figure 5 Data Collection in the Nursery, Boyargyi

Furthermore heavy damage to leafs or yellowish colouring of the leaves would result in a lower index. Damaged leaves would result in a reduction of the leaf colour index by 1. Heavily damaged plants in

Figure 6 Data Collection in Trial Plots number 3 in Zokekali

a reduction by 2 and nearly dead plants with entirely brown leaves or very strong signs of salinity/flooding/pest damage resulted in a leaf colour index of 1. A dead plant was recorded as a value of 0. When counting the number of tillers, also emerging tillers were included until the start of flowering. The number of panicles refers to the number of completely emerged flowers, panicles that were still emerging and only partially visible were not counted. Panicles still in the process of development were not counted. Panicle length was measured from the panicle neck node to the tip of the panicle, selecting the biggest panicle of the plant. The same panicle was used to count the number of spikelets, where every grain in development was counted. The number of panicles per tiller was calculated individually for every selected plant using the number of panicles and the number of tillers collected before harvest. For the case that a plant had died during the week, its death was recorded and the nearest plant was selected for data collection in the following week.

3.2.3 Harvest

All varieties were harvested once they were fully matured. The ten plants that were observed during the entire cropping cycle were measured one last time before harvesting a sample plot of 2x2m in the centre of the trial plot. In cases of extreme losses. Due to flooding, salinity or pests, the most representative square of 2x2m was selected. Within these 2x2 m the number of panicles, panicle length and number of spikelets of ten more plants was recorded. The number of hills within these 2x2 meters was counted and yield parameters were collected in volume and weight, to correspond to the local market that still mainly uses volume as unit of measurement. The entire harvest and processing was done by hand (Figure 7).

Figure 4 Separation of Grains and Stems after Harvest, Boyargyi

3.2.4 Farmers opinion and demonstration plot

In Boyargyi a demonstration plot was established using the seedlings remaining from the nursery. The plot was cultivated by an exemplary farmer that collaborates with the project. The demonstration plot was used during farmer field schools to explain the trial process and to train farmers on respective activities. They were asked to participate in grading events throughout the growth period, where they were asked to judge the presented plants and communicate their opinion regarding the newly introduced varieties. The two gradings were done shortly before transplanting and harvest respectively. Before transplanting they were asked to judge the varieties' plant height, plant density, leaf colour and root development. They were asked to give an overall grade to the varieties. The average grade was calculated using all obtained values and dividing them through the number of grades. Before harvest the farmers of both villages were invited to Boyargyi and were asked to estimate the yields of a trial plot and the demonstration plot respectively. Additionally, a few questions regarding cultivation practices and the project itself were asked. The yields obtained in this demonstration plot cannot be used in any statistical analysis, but can be used to show the varieties' tendencies regarding improved cultivation practice. The three main differences compared to the cultivation practice applied in the trial plots were improved soil preparation and levelling, transplanting by hand and improved water management through drainage.

Figure 5 Grading of Trial-Plot by Farmers, Boyargyi

3.2.5 Statistical analysis

Due to the very different nature of soil, weather and practice, the two villages will be considered separate trials. The very high variability between the two villages would lead to an increasing insignificance of the results, which is why a separate analysis of the two villages was chosen. This may allow for separate recommendations for the two villages, as they are affected by certain abiotic stress factors to different extent.

An Analysis of Variance (ANOVA) within NCSS was used to evaluate the significance of the observed results. Each date was analysed separately, no analysis over the entire growth period was conducted. The influence factor throughout all tests remained the ten chosen varieties. The data collected during the nursery was analysed using a One-Way Analysis of Variance and the Scheffe's Multiple Comparison Test (SMCT). The dependent variables were emergence rate (%) and plant height (cm). If the conditions for the ANOVA (normality of residuals and equality of variance) were not met, and a transformation of the data could not solve the issue, a Kruskal-Wallis One-Way ANOVA on Ranks was used together with a Dunn's/Bonferroni-Test to determine the significance.

For the data collected during the growth period an Analysis of Variance for Balanced Data (ANOVA with Blockdesign) for 10 factors (10 varieties) and 5 blocks (5 farmers per village). The target variables (plant-height, leaf-colour, number of tillers, number of spikelets, number of hills, yield) were put into relation to the varieties. The requirements were controlled using the tests of assumption included in the One-Way Analysis of Variance (equality of variance) and the multiple regression (normality of residuals). Should the data not meet the requirements, a Friedman's Test was used to determine significance using the same dependent varieties. To further analyse this data, a Wilcoxon-Wilcox Test on Ranks was used. Calculations for this test were done in Excel and are provided in the appendix. All analysis was done using a significance level of $p<0.05$, 10 factors and 5 blocks configuration in Boyargyi and 8 factors (due to the non-emergence of two varieties) 5 blocks configuration in Zokekali respectively.

4 Results and Discussion

The following chapters will highlight the most relevant results obtained throughout the trials. Details regarding statistical analysis can be accessed in the respective chapters in the appendix. The results will focus on four major subjects: emergence in the nursery, growth during the cropping period, yield performance and the farmers' perception of the varieties. The results will be shortly discussed and put into perspective. A conclusive discussion will be presented in a subsequent chapter.

4.1 Nursery

4.1.1 Emergence

Figure 6 Nursery in Zokekali, Empty Plots = F3 in the Front, F2 in the Back

The local and the salt-tolerant varieties are the ones that seem best adapted to the nursery conditions in the two villages. Higher emergence was observed in Boyargyi. This can be attributed to a finer land preparation, better levelling and water management through drainage. Due to insufficient emergence no further values were obtained for F2 Mekyut and F3 IR-84649 in Zokekali. The trial was continued without those two varieties, while the number of plants in Boyargyi was sufficient for a continued integration of the varieties in the trial. The low emergence of the two flooding tolerant varieties might be due to the age of the seeds and improper storage. The seeds of these two varieties were obtained from a farmer that had multiplied the seed for the project in 2015. Insuffiecient storage facilities might have led to a loss in quality/germination. The inconsistent development of the emergence is probably due to snails and changing competition between the seedl
ings. Following is a summary of the values and significant differences observed.

4.1.1.1 Boyargyi

There were significant differences in the emergence rates throughout the 25 days in the seedling nursery plots in Boyargyi. The significant differences over the course of the month before transplanting are listed in Table 5.

Nine days after sowing, the local varieties, except for L2, showed the best emergence rates together with S3 (0T-90.76%, L1 76.2%, S3-71.7%, L3 66.8%), shortly followed by F1 (65%) and S2 (63.5%). The other varieties struggled to emerge showing a thinner density (S1 46.1%, F2 38.6%, L2 16.8%, F3 7%). The factor variety had a significant influence on the emergence of the rice plants. A further analysis showed that the emergence of F3 was significantly lower than that of S3, L1 and 0T. L2 was only significantly lower than 0T. Between the other groups there were no significant differences.

After sixteen days S1 and F1 (S1 61.3%, F1 83.4 %) had remarkably increased in number, while the other varieties only saw slight changes in emergence (0T 102.4%, L3 73.2%, F2 43.7%, S2 68.2%) if at all (L1 75.7%, S3 70.7%, L2, 15.4%, F3 6.9%). The varieties continued to show a significant influence on the rate of emergence. The multiple comparison test showed that F3 had a significantly lower emergence rate than F1 and 0T, while L2 was lower than 0T. The other varieties remained without significant differences.

Table 5 Significant Differences: Boyargyi - Emergence

Days after seeding	Significant differences
4	F3, L2<0T, F1, L1, S3
2/7	F3<0T, F1, L1, S3 L2<0T, F1
9	F3<0T, L1, S3 L2<0T
11	F3<0T, F1 L2<0T
14	F3, L2<0T, F1
16	F3<0T, F1 L2<0T
18	F3<0T, F1 L2<0T
21	F3, L2<0T, F1
23	F3< 0T, F1, L1 L2< 0T, F1
25	F3, L2<0T, F1

After twenty-five days 0T remained with the highest emergence rate of 85% with five varieties having very similar seedling counts (F1 75.3%, L3 67.6%, S2 65.9%, L1 65.5%, S1 63.1%). S3 had remained with 57.8% emergence with F2 having stabilized at 46.3%. Two varieties didn't exceed 15% emergence (L2 14.7%, F3 12.6%). The influence of the variety remained significant with a lower emergence of F3 and L2 compared to 0T and F1. Still no differences between the other varieties were found. The development of the emergence rates of 0T, F1, F3, L1, L2 and S1 are illustrated in Figure 10.

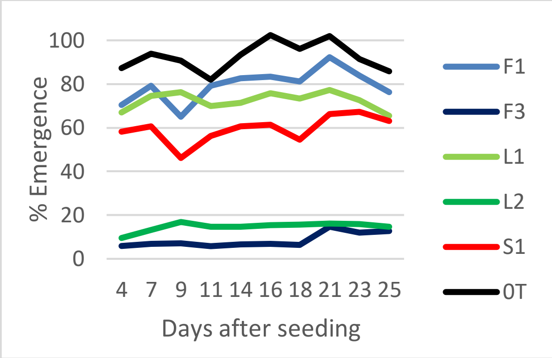


Figure 7 Emergence of F1, F3, L1, L2, S1 and 0T, Boyargyi

Figure 8 Broadcasting Seeds, Boyargyi

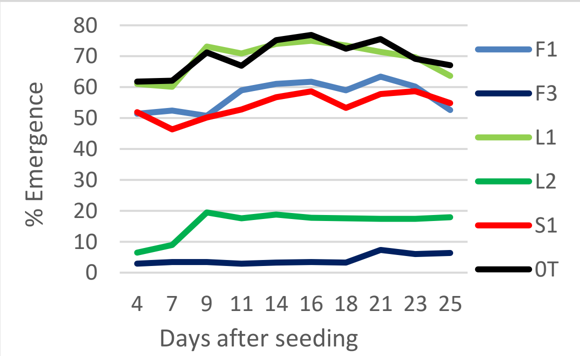
The values above 100% occur because the seeding density was only approximated and the seeds were broadcasted, creating spots of higher density (Figure 11). The low emergence of F3 and F2 may be explained through losses in seed quality through storage or low seed quality to begin with. The low emergence of L2 was not expected and the reasons for it are not entirely clear. Damage through snails, too much or too little water in very specific spots might have contributed to the result. The other rates were generally perceived as good, considering difficulties with pest and water management in the region. The good soil preparation and drainage of the plot in which the Nursery was located will surely have contributed to the relatively high numbers of emerging and surviving plants. 0T Pawsanyin has the highest emergence, which was to be expected as the variety has been adapted to the local customs and vice versa.

4.1.1.2 Zokekali

Table 6 Significant Differences Zokekali - Emergence

Days after seeding	Significant differences
4	F2, F3, L2<L1, L3, S1, S3
7	F2, F3, L2<F1, L1, L3, S1, S2, S3
9	F2, F3<L1, L3, S1, S2, S3 L2<L1, L3
11	F2, F3<L1, L3, S1, S2, S3 L2<L1, L3
14	F2, F3<L1, L3, S1, S2, S3 L2<L1, L3
16	F3<L1, L3, S1, S2, S3 F2< L1, L3, S1, S3 L2<L1, L3
18	F3<0T, F1, L1, L2, L3, S1, S2, S3 F2<0T, F1, L1, L3, S1, S2, S3 L2<L3, S3
21	F3<0T, F1, L1, L2, L3, S1, S2, S3 F2<0T, F1, L1, L3, S1, S2, S3 L2<L1, L3, S3
23	F3, F2<0T, F1, L1, L2, L3, S1, S2, S3 L2<L1, L3, S3

25	F3, F2<0T, F1, L1, L2, L3, S1, S2, S3 L2<L1



Also in Zokekali the varieties showed significant differences regarding emergence rate throughout the 25 days in the nursery. The significant results and the evolution of the varieties 0T, F1, F3, L1, L2 and S1 are displayed in Table & and Figure 12. L3 (73.2%) and L1 (69.9%) had the highest emergence nine days after seeding, with the three salt-tolerant varieties and the 0T having very similar plant counts (S1 54.6%, 0T 51.6%, S3 48.2%, S2 42.9%). F1 (36.4%) and L2 (22.1%) showed very low emergence while F2 and F3 didn't emerge at all. The factor variety had a significant influence on the emergence with a significantly lower emergence of F2 and F3 compared to all varieties except F1 and L2. L2 is significantly lower than L1 and L3. F1 is not significantly different from any other variety. Seven days later the distribution was similar with the local and the salt-tolerant varieties showing good emergence in Zokekali (L1 74.3%, L3 74.17, S3 59%, S1 56%, 0T 51.4%, S2 47.3%). F1(40.1%) and L2(20.1%) stayed consistant in values while F2 (8.2%) had a few plants emerging and F3 (0%) remained without seedlings at all. The influence of the variety on the emergence stayed significant with F3 being significantly lower than all varieties except F1, L2 and F2, F2 being lower than S1, S3, L3 and L1 and L2 being lower than L3 and L1. Twenty-five days after seeding the observations remained similar with the local and salt-tolerant varieties showing the best performances (L1 61.9%, L3 52.5%, 0T 48.2%, S3 46.8%, S1 46.7%). The other varieties struggled resulting in less than 1/3 of the seeds emerging (S2 32.5%, F1 28.8%, L2 21%, F2 2.2%, F3 0%). The influence of the factor variety remained significant with F2 and F3 having lower emergences than all the other varieties.

Figure 9 Emergence of F1, F3, L1, L2, S1 and 0T, Zokekali

Figure 10 Broadcasting Seeds, Zokekali

The low Emergence of F2 and F3 can be explained by the seed quality and duration of storage. Those two varieties were obtained from a farmer that had reproduced the seed in 2015 and stored it in local facilities that often struggle to maintain low humidity. The generally lower emergence compared to Boyargyi is probably due to the lack of drainage and soil preparation. The varieties were seeded into 10-15cm of standing water compared to sowing directly onto the soil as in Boyargyi (Figure 13). The drainage guarantees contact between the soil and the seed and increases germination and emergence.

4.1.2 Plant Height

It was expected that the local varieties would show higher average plant heights, as high-yielding improved varieties usually have shorter stature. This is due to more resources being allocated to reproductive rather than vegetative organs within the plant. Higher plants might be advantageous in areas with stagnant flooding, as they will more easily outgrow the water. In the situation of a flash flood, the

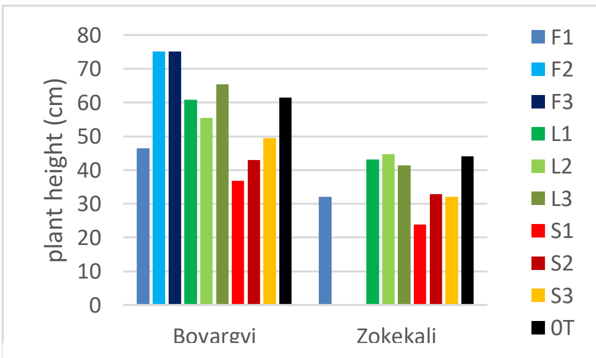


Figure 11 Average Plant Height before Transplanting

shorter plants are in advantage as the risk of collapse, once the water is gone, is lower. The values observed correspond to this expectation, except for F2 Mekyut and F3 IR-84649.1295.30. These two varieties reached very high plant heights in Boyargyi, due to low emergence numbers leading to low competition between the individual plants. The average plant heights in both villages is illustrated in Figure 14.

4.1.2.1 Boyargyi

Just before transplanting F2 and F3 showed a plant height average of 75.1 cm, followed by L3 (65.4 cm) 0T (61.5 cm), L1 (60.9cm) and L2 (55.4 cm). S3 (49.4 cm), F1(46.4cm) and S2 (43 cm) had average plant heights above 40 cm with only S1 remaining underneath this value with an average plant height of 36.8 cm. The influence of the variety on the plant height was significant. A further analysis of the data through a Dunn's/Bonferroni Test revealed that S1 had a significantly lower plant height than all other varieties except S2. F2 and F3 on the other hand showed the highest value, being significantly higher than all other varieties.
The exceptionally high values observed in F2 and F3 can be explained by their generally low emergence rate. The low competition enabled the few remaining plants to develop faster than the seedlings of the other varieties. It was to expect that the local varieties would show higher average plant heights, as high-yielding improved varieties usually have shorter growth, as they reach the higher yields by improving the harvest-index.

Zokekali

The average plant height before transplanting was lower in Zokekali (36.9 cm) than in Boyargyi (56.9 cm), starting with 0T at 44.9 cm. L2 (44.7 cm), L1 (43.1 cm) and L3 (41.364) displayed similar plant heights to 0T, with the salt tolerant varieties and F1 remaining under an average height of 40 cm (S2 32.9 cm, S3 32.4 cm, F1 32.1 cm, S1 23.8 cm). The variety also had a significant influence on plant height in Zokekali. The multiple comparison test revealed that S1 was significantly shorter than all other varieties while 0T was significantly higher than S1, F1, S2 and S3. F2 and F3 have not been measured, as the number of plants was insufficient and the trial was continued without those two varieties. The traditional varieties also show the expected higher average plant height compared to the salt and submergence tolerant varieties.

4.2 Growth Parameters

Parameters such as plant height, number of tillers and leaf colour help monitor the development of the rice plant throughout the entire growing period and can be helpful when identifying reasons for low or very different yields. The following chapters will elaborate the values observed in both Boyargyi and Zokekali.

4.2.1 Plant Height

Figure 12 Plot Number 1, 3 Days after Peak-Flood, Boyargyi

The influence of the varieties on the plant height, when comparing the data from one measurement date was significant in both villages throughout the entire growing period. The expected pattern of the local varieties being generally taller than the newly introduced ones was observed in both villages. 0T, L2, L3 being taller and F1, S1, S2 being shorter respectively were particularly noticeable. The plant height ca be used as an indicator for vigour or to draw conclusion regarding the genotype or origin of the variety. Furthermore, the development of plant height during and after a flood can be related to the expression of the SUB-1 QTL. Varieties expressing this submergence tolerance should grow considerably less while submerged, but struggle less once the water has reclined. The plant height was influenced by different exterior factors. A flood only two weeks after transplanting led to complete submergence for multiple days in Boyargyi (Figure 15). This slowed down the development of the plants, and the local varieties were smaller after 11 weeks compared to Zokekali. F1, S1, S2 and S3 on the other hand were smaller in Zokekali compared to Boyargyi at that time. This can be partly attributed to damage caused by rodents (most probably rats) starting 7 weeks after transplanting in Zokekali. The rodents destroyed the stems of the plants in order to reach the developing panicle, which resulted in death or re-emergence of the plants Other possible reasons for the difference are lower water levels and/or higher salinity levels.

4.2.1.1 Boyargyi

The varieties showed significant differences throughout the entire growing period in Boyargyi, except for the measurement 3 weeks after transplanting, where the influence of the factor variety was significant, but no groups were clearly different from each other. This might be due to high variability of the data resulting in less significant results. As can be seen in Table 7, the varieties that are mostly statistically significant were S1, S2, L2 and L3. S1 was smaller than other varieties on ten of eleven measurements, while smaller values were observed nine times in S2. F1 was significantly smaller than L2 five and six weeks after transplanting. L3 and L2 on the other hand had higher values on eight data collection dates. The other significant differences to S1 and S2 were L1 (six times), 0T (two times) and F2 (one time). Eleven weeks after transplanting, the local varieties showed similar average plant heights (0T 94.27cm, L1 96.46cm, L2 100.67cm, L3 95.07cm) followed by F2 (91.83cm) and S3 (90.97cm). The average values of the three IRRI-based varieties were all close to 85 cm (F1 84.86cm, F3, 86.96cm, S2 84.56cm) while Pyimyanmarsein (S1) only reached 74.22cm

Table 7 Significant Differences Boyargyi - Plant Height

Weeks after Transplanting	Significant differences
1	S1<L1, L3, F2 S2<L3
2	S1<L3, 0T
3	
4	S1, S2<L2
5	S1, S2, F1< L2 S1, S2< L3
6	S1, S2, F1< L2 S1, S2< L3
7	S1, S2 <L1, L2, L3
8	S1<L1 S1, S2< L2, L3
9	S1< 0T, L1, L3 S1, S2 < L2
10	S1< L1, L3 S1, S2< L2
11	S1<L1, L2

Figure 16 shows the evolution of the plant height over the 11 weeks in Boyargyi. The varieties displayed are 0T, F1, F2, L1, L2, S1 and S3. The peak two weeks after transplanting can be explained by the flood that occurred during that week, completely submerging our plots for 4-5 days. The natural response of rice plants to submergence is to outgrow the water. Plants expressing the SUB-1 QTL should stop their growth during submergence. It is difficult to observe this in the data, as there is a very high variability within the varieties and data collection had the be conducted after the water had partially reclined (access to the village was not possible for several days during the flood). The water reached peak levels of up to 100cm above field level. Depending on the plot, drainage was difficult, due to limitations in outflow to the canal. This resulted in a stagnant flood over the course of 2 weeks. This may be one of the reasons why F1, that is known to be well adapted to submergence, might have struggled. Once the water was drained many plants collapsed, which can be observed as a dip in plant-height from week two to three. The prolonged submergence led to a very long growth inhibition that slowed down the plants' development. As mentioned, the local varieties were expected to outgrow the newly introduced varieties due to their genetic disposition. F2 and S3 were bred based on or using local genetics from Myanmar, which is probably why they show average plant heights close to the traditional varieties.

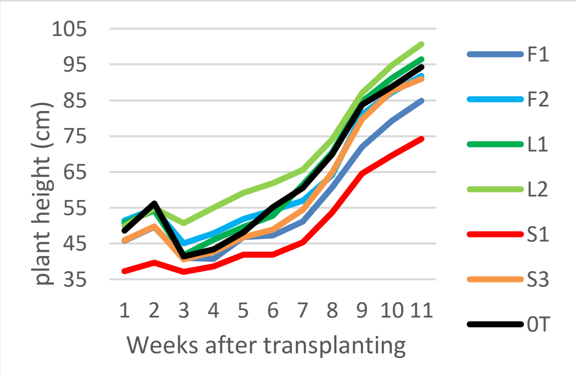


Figure 13 Evolution of Plant Height F1, F2. L1, L2, S1, S3 and 0T, Boyargyi

4.2.1.2 Zokekali

The varieties were also different in Zokekali throughout the entire growth period. The varieties showing the most significant differences were F1, S2, 0T and L2. As visible in Table 8, S2 showed lower values than other groups on all 11 dates, while F1 did so 9 times. S1 showed significantly smaller plants on four dates. Significantly higher average plant heights were observed with 0T and L2 eleven and nine times, respectively. L1 (three times) and L3 (five times) were the other significantly taller varieties. Also in Zokekali the traditional varieties showed similar average plant heights (0T 115.93cm, L1 111.10cm, L2 107.63cm, L3 111.25cm) with S3 (80.40cm) being the only other variety reaching more than 80 cm average plant height. F1 (66.93cm), S1 (66.22cm) and S2 (60.44cm) averaged close to 65 cm.

Table 8 Significant Differences Zokekali - Plant Growth

Weeks after Transplanting	Significant differences
1	SMCT: F1, S2< 0T, L1, L2, L3 S1, S3<0T, L2
2	S1<0T S1, S2, F1< L2
3	S2<L2 S1, S2<0T
4	F1, S2<0T, L2
5	S2<L1, L2, L3 F1, S2<0T
6	F1, S2<0T, L2, L3
7	S2<L2 F1, S2<0T, L3
8	F1<0T, L1, L2 F1, S2<L3
9	F1, S2<0T
10	S2<0T, L3
11	S2<L2 F1,S1,S2<0T

Figure 17 shows the development of the average plant height in Zokekali over the course of the 11 weeks of observation. The varieties displayed are 0T, F1, L1, L2, S1 and S3. As you can clearly see, the decrease of plant height observed in Boyargyi is missing. There was no flood in Zokekali, which means that the plants developed very different than in Boyargyi. This allows us to observe two different and very probable scenarios for the region: a year with and a year without flood. When recommending varieties for the use in this region, it is important that they can cope with both situations, as they are equally frequent and very difficult to predict. Seeing the performance of submergence tolerant varieties in an environment without flood enables broader conclusions. A particularity is the stunted growth of F1, S1 and S3 after 6/7 weeks. This stagnation of growth is due to damages caused by rodents (Figure 18). The varieties mentioned, with the addition of S2, started to flower around that time. No other plants in the entire region were flowering, as the local varieties have a longer growth period and depend on the end of the rainy season for flowering. This attracted a lot of rodents that caused damage to panicles and to entire plants. The varieties had to develop new tillers, leaves and panicles, which slowed down their development. As the local varieties seemed not at all affected by this, it is not entirely sure how much of the damage caused by rodents is to be associated with the earlier flowering, the smaller plant height or the small plot size.

Figure 17 Evolution of Pant Height F1, L1, L2, S1, S3

Figure 14 Damage Caused by Rodents with Plots of S1 and S2 on the Left and Centre Front, F1 in the Central Plot in the Backline

4.2.2 Number of Tillers

The number of tillers is an important indicator for potential yield as it ultimately limits the number of panicles and thus the number of grains. A variety that usually has a high yield might not be able to exploit its potential due to nutrients or space limiting the development of tillers. No significant influence on the number of tillers was found throughout the growing period in both villages. Only on one date, 9 weeks after transplanting, a significant influence of the varieties on the number of tillers was observed in Zokekali, but no groups were different from each other. Especially in the first half of the growing cycle the difference between the averages of the farmers were bigger than the differences between the varieties. In conversation with locals and specialists the high variability of the soil and nutrient supply were highlighted.

4.2.2.1 Boyargyi

No significant influence of the varieties on the number of tillers was observed in Boyargyi. This can be partly attributed to strong differences between the plots. Two weeks after transplanting the averages of the plots varied from 3.96 (Nr.2) to 8.32 (Nr.4) tillers/hill while the average values of the varieties stayed between 4.62 (F3) to 6.30 (F2) tillers/hill. Four weeks after transplanting the farmers values ranged from 4.22 (Nr.5) to 6.44 (Nr.4) and the varieties' values averaged between 4.25 (S2) and 6.1 (S1), except for 0T averaging 2.84 tillers per hill. These low values can be associated to the damages caused by the flood in Boyargy. After the flood many plants were covered by mud, lost leaves or even died off, this lead to a lower number of tillers. From this date onwards, the difference between plots started to reduce compared to the variability within varieties. Seven weeks after transplanting the plots showed averages of 10.57 (Nr.5) to 14.18 (Nr.3) tillers per hill while the varieties varied from 9.08 (0T) to 14.34 (F1) tillers/hill. Towards the end differences between certain plots started to become more noticeable again. On the last data collection date, plot number 3 showed a very high average value of 15.33 tillers/hill. This is more than 1,5 times the number of tillers compared to plot number 4, that only averaged 9.78 tillers per hill. The differences between the varieties were even higher, ranging from 7.96 (F3) to14.38 (L1). The effects of the flood can also be observed when looking at the development of tillers throughout the growth period. The values of the varieties 0T, F1, F2, L1, L2, S1 and S3 are displayed in Figure 19. After 2 Weeks, all varieties show reduced numbers of tillers to different extent. 0T was very strongly affected by the flood, but was able to reach values similar to the other varieties after 9 weeks. After 7 weeks the varieties started hitting plateaus regarding the number of tillers. Especially the newly introduced varieties reduced the number of tillers in the following weeks, while 0T's and L1's values continued to increase. The most noticable decreases are the ones from F1, S1 and S3. F1 and S1 dropped from nearly 14 close to 10 within 3 weeks. S3 dropped from close to 16 to 12 in the same timeframe. The locals mostly attributed this reduction to nutrient deficiency and/or pressure through pests and

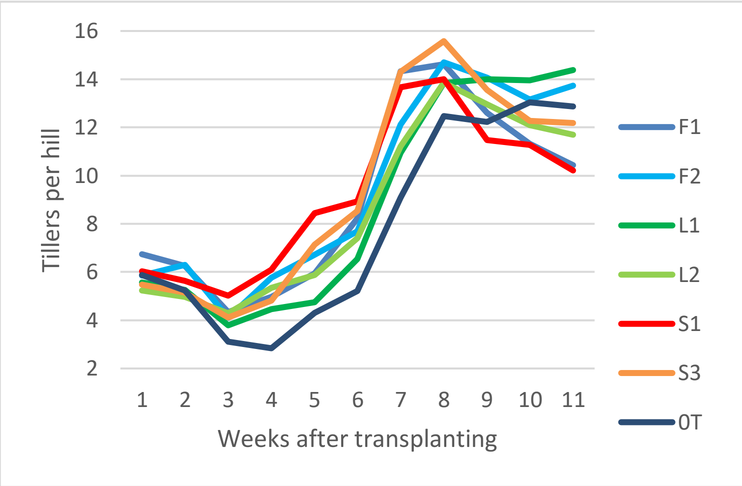


Figure 16 Evolution of Number of Tillers F1, F2, L1, L2, S1, S3 and 0T, Boyargyi

Figure 15 Damage by Rodents Plot Number 2, F1, Boyargyi

diseases. The damages caused by rodents were less severe than in Zokekali but still present (Figure 20). The rodents either ate the whole pannicle or damaged the stem to a degree that it would break and fall down. This leads to the death of the plant or in the best case to a reemergence of the panicle a few weeks later with extremely reduce number of spikelets.

4.2.2.2 Zokekali

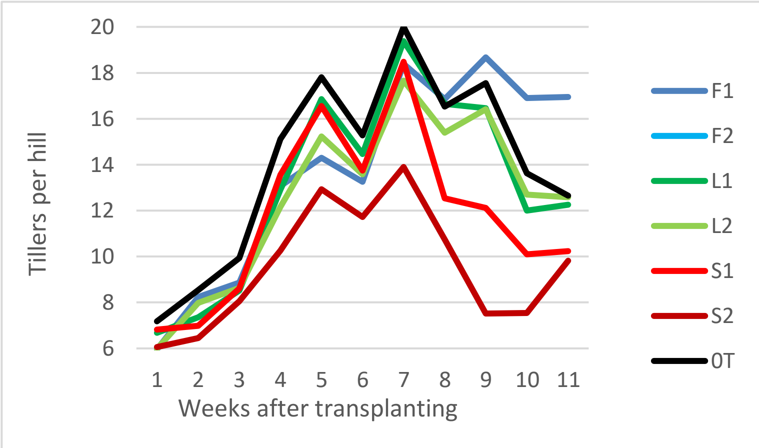


Figure 17 Evolution of Number of Tillers F1, F2, L1, L2, S1, S2 and 0T, Zokekali

The data was distributed similar to Boyargyi during the first weeks. Two weeks after transplanting the farmers showed values from 5.85 (Nr. 2) to 10.56 (Nr.5) while the varieties only ranged from 6.44 (S2) to 8.54 (0T). Two weeks later the tendency was still the same with the plots reaching values from 9.8 (Nr.1) to 18.13 (Nr.5) and the varieties show average values between 10.26 (S2) and 15.12 (0T). In Zokekali the farmers continued to show bigger differences than the varieties. 7 weeks after transplanting the average of the plots varied between 12.96 (Nr.2) and 21.1 (Nr.3) while the varieties showed values from 13.90 (S2) to 20.00 (0T). Nine weeks after transplanting the Friedman Test showed a significant influence of the factor variety on the number of tillers (Friedman's Test, 8 factors, 5 blocks; Q=17.00, p=0.02), but no groups were different from each other. The plots showed average values rom 9.65 (Nr 5) to 21.58 (Nr.1) highlighting the big differences between the plots. The varieties also showed very different values, rangin from 7.51 (S2) to 18.67 (F1). These values normalised towards the end of the observation period. Eleven weeks after transplanting the plots' averages only varied between 9.83 (Nr.2) to 17.28 (Nr.1) while the varieties stayed between 9.82 (S2) and 16.94 (F1) (Figure 21).

Figure 18 Rodent Damage, Plot 2, S1, Zokekali

The reduction of tillers after 7/8 weeks can also be observed in Zokekali, but here it is much more difficult to clearly attribute the reduction of tillers to one or two factors. As already mentioned the differences between the plots were very big, meaning that the averages displayed above only show an incomplete image. The reduction of tillers, especially in the two salt-tolerant varieties is mostly due to the damages by rodents (Figure 22). The early flowering varieties (F1, S1, S2, S3) were most affected by this. F1 still shows very high values due to its sub-plot from farmers nr.1. The variety had been strongly affected by snails in the first weeks. This resulted in a very low number of plants surviving in this plot. The remaining plants had very little competition and developed abnormally high number of tillers.

4.2.3 Leaf Colour Index

The leaf colour index can be used as an indicator for the plants health or nutrition status. The values range from 1 to 5, the higher the index the healthier the plant is. Locals stated that leaf yellowing was usually a sign of salinity while leaf colour is also often used to evaluate nitrogen supply of the plant. This is why this index will be used as a general indicator of plant health. The varieties had different influences on the leaf colour index in the two villages. Both villages had seen very different issues throughout the season and the reaction to those issues where thus also varied. There are some insecurities regarding the quality of the data collected. The index is based on personal perception and visual assessment, which is why the results should be interpreted with care. If this data were to be collected in a next trial, it is very important that the data collection method is very clearly defined to avoid a distorted analysis. This Index, or leaf colour in general, should be used as an indicator for the plants health and their nutrient supply. Optimally farmers would check their fields regularly and fertilize accordingly. A value of 4 is desirable and values below should be answered by nitrogen fertilisation. Taking into account the extensive production in the Gulf of Mottama, other standards might be better suited for this region. The next chapters will elaborate on some observed tendencies.

4.2.3.1 Boyargyi

Table 9 Significant Differences Boyargyi - Leaf Colour Index

Weeks after Transplanting	Significant differences
1	L1<F3 0T<F3, S1
2	
3	L1, S2<S1
4	0T, L1, S2<S1
5	
6	0T, F2, L1<S1
7	0T<S1
8	F2<F1, S1, S3
9	
10	
11	0T, F2, L3<S1

The varieties had a varying influence on the leaf colour index over the course of the growing period in Boyargyi. No significant influence of the varieties on the index was observed two, five, nine and ten weeks after transplanting. The varieties that mainly stand out are 0T, L1, and S1. As can be seen in the summarised statistical results in Table 9, 0T showed significantly lower values on five dates while L1 did so four times. F2 (three times), S2 (two times) and L3 (once) made up the other significantly lower groups. S1 showed significantly higher leaf colour index on seven of the eleven dates. The other varieties that showed a significantly higher index were F3 (once) and S3 (once).
In Figure 23 the evolution of the leaf colour indices of 0T, F3, L2 and S1 are displayed. The data from the first weeks is not displayed as the plants are prone to stress after transplanting. The data displayed shows the development after the flood. All varieties were strongly affected by the flood and showed damage to leaves (Figure 24). Some varieties, 0T in particular, completely lost certain leaves and had to develop new ones. S1 Pyimyanmarsein already showed a darker leaf colour in the nurseries and was also the quickest variety to recover from the submergence regarding leaf colour. On the question why a salt resistant, rather than a submergence tolerant variety, was recovering the fastest after the flood, Mr Tun Zaw Htay, who had helped select the plots, explained the results through the soil salinity. The other varieties were already stressed by salinity and snails after transplanting. Due to this they entered the phase of submergence weakened and once the water retreated were again challenged by rising salt pressure. High water levels help to push the salt out of the topsoil, but as the drainage systems are not very effective nor reliable, a controlled water level that would support the plants is difficult to achieve. The two dips seven and nine weeks after transplanting might be credited to nutrient limitations, increasing salt-

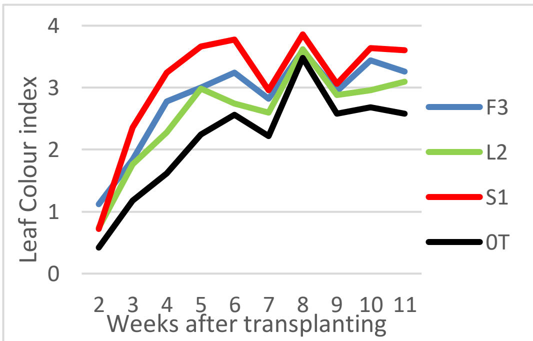


Figure 19 Evolution of Leaf Colour Index F3, L2, S1 and 0T, Boyargyi

Figure 20 Plot Number 5 one Week after Peak Flood, Boyargyi

pressure through decreasing water levels and pests (rodents, snails, insects). Some differences can also be attributed to different lighting conditions and different people collecting the data. For future research it should be defined clearly who collects this data, when and how to avoid distortion of the data. The rodent issue that we encountered in Zokekali was not as prominent in Boyargyi and affected mostly the panicles, not the leaves. This can be explained by higher water levels in most of the plots in Boyargyi. High water levels reduce some of the pressure by rodents and restrict the damages on the upper parts of the plant, giving a higher chance of recovery.

4.2.3.2 Zokekali

As can be seen on Table 10, the influence of the varieties on the leaf colour index was only significant on four dates in Zokekali. From five until seven weeks after transplanting higher values were registered for F1. L3 was lower an all three of these dates, while on the 7th measurement date 0T and L1 were also observed brighter or damaged. Ten weeks after transplanting S2 had significantly lower values than 0T, L1 and L3.

Table 10 Significant Differences Zokekali - Leaf Colour Index

Weeks after Trans-planting	Significant differences
1	
2	
3	
4	
5	L3<F1
6	L3<F1
7	0T, L1, L3<F1
8	
9	
10	S2<0T, L1, L2
11	

Figure 25 shows the observed values of 0T, F1, L1, L3, S1 and S2 during the 11 weeks of observation. Once established after transplanting, F1 and S2 showed very dark leaf colour throughout the first seven weeks. From week seven onwards these two varieties and S1 were affected by heavy rodent damages, destroying big parts of the trial plots (Figure 26). This is visible as a strong drop in index values of these varieties. Once they had re-established new tillers and leaves, the other varieties had also started flowering. All varieties ended the season on similar values, but the short cycle varieties experienced a very heavy setback through rodents during more than two weeks.

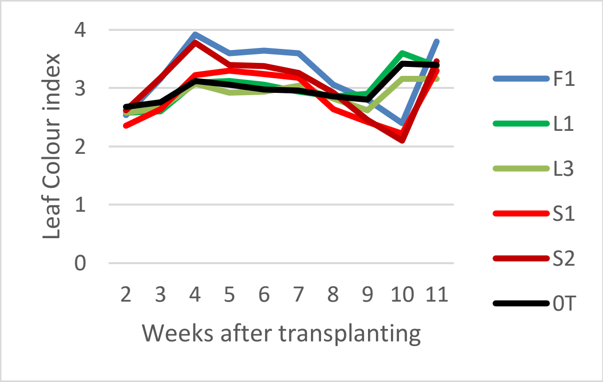


Figure 22 Evolution of Leaf Colour Index F1, L1, L3, S1, S2 and 0T, Zokekali

Figure 21 Rodent Damage Plot Number 5, F1, Zokekali

4.3 Harvest

The performance of a variety is ultimately defined by its productivity until harvest and the accomplished yield. Several parameters were recorded at harvest and will be compared to illustrate the characteristics of the varieties and their yield. Significant influences and differences among the varieties were observed in both villages and most parameters. The data was collected on the day of harvest, meaning that the length of the growing period might vary between the varieties. Harvesting was done an average of 3 days later in Zokekali (133.85 days after transplanting) compared to Boyargyi (130.98 days after transplanting). Most of this difference is due to the local varieties. 0T was harvested an average of 4.4 days later in Zokekali, while L1 (6.2 days), L2 (11.6 days) and L3 (4.2 days) all had later harvest dates too. Only S3 (7.2 days) of the newly introduced varieties was harvested a week later in Zokekali. The other varieties (F1 -0.6 days, S1 0.8 days, S2 -0.4 days) stayed within one day of average harvest time of their counterparts in Boyargyi. Without the damage caused by rodents and late rains, these varieties would have been ready for harvest at least two weeks earlier. The shortest average cropping cycles were observed in S3 with 127.3 and F1 with 129.1 days after transplanting, while the longest ones were observed in F2 (140.8) and L3 (138.1). It is not entirely clear what lead to the later harvesting dates in Zokekali, as usually floods lead to a delayed harvest as it delayes the plants development depending on the period of submergence. Following this logic, the harvest in Boyargyi should have been later. Rodent damages or high soil salinity might be reasons for the late harvest. Furthermore, the rainy season started late in 2017 and the rains went on until mid of October, which is late compared to the preceding years. The overall average harvesting date was 132.65 days after transplanting. These differences should be kept in mind when studying the data presented below.

4.3.1 Number of Hills and Plant Height

Figure 23 Heavily Reduced Plant Number after Flood in Plot 5, F1, Boyargyi

The number of hills and the plant height can be indicators to how well the different varieties have coped with the environment. Assuming a similar or identical transplanting density, the number of hills can be a measurement of survivability, while plant height can help to draw conclusions regarding the varieties genotype and vigour. Even though the submergence tolerant varieties should be genetically able to cope with the flash flood that occurred in Boyargyi, the local varieties seemed to be better adapted to the environmental stress. They generally showed higher hill counts than their newly introduced counterparts. This might be explained by a stagnating flood following the flash flood, and varieties expressing the SUB-1 gene are known to struggle with stagnating floods. Other factors like nutrients, pests and diseases might have further influenced those parameters. In Zokekali, no significantly different groups were observed when comparing the number of hills in the harvested sample plot, which suggests that most of the differences in Boyargyi was due to the flood and its consequences. Somewhat expected tendencies regarding plant height were observed in both villages, with the traditional varieties outgrowing the "improved" varieties. Issues with pests increased this discrepancy, particularly in Zokekali. It is not possible to separate certain environmental factors and their influence on the performance of the varieties. Further and more detailed research would be needed to clearly correlate a certain factor to an observed performance. The low hill count will have surely resulted in lower yields. The farmers will prefer plants with a strong vigour and that can survive within the conditions present in the two villages. The local varieties seem to better cope with the stresses present in the Gulf and generally show higher numbers of survival. The following chapters will present the data collected.

4.3.1.1 Boyargyi

There was a significant difference between the varieties regarding the number of remaining hills in Boyargyi. The local varieties showed higher survival rates than the newly introduced ones. Only S3 (64) had an average value of hills close to 0T (75), L1 (67.2), L2 (71.4) and L3 (80). F1 (47), F2 (54.6) and F3 (57.2) showed the lowest numbers of surviving plants (Figure 28). The two remaining salt tolerant varieties (S1: 61.6, S2: 57.2) averaged close to 60 hills on the sample plot. As presented in Table 11 F1 and F2 had significantly less hills than all the local varieties and S3, while F3 and S2 only had lower values than 0T and L3. S1 only had significantly less hills than L3.
Looking at plant height there was also a significant influence of the varieties in Boyargyi. F1 (94.27cm) had the lowest average plant height, being significantly shorter than 0T (132.53 cm), F2 (149.53cm), L1 (134.54cm) and L3 (130.40cm). S2 (96.27cm) had the second lowest average height, being smaller than F2 and L1, and F3 (97.85cm) only being significantly smaller than F2 (Figure 29).

Table 11 Significant Differences Boyargyi - Number of Hills and Plant Height

Number of Hills	F1, F2<0T, L1, L2, L3, S3 F3, S2<0T, L3 S1<L3
Plant Height	F1<0T, F2, L1, L3 S2<F2, L1 F3<F2

It is very unexpected to have flooding/submergence tolerant varieties be the ones with the lowest survival rate in plots that were affected by severe flooding. The complexity of issues reducing the plant numbers seems to outweigh the genetical resilience to submergence present in these varieties. It is unclear whether pests and diseases, salinity or nutrient deficiency were the main reasons for the high losses observed in those varieties. Some submergence tolerant varieties also struggled with stagnant flooding before or after the complete submergence, which was the case in Boyargyi when the water levels only slowly decreased in some plots. The results regarding plant height were mostly expected. F2 showed a phenotype closer to the local varieties than to the newly introduced ones, also characterized by a tall plant. This might be explained by it mostly being based on local Myanmar varieties.

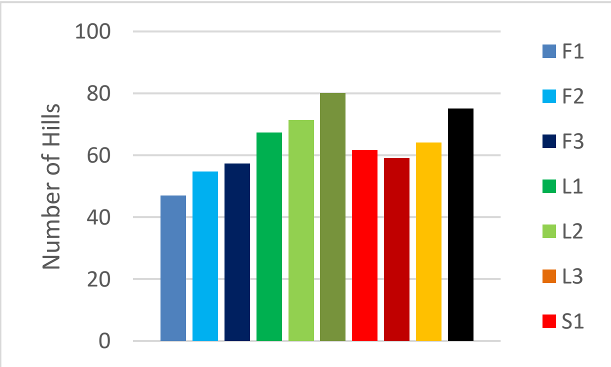


Figure 25 Boyargyi – Average Number of Hills

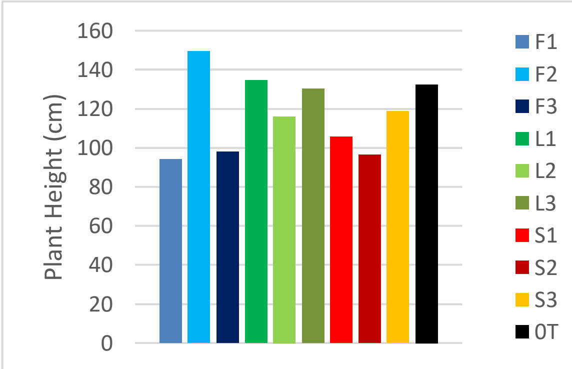


Figure 24 Boyargyi - Average Plant Height

4.3.1.2 Zokekali

The varieties had no significant influence on plant survival in Zokekali. Most of them averaged between 60 and 70 hills (F1 67, L1 69.2, S1 62.8, S2 63.4, S3 69) except for 0T (70.4), L2 (71.8) and L3 (58.6) (Figure 30). A significant influence of the varieties on plant height was observed, with S2 (63.46cm) having lower values than L1 (137.5cm), L2 (132.0cm) and L3 (136.15cm). S1 (69.35cm) was only significantly shorter than L1 and L3 (Table 12). 0T (135.70cm), F1 (96.08cm) and S3 (105.84cm) were not different to any other groups (Figure 31).

Table 12 Significant Differences Zokekali - Number of Hills and Plant Height

Nr. Hills	
Plant Height	S2< L1, L2, L3 S1< L1, L3

The very similar survival rates of all varieties emphasize the complexity of the environmental issues. The salt tolerant varieties and F1 had issues with rodents and the local varieties struggled with salinity and snails at different points throughout the season. The difference in plant height was expected as the newly introduced varieties are characterized by shorter growth. The extremely low values of S1 and S2 might be further explained by the rodent damages that were observed from six weeks onwards. F1 and especially S3 were either able to recover faster after the damages, or were less affected by them.

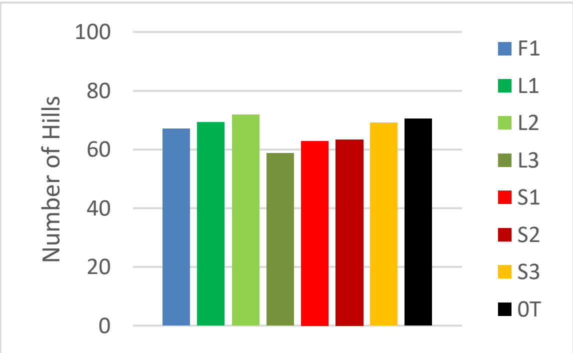


Figure 26 Zokekali - Number of Hills

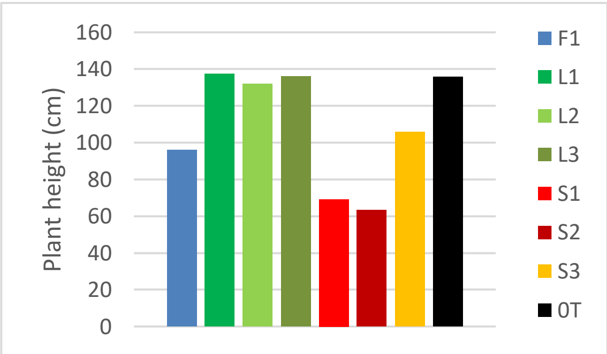


Figure 27 Zokekali - Plant Height

4.3.2 Number of Tillers and Panicles

Figure 28 Plant with Low Competition and High Tiller Count

The yield a variety can produce is directly dependent on the number of tillers and panicles a plant can produce. The influence of the varieties on the number of tillers and panicles per hill has been significant in both villages, but only few groups showed significant differences. Some of these differences may be attributed to low plant density due to damage by snails (Figure 32). The low competition results in plants with above average tiller numbers. Other plots, especially in Zokekali, have been heavily damaged by rodents, decreasing the number of tillers and panicles. This will have a negative impact on the yield of the affected varieties and they will not be able to reach their full potential. More detailed data would be needed to define the environmental factor that has the most influence on the development of tillers and panicles. The transplanting technique used in the Gulf of Mottama places the seedlings lower into the ground than conventional transplanting by hand resulting in lower numbers of tillers. Nutrients might also be a limiting factor and the pressure from pests and diseases probably has a strong impact on the development of the plants. The higher number of tiller in the plots with low competition are not able to compensate for the loss of yield, so directly linking the average number of tillers to yield is not possible. The following chapters will extend on the data in more detail.

4.3.2.1 Boyargyi

There was a significant influence of the varieties on the number of tillers and the number of panicles observed at harvest, but no groups were significantly different from each other in Boyargyi. Significantly more panicles per tiller were observed in L1 (0.98) compared to F2 (0.92) (Table 13). remarkable values are L1 (16.1) S2 (12.44) and 0T (11.12) with high numbers of tillers per hill and L3 (8.56) and S1 (8.64) with the lowest average number of tillers (Figure 33). The same three varieties also had the highest average number of panicles (L1 15.08, S2 12.2, 0T 10.82) while L3 (8.26) and F1 (8.3) had the lowest values. The highest panicles per tiller ratios after L1 were S3 (0.97), L3 (0.96) and F3 (0.96).

Table 13 Significant Differences Boyargyi - Number of Tillers and Panicles

Nr. Tillers	
Nr Panicles	
Panicles per Tiller	F2<L1

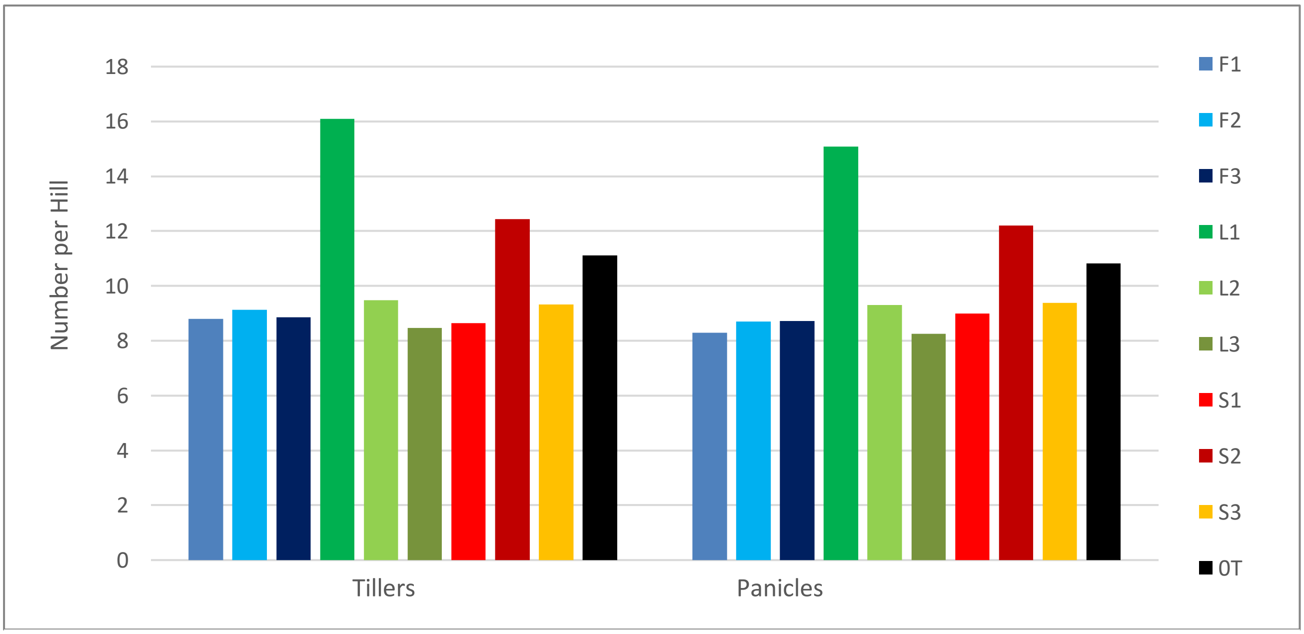


Figure 29 Boyargyi - Number of Tilers and Panicles

4.3.2.2 Zokekali

The varieties had a significant influence on the number of tillers and panicles in Zokekali. As can be seen in Table 14, a lower number of tillers per hill was observed in S3 (9.86) compared to F1 (18.08), while lower numbers of panicles were recorded in S2 (6.66) compared to F1 (12.589 and L1 (12.72). F1 (0.76) developed less panicles per tiller than 0T (0.95), L1 (0.96) and S3 (0.94).

Table 14 Significant Differences Zokekali - Number of Tiller and Panicles

Nr Tillers	S3<F1
Nr. Panicles	S2<F1, L1
Panicles per Tiller	F1<0T, L1, S3

The high tiller values of F1 (Figure 34) can, at least to some extent, be explained by plot number one in Zokekali, where F1 had big losses at early stages through snails. This left few plants that could then grow with little competition and developed many tillers. The nutrients supplied by the soil, added by fertilisation or the plant's capacity to absorb them, where not sufficient to develop panicles in all of the tillers, which might explain the low panicle per tiller values.

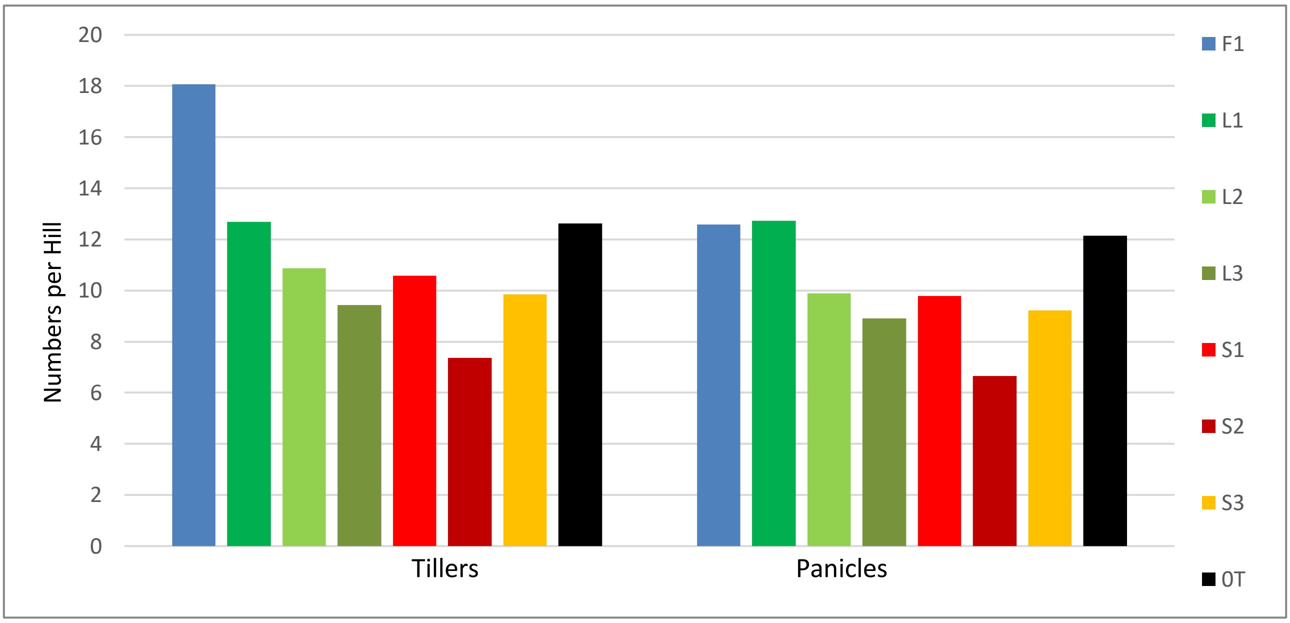


Figure 30 Zokekali - Number of Tillers and Panicles

4.3.3 Panicle Length and Number of Spikelets

The panicle length and number of spikelets are common yield indicators and can be used to explain exceptionally high or low yields. The varieties clearly showed an influence on the characteristics of the flower development in both villages. S3 Sinthwelatt showed good values regarding panicle length and number of spikelts in both villages, while S1 Pyimyanmarsein and S2 IR-11T255 had very low values in Zokekali. This may be due to the rodent damages that occurred when those varieties first flowered. The second generation of panicles that they developed afterwards was a lot smaller and had less grains. In Boyargyi, low values were observed in F1 Swarna Sub-1 which can partly be explained by similar factors (Figure 35). These re-emerged panicles surely did not reach the full potential of the plants and will have led to lower yields. It is unclear whether a later sowing date, resulting in simultaneous flowering times, would have reduced the damage or if the newly introduced varieties are generally more susceptible to rodents and other pests. It is also possible that bigger surfaces of the same variety might have led to lower pressure. Higher yields could be expected from all varieties that were affected by these conditions, but it is unclear how much factors apart the rodents influenced the development of the panicles. Further research is needed to link certain factors or practices to the performance of certain varieties. The results will be presented below.

Figure 31 Damage to Panicles Caused by Insects, Boyargyi

4.3.3.1 Boyargyi

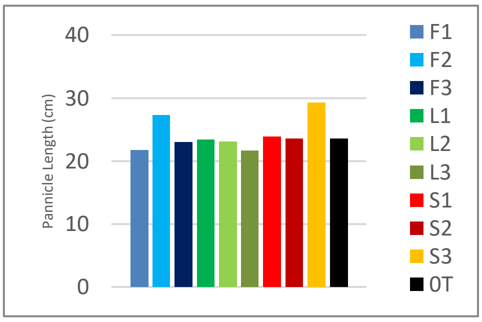


Figure 32 Boyargyi - Panicle Length

The influence of the varieties on the panicle length as well as the number of spikelets was significant (Table 15). The most significant varieties are F1, F2 and S3. F1 (21.72cm) and L3 (23.08) had significantly shorter panicles than F2 (27.28cm) and S3 (29.29 cm). The rest of the varieties had very similar average panicle length, with all varieties except F3 (22.99cm) remaining between 23 and 24 centimetres (Figure 36).

Table 15 Significant Differences Boyargyi - Panicle Length and Number of Spikelets

Panicle Length	F1, L3<F2, S3
Number of Spikelets	F1<F2, S1, S3

A lower number of spikelets was observed in F1 (85.2) compared to F2 (162.14), S1 (162.2) and S3 (165.16). 0T (152.94), S2 (146.8) and S3 (165.16) had average numbers of spikelets above 140, while F3 (106.96), L2 (115.2) and L3 (117.14) remained under this value (Figure 37).

F1 Swarna Sub-1 was the first variety flowering in Boyargyi, which made it susceptible to the same rodent attacks that damaged the trials in Zokekali. Even though the damage was not as severe, it still showed in a significantly smaller panicle being developed after the re-emergence.

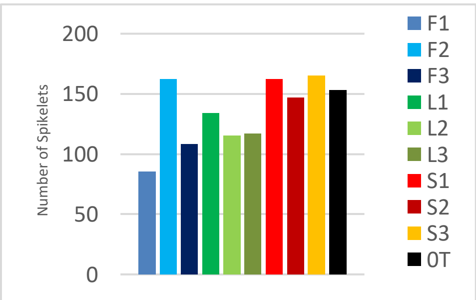


Figure 33 Boyargyi - Number of Spikelets

4.3.3.2 Zokekali

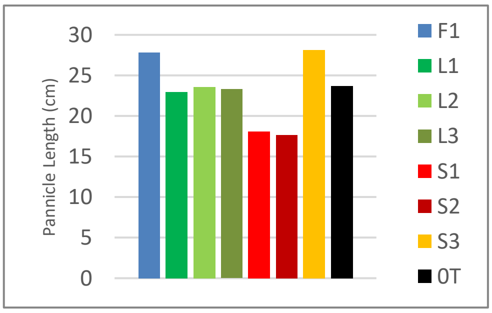


Figure 34 Zokekali - Panicle Length

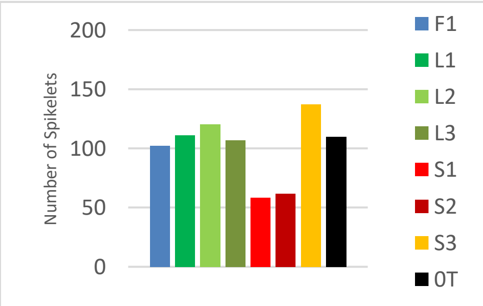


Figure 35 Zokekali - Number of Spikelets

Also in Zokekali the analysis showed a significant influence of the varieties on the panicle length and the number of spikelets per panicle (Table 16). The most noticeable varieties regarding panicle length are L2, S1, S2 and S3. S2 (17.64cm) had significantly smaller panicles than F1 (23.62) and S3 (28.19). S1 (17.64) was only different from S3. The other varieties all had average panicle lengths between 22 and 24 centimetres (Figure 38). S1 (58.04) and S2 (61.76) had less spikelets per panicle than L2 (120.18) and S3 (137.48). F1 (102.26) has the next smallest average number of spikelets with 0T (110.16), L1 (111.26) and L3 (106.92) averaging values close to 110 (Figure 39).

Table 16 Significant Differences Zokekali - Panicle Length and Number of Spikelets

Panicle Length	S2<F1, S3 S1< S3
Number of Spikelets	S1, S2<L2, S3

The two salt tolerant varieties S1 Pyimyanmarsein and S2 IR-11T255 were the two varieties that suffered most from the rodent damages (Figure 40). This had a strong impact on the development of their panicles. As their first panicles had all been destroyed, they had to invest into the development of new, much smaller panicles, that had less spikelets. Even though F1 started to flower earlier, it seemed less affected by this, or was able to recover some of the damage. Especially S3, with the longest panicles and the highest average spikelet count, was clearly less affected by the rodents. The reasons for this selective damage are not entirely clear and the very clear differences between the varieties should be further investigated.

Figure 36 Rodent Damage Plot Number 3, S2, Zokekali

4.3.4 Yield

The yield a variety can achieve is often the most important factor for adoption and is responsible for the food security and/or the income of the farmer. The ten (eight for Zokekali) tested varieties had significantly different yields in the villages, with S3 Sinthwelatt showing the highest average yield in both. L2 Kyarpyan also showed a significantly higher yield in Zokekali, while S2 IR-11T255 had low yields in both environments. The newly introduced varieties, with the exception of S3, were not able to outperform the locally present varieties under the current conditions. S3 Sithwelatt showed consistently good performance throughout all observed parameters, which might be an explanation for its high yield. Even though the local varieties had more or roughly the same number of tillers and panicles, S3 Sinthwelatt had longer panicles with higher numbers of spikelets. The very low number of spikelets observed in S1 and S2 in Zokekali, which may be due to heavy rodent damages, might explain the very low yields obtained for these varieites. The panicle length and number of spikelets of F1 might be inflated due to certain plots with low competition; this may be an explanation for the underperformance of F1 in Zokekali. The low yields of all flooding tolerant varieties in Boyargyi might partly be explained by the low number of hills remaining at harvest. Even though they should be resilient to submergence, the other factors like stagnant water levels, pests and nutrients seem to have outweighed the capacity to tolerate submergence. The very consistent performance of the local varieties can be a hint to why the farmers chose to still cultivate these varieties. They had the highest survival rates in Boyargyi and seemed to be well adapted to the stress prone extensive production present in the Gulf of Mottama. S3 Sinthwelatt seems to be able to reach comparable yields or even outperform the local varieties, but the farmers stated issues with the eating properties of this variety, which may lead to problems regarding its adoption. Further research is needed to assess how the "high-yielding" varieties would perform with different cultivation practice and production intensity. From the obtained results it is not possible to clearly recommend one of the new varieties for the region, as it is unclear whether farmers might accept Sinthwelatt, even though its eating properties are less desired, or change their cultivation practice. The results will be presented below.

4.3.4.1 Boyargyi

The varieties had a significant influence on the yield in Boyargyi. S2 (12.46 basket/acre,0.95 t/ha) showed lower yields than S3 (61.84 basket/acre, 3.38 t/ha) when measured in volume as well as in weight. The local varieties all averaged yields above 2 t/ha (0T 2.57 t/ha, L1 2.08 t/ha, L2 2.94 t/ha, L3 2.56 t/ha) while the remaining varieties averaged between 1.2 and 1.7 tonnes per hectare (F1 1.64 t/ha, F2 1.48 t/ha, F3 1.24 t/ha, S1 1.53 t/ha). It is noteworthy that even though 0T has a higher yield than L3 when compared in weight, the same samples compared in volume benefit L3 (0T 39.92 basket/acre, L3 50.38 basket/acre). This should be kept in mind when calculating weight from volume or vice versa, as often standard conversion rates are used. Some of the millers and most of the farmers still use volume as a measurement for quantity, which is why both values were recorded.

Table 17 Significant Differences Boyargyi - Yield

Basket/Acre	S2<S3
t/ha SP	S2<S3

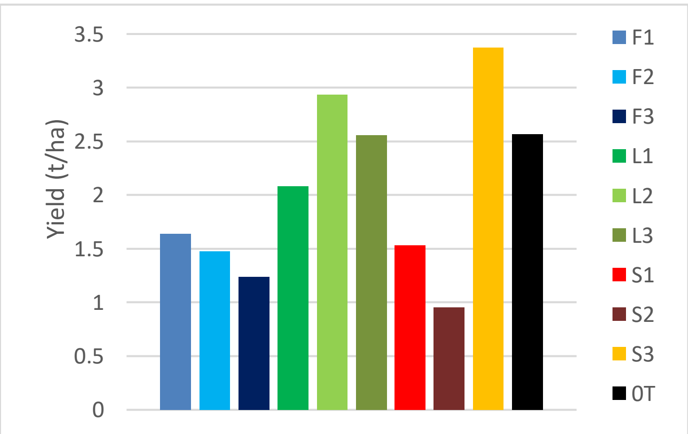


Figure 37 Boyargyi - Yield

4.3.4.2 Zokekali

Table 18 Significant Differences Zokekali - Yield

Basket/Acre	F1, S1, S2<L2, S3
t/ha SP	S2<L2, S3

In Zokekali the analysis of the harvest revealed significant differences between certain varieties (Table 18). Significantly higher yields were reported for L2 (72.61 basket/acre) and S3 (78.35 basket/acre) compared to F1 (21.99 basket/acre), S1 (28.19 basket/acre) and S2(17.69 basket/acre). When comparing the yields in weight, the difference was only S2 (0.99 t/ha) was significantly lower than L2 (3.99 t/ha) and S3 (4.05 t/ha). The local varieties (0T 3.42 t/ha, L1 2.71 t/ha, L3 2.22 t/ha) also averaged yields above 2t/ha in Zokekali, while F1 (1.45 t/ha) and S1 (1.54 t/ha) averaged close to 1.5 t/ha (Figure 42).

It is difficult to say how well the short-cycle varieties would perform if they were flowering at the same time as the other rice plants, or how many other factors apart from the rodents have influenced the yield of F1, S1 and S2. S3 has a phenotype and a growth cycle that are much more like the local varieties but exceeded them in average yield.

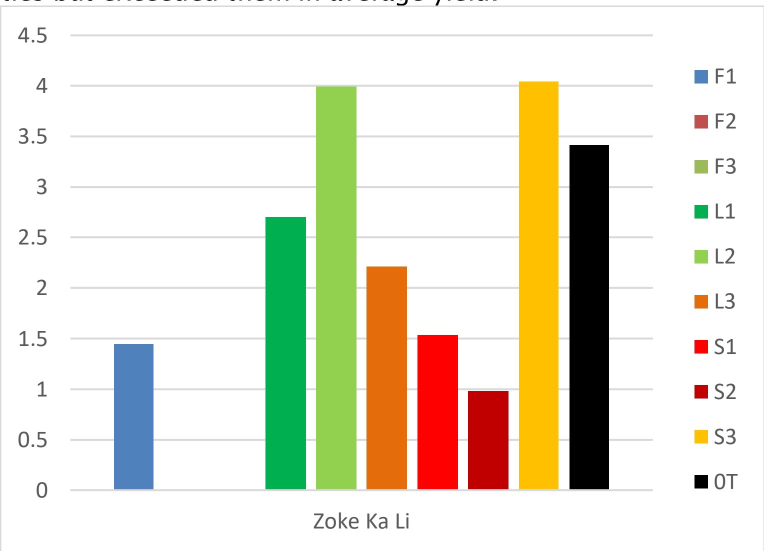


Figure 38 Zokekali - Yield

4.4 Farmer Opinion

4.4.1 Nursery

Two days before transplanting the farmers in both villages were invited to have a look at the nursery and grade the varieties according to their preferences on scale from 1 (worst) to 5 (best). Eleven farmers attended this event in Zokekali (Figure 43), while 14 farmers were present in Boyargyi. As can be seen in Figure 44, F2 and L3 received the highest average "overall" grade of 4.5, shortly followed by F1 (4.36), L1 (4.43) and S1 (4.36) in Boyargyi. The farmers were less content with the performance of F3, compared to the other varieties, giving it an average grade of only 3.79.

Figure 39 Farmer Grading of Nursery Plots, Zokekali

In Zokekali, L1 (4.73) had by far the highest average grade, followed by F1 (4.45), L3 (4.45) and S2 (4.45). S1 was the least popular variety, still reaching an average grade of 4.18 (Figure 45).

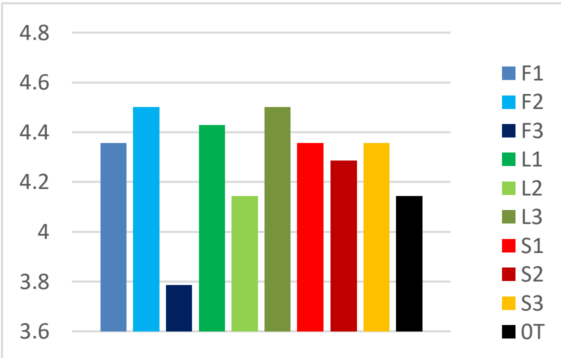


Figure 41 Nursery Overall Impression Grade Average Boyargyi

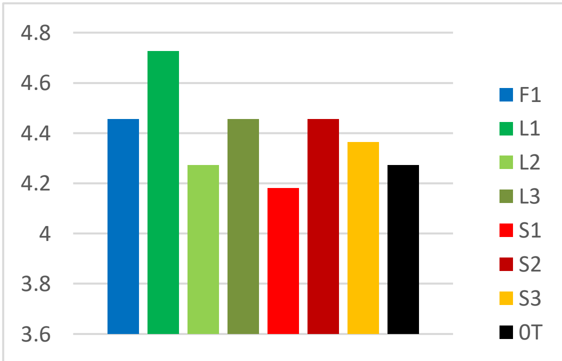


Figure 40 Nursery Overall Impression Grade Average Zokekali

Village	Boyargyi											Zokekali									Ø
Variety	F1	F2	F3	L1	L2	L3	S1	S2	S3	0T	Ø	F1	L1	L2	L3	S1	S2	S3	0T	Ø	Ø
Leaf Colour	3.8	3.5	4.4	3.9	4.3	3.0	4.1	3.7	4.0	3.6	3.8	3.5	4.6	3.8	3.4	3.6	4.0	3.4	3.8	3.8	3.8
Plant Height	4.0	3.5	4.4	3.2	4.3	3.1	3.3	3.4	3.9	3.6	3.7	2.3	3.8	3.1	3.1	1.7	1.7	2.2	3.8	2.7	3.3
Root	3.7	3.5	3.1	3.1	4.1	3.0	4.0	4.1	3.9	3.2	3.6	4.5	3.8	3.5	4.5	3.8	3.6	4.1	3.9	4.0	3.7
Density	4.1	3.2	4.0	3.6	4.4	2.9	3.9	3.7	4.1	3.1	3.7	3.4	4.4	3.2	3.4	3.1	3.8	3.6	3.9	3.6	3.7
Over-all	4.4	4.1	4.5	4.4	4.5	3.8	4.4	4.3	4.4	4.1	4.3	4.5	4.7	4.3	4.5	4.2	4.5	4.4	4.3	4.4	4.3

Remarkable values are the very low grades of the newly introduced varieties regarding plant height, especially in Zokekali (Table 21). F1 (2.27), S1 (1.73), S2 (1.73) and S3 (2.18) all received average grades below 2.5 because of their low plant height. The farmers seem to value a certain plant height before transplanting, or they might like the phenotypes they are used to and interpret the short growth of the other varieties as a weakness. Another aspect that was negatively perceived was the low plant density of L2 (3.18) and S1 (3.09) in Zokekali and of 0T Pawsanyin (3.07) in Boyargyi. Most varieties showed similar grades in both villages, the most notable difference was S1 that received an average grade of 3.82 in Boyargyi, where the dark leaf colour (4.07) and the good root development (4.00) were valued, while it only averaged a grade of 3.07 in Zokekali due to bad grades in plant height and density (1.73/3.09). The overall grades of all varieties were very similar in both villages, wich sugest that there was no distinct preference regarding the varieties. L3 got low values in Boyargyi, which might be explained by its low emergence numbers, but the farmers also didn't like its properties in general. Taller seedling generally got higher grades, but it is unclear whether this is primarily due to the farmers preferring taller seedlings or the objective of the grading being unclear. It is very well possible and probable that certain farmers did not entirely understand the purpose of the grading and were either influenced by other farmers or were confused/overwhelmed by the task given. A good example for this is that the overall grade should normaly represent an average of the four other parameters, but it is usually higher than any of them. The farmers didn't have a lot of experience in observing and grading different varieties. Future gradings should be prepared with an extensive introduction in mind and a local person explaining the purpose of these gradings and how the farmers could benefit from these exercises. It could also be helpful to integrate some farmers in the development of questionaires/grading sheets.

4.4.2 Grading and Yield Estimate Before Harvest

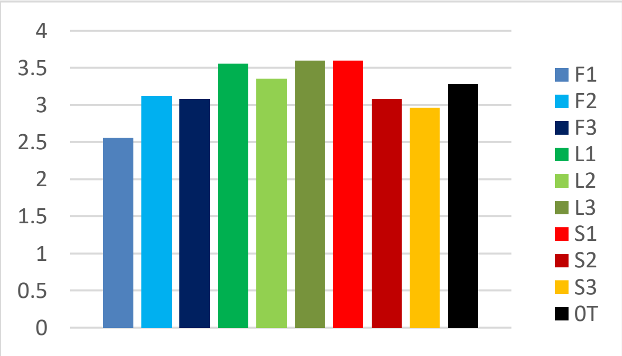


Figure 42 Average Grade Plot Number 3

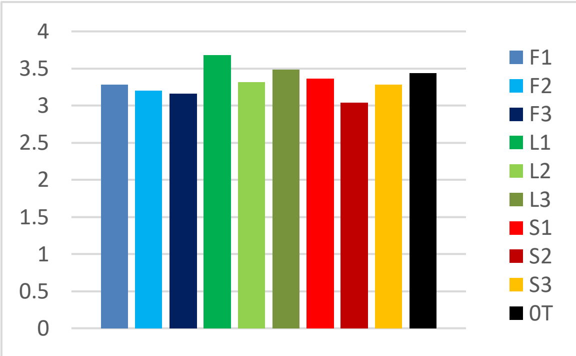


Figure 43 Average Grade Demonstration Plot

During the grading just before harvest, the farmers compared one of the trial plots to the demonstration plot in Boyargyi. The graded the varieties regarding their personal impression and preferences and estimated their yield. As can be seen in Figures 46 and 47, the average grade for most varieties was higher in the demonstration plot than in the trial. Only L2 (3.32/3.36), L3 (3.48/3.6), S1 (3.36/3.6) and S2 (3.04/3.08) obtained higher average values in the trial plot. No variety got considerably lower grades in the demonstration plot compared to the trial plots. Especially the flooding tolerant varieties seemed to leave a better impression in the demonstration plot. No clear favourite can be nominated on the basis of these figures, and it is unclear how the introduction of certain varieties

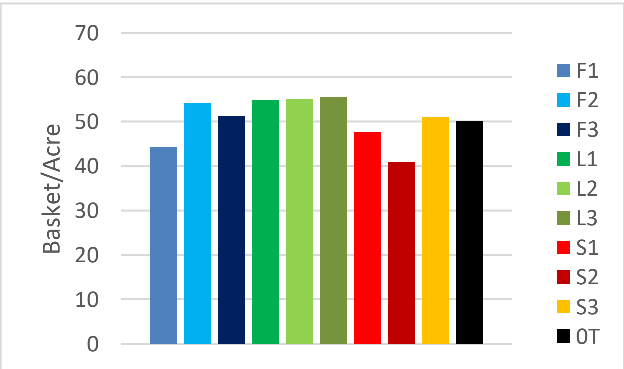


Figure 44 Average Estimated Yield Plot Number 3

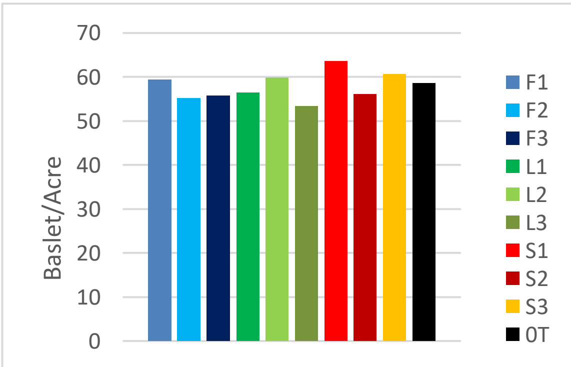


Figure 45 Average Estimated Yield Demonstration Plot

and presentations during the farmer field schools might have influenced the farmers opinion or actions. They stated to be interested in F1 Swarna Sub-1 and S2 IR-11T255 but at the same time gave these two varieties very low grades and a low estimated yield. These two varieties were both mentioned during the farmer field school to explain certain mechanisms and differences. The consistent naming of these varieties together with S3 Sinthwelatt has probably influenced the farmers' opinion. Due to language issues it was not always possible for the researcher to completely understand discussions and/or instructions, this makes it difficult to draw conclusions from this data. Regarding the

estimated yield, a similar but more pronounced tendency was observed (Figure 48, Figure 49). Only for L3 (53.4/55-6) the farmers expected a lower basket per acre yield in the plot established for the farmer field school than in the trial-fields. The biggest differences in estimated yields were observed in 0T (58.6/50.2), F1 (59.4/44.2), S1 (63.6/47.6), S2 (56/40.8) and S3 (60.6/51). The yields estimated by the farmers were very close to each other, which wasn't the case in the actual harvest. Their estimates ranged from 40 basekts/acre to 55 baskets per acre on the trial fields, while the actual yields were between 10 baskets/acre and 63 baskets/acre. The same tendency can be observed in the estimates of the demonstration plot yields. This suggests that the farmers do not often estimate their yields or are only partly able to do it. Together with the observations in the gradings this could lead to the conclusion that farmers do not actively observe their crops and act according to the state of the fields. Many trial fields were never visited throughout the season, which leaves the impression that farmers ae used to a low risk low reward strategy.
The fact, that the farmers estimated an average yield difference of more than 15 baskets per acre for three varieties when comparing the demonstration plot to the trial plots, shows that all farmers seem to be aware of the improved situation in the demonstration plot. Together with Mr. Tun Zaw Htay, who was also leading the farmer field school, the major differences between the trial and the demonstration plot were evaluated. The three factors soil preparation and leveling, transplanting technique (by hand in the demonstration plot) and water management were identified as the main differences in cultivation practice.

Table 20 Farmers Opinion on Changes, Improvements and Issues Regarding Soil Preparation, Transplanting by Hand and Water Managment

Topic (Total 25 Farmers)	Acknowledge Improvement	Have Issues	Issues Stated
Soil Preaparation and leveling	22	15	Investment (8), Machines (6), Drainage (2), Labour (2)
Transplanting by Hand	15	22	Skilful Labour (13), Amount of Labour (6), Deepwater Fields (2)
Water Managment	13	17	Condition of Field (4), No Canal Available (4), Financing/Know-How (4), Weather (2), Deepwater Fields (2)

As illustrated in Table 20, 22 of the 25 participating farmers acknowledged that they could improve their situation by adapting soil preparation and levelling. Fifteen farmers however stated that they would face difficulties to realize such improvements. The most frequently stated issues where the availability of machines (6) and financial support (8). Fifteen farmers acknowledged the benefits of transplanting by hand, but 22 mentioned constraints regarding the adoption of this change. The most prominent ones are the lack of skilled labour (13) and the lack of labour force in general (6). Slightly more than half of the farmers were seeing the benefits of advanced water management, but 17 of the 25 farmers stated problems regarding drainage and water levels. Unsuitable conditions in the fields (4), the lack of a nearby canal (4) and know how as well as financing (4) seem to be the biggest constraints encountered by the farmers when wanting to adapt water management. When asked about the benefits of shorter-cycle varieties, most farmers stated that an earlier harvest would mean more and/or earlier benefits. Other benefits that have been stated in discussions were the possibility to do extended weed management before broadcasting summer paddy or to have sufficient time to clear the fields before sowing green gram, which is usually sown in mid-November. Of the newly introduced varieties, F1 Swarna-Sub1 (22), S1 Pyimyanmarsein (19) and S3 Sinthwelatt (15) were preferred by the farmers. When asked what they expected or would like to see from the project in the next phase, most people stated support regarding inputs (16), technology (10) or finances (7). When asked about their own changes the most prominent theme was that of good quality seed (4), new varieties (5) and seed-multiplication-plots (7). Other farmers stated that they were interested in changing their practice, but that the continuous support and training by the project was important.

4.4.3 Demonstration Plot

Figure 46 Demonstration Plot 14 Weeks after Transplanting

The demonstration plot that was established using the remaining seedlings of the trial nursery was mainly used for teaching purposes during the regularly held farmer field schools. Apart from explanations regarding the trial, exercises to pest, diseases and general crop management were the core activities carried out in this plot. This plot was less affected by rodents than the trial plots (Figure 50). The reasons for this are not entirely clear, but high water levels in the surrounding canal might have stopped the migration of the rodents partly.

Furthermore, the excellent soil preparation, transplanting technique and water management enabled the varieties to realize more of their genetic potential. The data obtained from this plot cannot be used for statistical analysis, as there was no repetition, but it can be used to highlight observed tendencies and differences to the trial. The data will be compared to the values observed in the trial plots in Boyargyi.

The average number of panicles per hill was lower in the demonstration plot (6.92) than in the trials (9.97), but the average number of spikelets per flower was higher (140.17 vs 134.73). The average panicle length was also higher (25.82 cm) compared to the trial plots (24.02 cm). The lower average number of panicles per hill can be explained by a higher remaining hill count in the demonstration plot (85.4 vs 63.7); this increases competition between the individual plants and thus reduce the number of tillers per hill. The varieties that showed the biggest differences in hill count compared to the trials are F1 (47 hills->90 hills), F2 (54.6 hills->87 hills), F3 (57.2 hills->89 hills) and S2 (59 hills->93 hills). 0T (75 hills->79 hills) and S3 (64 hills->77 hills) showed the smallest difference.

Regarding yield, as you can see in Table 21, there were remarkable differences between the trial plots and the demonstration plot. The yield of all varieties was higher in the demonstration plot, except for L1, where the yield obtained in the demonstration plot equalled average the average of the trial plots. F3 (167%), S1 (250%) and S3 (185%) registered more than 150% higher yields than they averaged in the trial. Also, 0T (62%), F1 (50%), F2 (87%) and L3 (54%) showed an increase of 50% or more. Less significant increases compared to the trial plots were observed in L2 (21 %) and S3 (41 %) but these varieties had the highest yield in the trial. These values are only to be understood as reference points to enable a discussion on the influence of cultivation practices on the yields of the rice varieties in this region. They do not represent significant results. The generally higher yields in the demonstration plot show that beneficial circumstances, like soil preparation, transplanting technique and water management, can help the plants achieve higher yields. Even 0T Pawsanyin, that is usually cultivated in both villages, had a substantially higher yield in the demonstration plot. When comparing the yields on volume basis (how rice is usually sold and/or measured in Mon State) the farmer managing the demonstration plot would have harvested 80 % more rice than his peers managing the trial plots. Possibly by only applying certain changes to the cultivation practice. Overall there was an average yield difference of 91 %. As presented in the chapter above some farmers stated constraints regarding the adoption of the changes.

Table 21 Average Yields of the Trial compared to Yields Obtained in the Demonstration Plot

Variety	Yield Trial (basket/acre)	Yield demonstration plot (basket/acre)	Yield trial (t/ha)	Yield demonstration plot (t/ha)	Difference (%) (basket/acre)	Difference (%) (t/ha)
0T	39.9	71.9	2.6	4.2	80	62
F1	23.5	49.8	1.6	2.4	112	50
F2	33.5	48.9	1.5	2.8	46	87
F3	21.7	59.3	1.2	3.2	173	167
L1	34.8	36.3	2.1	2.1	4	0
L2	56.3	64.2	2.9	3.5	14	21
L3	50.4	78.7	2.6	4	56	54
S1	23.6	83.4	1.5	5.25	253	250
S2	12.5	53.0	1.0	2.85	324	185
S3	61.8	87.0	3.4	4.78	41	41

5 Discussion

The conditions in which the farmers cultivate rice in Boyargyi and Zokekali is characterised by very complex combinations of biotic and abiotic stresses. High salt levels in the soil, erratic rainfall, pest and diseases pose challenges to the plants and the farmers. Even though the plots were selected to be as uniform as possible the differences in soil type, nutrients and drainage/water management might have influenced the results. Boyargyi was struck by a heavy flood only two weeks after the trial plots had been transplanted. The flood had visible effects on the rice plants with certain varieties struggling less than others. The local varieties were coping better with the situation than the newly introduced submergence tolerant varieties. Some studies have shown that genotypes expressing the SUB1 gene, as it is the case with F1 Swarna-Sub1, struggle with submergence followed by stagnant flooding as they are inhibited to outgrow the flood. Combining Sub1 with taller traditional varieties or finding a way to enable elongation when partially submerged might alleviate these issues and make Sub-1 varieties more interesting for areas that regularly face stagnant flooding (Jackson and Ismail 2015, Sarkar et al. 2009, Setter and Laurels 1996). As this was the case in Boyargyi, it can explain some of the low yields observed in F1 Swarna-Sub1 particularly At the time of the research it is not clear whether F3 IR 84649 also has the Sub-1 QTL activated, this might partly explain the low yield obtained for this variety. Some newly developed varieties that combine tolerance to submergence and salinity might also be better suited for the conditions in the two villages (Tamang and Fukao 2015).

Figure 48 Plot Number 1, One Week After Flood, Boyargyi

Figure 52 Plot Number 1, Two Weeks After Flood, Boyargyi

Figure 47 Plot Number 1, Four Weeks After Flood, Boyargyi

Figure 54 Plot Number 1, Eight Weeks After Flood, Boyargyi

In Zokekali the short-cycle varieties flowered before any other fields started flowering. This attracted rodents that caused serious damage to the plants. It is unclear how much these damages can be reduced by seeding later, in order to align the flowering with the local varieties, or by having bigger fields, where the impact of the rodents is less devastating. It is also not possible to assess whether the short growth habit of these varieties further worsened the situation. The damages by rodents delayed the short-cycle varieties and forced them to re-establish tillers and panicles, which resulted in smaller flowers with less spikelets. This reduced grain production and high numbers of dead plants seem to be the main reasons for the low yields of F1 Swarna-Sub1, F3 IR-84649, S1 Pyimyanmarsein and S2 IR-11T255. F2 Mekyut and S3 Sinthwelatt were less or not affected by these rodent damages, as they have longer growth cycles than the previously mentioned varieties.

Figure 49 Snail in Zokekali

The varieties possibly suffered from nutrient deficiencies as the cultivation approach practiced by the farmers in Boyargyi an Zokekali is very extensive. The amounts of fertilizer, especially of nitrogen, applied might limit the productivity of certain varieties. Very little, if any at all, weeding is done and the land preparation/levelling is very basic. When the trial plots were transplanted in Boyargyi, very little other rice fields had allready been transplanted, which means that the pressure from snails was probably higher than it was to be expected (Figure 55). Towards the end of the cropping season, some damages by ruminants grazing in the fields were also observed (Figure 56).

Figure 50 Damage by Ruminants in Boyargyi

The local varieties seemed to generally cope better with these conditions. The variety that performed best throughout both villages was S3 Sinthwelatt. It was the only newly introduced variety that was able to compete with the traditional varieties (0T Pawsanyin, L1 Baygyar, L2 Kyarpyan, L3 Taungpyan) and even outperform them. Some farmers have expressed that they are not entirely satisfied by the eating properties of S3 Sinthwelatt, which might be a constraint for adoption of this variety (Htay 2017). S3 and the local varieties were very consistent throughout all collected parameters. S3 Sinthwelatt had good values regarding the panicle length and the number of spikelets, which is where it outperformed the local varieties. The consistency and stability of the local varieties is what makes them optimal for the region and explains why the farmers are still cultivating these varieties. Under the current conditions and with the current practice of leaving the plants on the field until harcest it makes sense to use a variety that copes well with a low risk low reward strategy. S3 Sinthwelatt might be even better for this situation, but issues regarding its eating properties have to be clarified before promoting this variety on a larger scale.

Figure 51 Grading of Demonstration Plots with Farmers from Different Villages

The demonstration plot that was established in Boyargyi showed that under beneficial circumstances the new varieties can express more of their potential. The farmer that was taking care of the demonstration plot had been working with the project for some time and was known to have exemplary management. Furthermore, this field was located close to his home, which made regular observations more convenient. No variety performed worse in the demonstration plot compared to their averages in the trial. 250% more yield was observed in S1 IR-11T255, which was the highest yield. 0T Pawsanyin, which should be well adapted to the conditions in the field, showed a yield improvement by more than 60%. The plants averaged close to double the yield. Most of this improvement can be attributed to a thorough soil preparation with decent levelling, transplanting by hand and water management through drainage. The farmers participating in the farmer field schools and gradings seemed interested by the benefits of an improved cultural practices (Figure 57).

The data collected during this trial is not detailed enough to draw precise conclusions regarding the influence of cultivation practices on the yield of varieties. The farmers seemed interested by the results they observed in the demonstration plot and were mostly keen on adapting new techniques and technologies. However, the current situation regarding infrastructure, work and markets in Mon State poses some constraints to the adoption of new cultivation practices. The main factors limiting change are mechanisation for soil preparation, labour for transplanting, and a functioning close-by canal or drainage system for water management.

6 Conclusions

The salt tolerant variety S3 Sinthwelatt shows potential to improve the yields in Boyargyi and Zokekali. The variety was able to cope well with an environment majorly affected by salinity, as was the case in Zokekali, and one affected by flooding. Issues regarding its eating properties must be considered when promoting its adoption. Some of the other newly introduced varieties showed potential in a demonstration plot with improved cultivation practice, but will not be able to improve the situation in the two villages without adaptions in crop management. The local varieties seem to be generally better adapted to the prevailing conditions in the fields.

Further research is necessary to determine the major issues and limitations in the agricultural system. Trials researching different cultivation intensities and systems could allow for more precise conclusions and recommendations regarding soil preparation, transplanting and water management.

The farmers seem interested in new varieties and practices and are keen on continuing the cooperation with the project. The extension provided by the project is appreciated. It is important to consider whether the additional investments, be it money or labour, can be compensated by the increase in yield.

7 References

Akinwale MG, Akinyele B O, Odiyi A C, Osekita O S, Gregorio G, 2015. Inheritance of Submergence Tolerance in Lowland Rice Varieties. Donnish Journal of Agricultural Research, 2 (9), P. 77-80.

Denning G, Baroang K, Sandar T M, 2013. Background Paper No.2 Rice Productivity Improvement in Myanmar. United States Agency for international Development (USAID) Burma, Yangon, 34 P.

Fukao T, Yeung E, Bailey-Serres J, 2011. The Submergence Tolerance Regulator SUB+A Mediates Cross-talk between Submergence and Drought Tolerance in Rice. The Plant Cell, 23 (1), P. 412-427.

Gregorio F B, Islam M R, Vergara G V, Thirumeni S, 2013. Recent Advances in Rice Science to Design Salinity and other Abiotic Stress Tolerant Rice Varieties. SABRAO Journal of Breeding and Genetics, 45 (1), 31-41.

Helvetas Swiss Intercooperation (HSI) Myanmar, 2015. Project Document for Main Pahse15-September 2015 to April 2018. Helvetas Swiss Intercooperation (HSI) Myanmar, Yangon, 108 P.

Hom N H; Htwe N M, Hein Y, Than S M, Kywe M, Htut T, 2015. Myanmar Climate-Smart Agriculture Strategy. Ministry of Agriculture and Irrigation, Nyapyidaw, 44 P.

Horie T, Karahara I, Katsuhara M, 2012. Salinity Tolerance Mechanisms in Glycophytes: An Overview with the Central Focus on Rice Plants. Rice, 5 (1), P. 11-28.

Htay T Z, 2017. Livelihood Officer CLCMGoMP, personal supervisor and local expert

International Rice Research Institute (IRRI), 1986. Progress in Rainfed Lowland Rice. Retrieved on 30.1.2018,

International Rice Research Institute (IRRI), 2014. Wild Parent Spawns Super Salt-tolerant Rice. 4.15.2013, retrieved on 7.8.2017, http://ricetoday.irri.org/wild-parent-spawns-super-salt-tolerant-rice

International Rice Research Institute (IRRI), 2015. A Sucessful Salt-tolerant Rice Variety in Sreefalkathi Village. 8.6.2015, retrieved the 7.8.2017, http://strasa.irri.org/news-and-events/salt-tolerantricevarietysuccessstoryofsreefalkathivillage

International Rice Research Institute (IRRI), 2016a. Myanmar All Set to Adopt Climate-Smart Strategies in Agriculture. 4.1.2016, retrieved the 8.7.2017, http://ricetoday.irri.org/myanmar-ready-to-adopt-climate-smart-strategies-in-agriculture

International Rice Research Institute (IRRI), 2016b. Myanmar Partners Produce High-Yielding Salinity-Tolerant Rice Varieties. 6.8.2016, retrieved the 8.7.2017, http://ricetoday.irri.org/myanmar-partners-produce-high-yielding-salinity-toleran-rice-varieties

IUCN, 2017. Conserving wetlands in Myanmar: Gulf of Mottama is Myanmar's fourth Ramsar site. International Union for Conservation of Nature, 16.5.2017, retrieved the 30.1.2018, https://www.iucn.org/news/myanmar/201705/conserving-wetlands-myanmar-gulf-mottama-myanmar%E2%80%99s-fourth-ramsar-site

Islam M R, Gregorio G B, 2013. Progress of Salinity Tolerant Rice Variety Development in Bangladesh. SABRAO Journal of Breeding and Genetics, 45 (1), P. 21-30.

Jackson M B, Ismail A M, 2015. Introduction to the Special Issue: Electrons, Water and Rice Fields: Plant Response and Adaption to Flooding and Submergence Stress. AoB Plants, 7, P. 78-88.

Kato Y, Collard B C Y, Septiningsih E M, Ismail A M, 2014. Physiological Analyses of Traits Associated with Tolerance of Long-Term Partial Submergence in Rice. AoB Plants, 6, P. 58-68.

Kawano N, Ito O, Sakagami J I, 2008. Morphological and Physiological Response of Rice Seedlings to Complete Submergence (Flash Flooding). Annals of Botany, 103 (2), P. 161-169.

McKinley J, Adaro C, Pede V, Setiyono T, Aung N M, Htwe N M, Nyo M H, Tha S M, Hom N H, Swe K L, 2015. The Current State of Climate Change Perceptions and Policies in Myanmar: 2014 Report. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Copenhagen, 30 P.

Munns R, Tester M, 2008. Mechanisms of Salinity Tolerance. Annual Review of Plant Biology, 59 (1), P. 651-681.

Naing T A A, Kingsbury A J, Buerkert Am Finckh M R, 2008. A Survey of Myanmar Rice Production and Contraints. Journal of Agriculture and Riral Development in the Tropics and Subtropics (JARTS), 109 (2), P. 151-168.

Paris T R, Manzanilla D, Tatlonghari G, Labios R, Cueno A, Villanueva D, 2011. Guide to Participatory Varietal Selection for Submergence-Tolerant Rice. International Rice Research Institute (IRRI), Los Baños, 120 P.

Platten J D, Egdane J A, Ismail A M, 2013. Salinity Tolerance, Na+ Exclusion and Allele mining of HKT1; 5 in Oryza sativa and O. glaberrima: Many Sources, many Genes, one Mechanism? BMC Plant Biology, 13 (1), 32-48.

Plett D, Safwat G, Gilliham M, Skrumsager-Moller I, Roy S, Shirley N, Jacobs A, Johnson A, Teste M, Rahman A, 2010. Improved Salinity Tolerance of Rice Through Cell Type-Specific Expression of AtHKT1;1. Retrieved the 6.8.2017, http://dx.plos.org/10.1371/journal.pone.0012571

Rad H E, Aref F, Khaledian M, Rezaei M, Amiri E, Falakdehy O Y, 2011. The Effects of Salinity at Different Growth Stages on Rice Yield. International Congress on Irrigation and Drainage, Teheran, 12 P.

Rahman M A, Thant A A, Win M, Tun M S, Moet P, Thu A M, Win K T, Myint T, Myint O, Tuntun Y, Labios R V, Casimero M C, Gregorio G B, Johnson D E, Singleton G R, Singh R K, 2015. Participatory Varietal Selection (PVS): A “Bottom-Up” Approach Helps Rice Farmers in the Ayeyarwady Delta, Myanmar. SABRAO Journal of Breeding and Genetics, 57 (3), P. 299-314.

Ray P K S, Islam M A, 2008. Genetic Analysis of Salinity Tolerance in Rice. Bangladesh Journal of Agricultural Research, 33(4), P. 519-529.

Sarkar R K, Panda D, Reddy J N, Patnaik S S C, Mackill D J, Ismail A M, 2009. Performance of Submergence Tolerant Rice (Oryza sativa) Genotypes Carrying the Sub1 Quantitative Trait Locus Under Stressed and Non-Stressed Natural Field Conditions. Indian Journal of Agricultural Sciences, 79(11), P. 876-883.

Setter T L, Laureles E V, 1996. The Beneficial Effect of Reduced Elongation Growth on Submergence Tolerance of Rice. Journal of Experimental Botany, 47 (10), P. 1551-1559.

Singh R K, Redoña E, Gregorio F B, Salam M A, Islam M R, Singh D P, Sen P, Saha S, Mahata K R, Sharma S G, Pandey M P, Sajise A G, Mendoza R D, Toledo M C, Dante A, Ismail A M, Paris T R, Haefele S M, Thomson M J, Zolvinski S, Singh Y P, Nayak A K, Sing R B, Mishara V K, Sharma D K, Gautam R K, Ram P C, Singh P N, Verma O P, Singh A, Lang NT, 2010. The Right Rice in the Right Place: Systematic Exchange and Farmer-based Evaluation of Rice Germplasm for Salt-affected Areas. In: Hoanh C T, Szuster B W, Suan-Pheng K, Ismail A M, Noble A D (eds.) Tropical Deltas and Coastal Zones – Food Production, Communities and Environment at the Land-Water Interface. CAB International, Oxfordshire, P. 166-182.

Singh U S, Dar M H, Singh S, Zaidi N W, Bari M A, Mackill D J, Collard B C Y, Singh VN, Singh J P, Reddy J N, Singh R K, Ismail A M, 2013. Field Performance, Dissemination, Impact and Tracking of Submergence Tolerant (Sub1) Rice Varieties in South Asia. SABRO Journal of Breeding and Genetics, 45 (1), P. 112-131.

Stads G J, Kam P S, 2007. Myanmar, Agricultural Science and Technology Indicators (ASTI) Country Brief. Consultative Group on International Agricultural Research (CGIAR), retrieved the 8.7.2017, https://www.asti.cgiar.org/pdf/myanmar_CB38.pdf

Tamang B, Fukao T, 2015. Plant Adaptation to Multiple Stresses during Submergence and Following Desubmergence. International Journal of Molecular Sciences, 16 (12), P. 30164-30180.

Thi-Lang N, Thanh N C, Buu, B C, Ismail A, Thi-Be-Tu P, 2009. Genetic Diversity of Salt Tolerance Landraces in Vietnam. Journal of Plant Breeding and Crop Science, 1 (5), P. 230-243.

Thomson M J, Ocampo M, Egdane J, Rahman MA, Sajise A G, Adorada D L, Tumimbang-Raiz E, Blumwald E, Seraj Z I, Singh R K, Gregorio G B, Ismail A M, 2010. Characterizing the Saltol Quantitative Trait Locus for Salinity Tolerance in Rice. Rice, 3 (2-3), P. 148-160.

Watling K, 2007. Measuring Salinity. Queensland Government Natural Resources and Water, Queensland, 2 P.

Wattana P, Maysaya T, 2008. Effect of Salinity Stress on Growth and Carbohydrate Metabolism in three Rice (Oryza staiva L.) cultivars differing in salinity tolerance. Indian Journal of Experimental Biology, 46, P. 736-742.

Wongton P, True J, 2015a. Non-Fishery Value Chain Study Report (CLCMGoMP). Helvetas Swiss Intercooperation (HSI) Myanmar, Yangon, 60 P.

Wongton P, True J, 2015b. Updated Situation Analysis of the Gulf of Mottama. Swiss Agency for Development and Cooperation, Bern, 35 P.

Xiong H, Li J, Liu P, Duan J, Zhao Y, Guo X, Li Y, Zhang H, Ali J, Li Z, Yang H, 2014. Overexpression of OsMYB48-1, a Novel MYB-Related Transcription Factor, Enhances Drought and Salinity Tolerance in Rice. PloS ONE, retrieved the 6.8.2017, http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0092913

Yl M M, Tun A, Mar A A, Yee K, Singleton G R, 2010. Dissemination Integrated Natural Resource Management for Lowland Rice in Myanmar. In: Palis F G, Singleton G R, Casimero M C, Hardy B (eds.). Research to Impact: Case Studies for Natural Resource Managment For Irrigated Rice in Asia. International Rice Research Institute, Los Baños, P. 67-80.

Yoshida S, 1981. Fundamentals of Rice Crop Science. International Rice Research Institute, Los Baños, 279 P.

Zhang Y, Wang Z, Li L, Zhou Q, Xiao Y, Wei X, Zhou M, 2015. Short-term Complete Submergence of Rice at the Tillering Stage Increases Yield. PloS ONE, retrieved the 6.8.2017, http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0127982

Acknowledgements

First and foremost, I want to thank HAFL and Helvetas for the possibility to work in the CLCMGoMP and conduct this research. Special thanks go out to: Peter Schmidt, Jos van der Zanden, Than Htike Aung and Tun Zaw Htay for supervising me in Myanmar during this time; to Win Htun, Saw Pho Sa, Zin Htoo Nai, A Linn Yaung and Kyaw Zin Win for helping me with the data collection; and to Alessandra Giuliani and Christoph Studer for supporting me from Yangon and Bern respectively.

Benjamin Pablo Jungblut

Appendix

Table of Contents

Results Statistical Analysis Nursery

Emergence

Boyargyi:

Summary:

Date/Days after seeding	ANOVA significant (10 factors)	Significant diferences
1/4	Yes ($F_{9,40}$=8.12, p<0.01)	F3, L2<0T,F1, L1, S3
2/7	Yes ($F_{9,40}$=7.49, p<0.01)	F3<0T, F1, L1, S3 L2<0T, F1
3/9	Yes ($F_{9,40}$= 7.50, p<0.01)	F3<0T, L1, S3 L2<0T
4/11	Yes ($F_{9,40}$=6.08, p<0.01)	F3<0T, F1 L2<0T
5/14	Yes ($F_{9,40}$=6.60, p<0.01)	F3, L2<0T, F1
6/16	Yes ($F_{9,40}$=6.67, p<0.01)	F3<0T, F1 L2<0T
7/18	Yes ($F_{9,40}$=6.46, p<0.01)	F3<0T, F1 L2<0T
8/21	Yes ($F_{9,40}$=6.68, p<0.01)	F3, L2<0T, F1
9/23	Yes ($F_{9,40}$=7.65, p<0.01)	F3< 0T, F1, L1 L2< 0T, F1
10/25	Yes ($F_{9,40}$=7.18, p<0.01)	F3, L2<0T, F1

Date 1:

Analysis of Variance Report

Page/Date/Time 1 06.10.2017 11:13:39
Database Z:\Users\Benjamin\Documents\ ... n\NCSS\Emergence-Boyargyi.S0
Response Emergence_Rate_Date_1

Tests of Assumptions Section

Assumption	**Test Value**	**Prob Level**	**Decision (0.05)**
Skewness Normality of Residuals	-0.5272	0.598064	Accept
Kurtosis Normality of Residuals	-0.0907	0.927695	Accept
Omnibus Normality of Residuals	0.2862	0.866684	Accept
Modified-Levene Equal-Variance Test	1.7617	0.106651	Accept

Box Plot Section

Analysis of Variance Table

Source Term	**DF**	**Sum of Squares**	**Mean Square**	**F-Ratio**	**Prob Level**	**Power (Alpha=0.05)**
A: Variety	9	31781.35	3531.261	8.12	0.000001*	0.999991
S(A)	40	17403.69	435.0923			
Total (Adjusted)	49	49185.04				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_1
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=435.0923 Critical Value=4.3722

Group	**Count**	**Mean**	**Different From Groups**
Flodding 3 IR-84649.1295.30	5	5.876777	Local 1 Baygyar, Salt 3 Sinthwelatt Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	9.523809	Salt 3 Sinthwelatt Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	35.59472	
Local 3 Taungpyan	5	54.85437	
Salt 2 IR-11T225	5	55.29914	
Salt 1 Pyimyanmarsein	5	58.27715	
Local 1 Baygyar	5	67.09677	Flodding 3 IR-84649.1295.30
Salt 3 Sinthwelatt	5	69.14286	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan
Flodding 1 Swarna Sub-1	5	70.33708	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan
Zero Treatment Pawsanyin	5	87.26495	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 2:

Analysis of Variance Report

Page/Date/Time	1 06.10.2017 11:15:13
Database	Z:\Users\Benjamin\Documents\ ... n\NCSS\Emergence-Boyargyi.S0
Response	Emergence_Rate_Date_2

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.2461	0.805639	Accept
Kurtosis Normality of Residuals	-0.1282	0.897960	Accept
Omnibus Normality of Residuals	0.0770	0.962237	Accept
Modified-Levene Equal-Variance Test	2.0109	0.063445	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	36477.59	4053.065	7.49	0.000003*	0.999968
S(A)	40	21632.25	540.8062			
Total (Adjusted)	49	58109.84				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_2
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=540.8062 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	6.729858	Salt 3 Sinthwelatt, Local 1 Baygyar Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	13.2381	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	40.17621	
Salt 1 Pyimyanmarsein	5	60.52435	
Local 3 Taungpyan	5	62.03883	
Salt 2 IR-11T225	5	68.03419	
Salt 3 Sinthwelatt	5	72.85714	Flodding 3 IR-84649.1295.30
Local 1 Baygyar	5	74.59677	Flodding 3 IR-84649.1295.30
Flodding 1 Swarna Sub-1	5	79.32584	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan
Zero Treatment Pawsanyin	5	93.76068	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 3:

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.5159	0.605908	Accept
Kurtosis Normality of Residuals	0.7902	0.429410	Accept
Omnibus Normality of Residuals	0.8906	0.640634	Accept
Modified-Levene Equal-Variance Test	1.5802	0.154480	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	32101.49	3566.833	7.50	0.000002*	0.999969
S(A)	40	19021.77	475.5443			
Total (Adjusted)	49	51123.27				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_3
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=475.5443 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	7.014218	Salt 3 Sinthwelatt, Local 1 Baygyar Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	16.85714	Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	38.59031	
Salt 1 Pyimyanmarsein	5	46.14232	
Salt 2 IR-11T225	5	63.50427	
Flodding 1 Swarna Sub-1	5	65.01873	
Local 3 Taungpyan	5	66.79612	
Salt 3 Sinthwelatt	5	71.71429	Flodding 3 IR-84649.1295.30
Local 1 Baygyar	5	76.20968	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	5	90.76923	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 4:

Analysis of Variance Report

Page/Date/Time 1 06.10.2017 11:17:44
Database Z:\Users\Benjamin\Documents\ ... n\NCSS\Emergence-Boyargyi.S0
Response Emergence_Rate_Date_4

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-0.1461	0.883858	Accept
Kurtosis Normality of Residuals	0.2009	0.840798	Accept
Omnibus Normality of Residuals	0.0617	0.969626	Accept
Modified-Levene Equal-Variance Test	1.6643	0.130264	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	30238.02	3359.78	6.08	0.000024*	0.999537
S(A)	40	22117.83	552.9457			
Total (Adjusted)	49	52355.84				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_4
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=552.9457 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	5.781991	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	14.66667	Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	41.14537	
Salt 1 Pyimyanmarsein	5	56.10487	
Salt 2 IR-11T225	5	59.23077	
Local 3 Taungpyan	5	64.56311	
Salt 3 Sinthwelatt	5	68.19048	
Local 1 Baygyar	5	69.91936	
Flodding 1 Swarna Sub-1	5	79.10112	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	5	81.96581	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 5:

Analysis of Variance Report

Page/Date/Time 1 06.10.2017 11:18:49
Database Z:\Users\Benjamin\Documents\ ... n\NCSS\Emergence-Boyargyi.S0
Response Emergence_Rate_Date_5

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.2789	0.780343	Accept
Kurtosis Normality of Residuals	0.4072	0.683878	Accept
Omnibus Normality of Residuals	0.2436	0.885342	Accept
Modified-Levene Equal-Variance Test	1.7539	0.108394	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	35674.23	3963.803	6.60	0.000010*	0.999824
S(A)	40	24021.97	600.5492			
Total (Adjusted)	49	59696.19				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_5
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=600.5492 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	6.635071	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	14.57143	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	42.73128	
Salt 1 Pyimyanmarsein	5	60.74907	
Salt 3 Sinthwelatt	5	67.80952	
Salt 2 IR-11T225	5	68.03419	
Local 3 Taungpyan	5	69.32039	
Local 1 Baygyar	5	71.45161	
Flodding 1 Swarna Sub-1	5	82.69663	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan
Zero Treatment Pawsanyin	5	93.4188	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 6:

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.3281	0.742807	Accept
Kurtosis Normality of Residuals	0.2594	0.795349	Accept
Omnibus Normality of Residuals	0.1749	0.916242	Accept
Modified-Levene Equal-Variance Test	1.6865	0.124490	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	40087.48	4454.165	6.67	0.000009*	0.999845
S(A)	40	26725.43	668.1357			
Total (Adjusted)	49	66812.91				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_6
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=668.1357 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	6.919431	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	15.42857	Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	43.70044	
Salt 1 Pyimyanmarsein	5	61.27341	
Salt 2 IR-11T225	5	68.20513	
Salt 3 Sinthwelatt	5	70.66666	
Local 3 Taungpyan	5	73.20388	
Local 1 Baygyar	5	75.72581	
Flodding 1 Swarna Sub-1	5	83.37079	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	5	102.3932	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Date 7:

Analysis of Variance Report

Page/Date/Time	1 06.10.2017 11:21:06
Database	Z:\Users\Benjamin\Documents\ ... n\NCSS\Emergence-Boyargyi.S0
Response	Emergence_Rate_Date_7

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-0.1161	0.907574	Accept
Kurtosis Normality of Residuals	0.1896	0.849648	Accept
Omnibus Normality of Residuals	0.0494	0.975595	Accept
Modified-Levene Equal-Variance Test	1.6476	0.134759	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	36200.47	4022.275	6.46	0.000013*	0.999770
S(A)	40	24916.39	622.9097			
Total (Adjusted)	49	61116.86				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_7
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=622.9097 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	6.445498	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	15.52381	Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	43.43612	
Salt 1 Pyimyanmarsein	5	54.60674	
Salt 2 IR-11T225	5	65.21368	
Salt 3 Sinthwelatt	5	67.2381	
Local 3 Taungpyan	5	72.52427	
Local 1 Baygyar	5	73.30645	
Flodding 1 Swarna Sub-1	5	81.04869	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	5	95.9829	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 8:

Analysis of Variance Report

Page/Date/Time	1 06.10.2017 11:22:18
Database	Z:\Users\Benjamin\Documents\ ... n\NCSS\Emergence-Boyargyi.S0
Response	Emergence_Rate_Date_8

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-0.0527	0.957934	Accept
Kurtosis Normality of Residuals	-0.0776	0.938140	Accept
Omnibus Normality of Residuals	0.0088	0.995607	Accept
Modified-Levene Equal-Variance Test	1.6245	0.141236	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	37023.8	4113.755	6.68	0.000009*	0.999848
S(A)	40	24637.44	615.9359			
Total (Adjusted)	49	61661.23				
Total	50					

* Term significant at alpha = 0.05

Means and Effects Section

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_8
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=615.9359 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	14.69194	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	16.19048	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	50.39648	
Salt 3 Sinthwelatt	5	65.71429	
Salt 1 Pyimyanmarsein	5	66.21723	
Salt 2 IR-11T225	5	67.52137	
Local 3 Taungpyan	5	73.59223	
Local 1 Baygyar	5	77.25806	
Flodding 1 Swarna Sub-1	5	92.28465	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan
Zero Treatment Pawsanyin	5	101.8803	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 9:

Analysis of Variance Report

Page/Date/Time	1 06.10.2017 11:23:22
Database	Z:\Users\Benjamin\Documents\ ... n\NCSS\Emergence-Boyargyi.S0
Response	Emergence_Rate_Date_9

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.4252	0.670686	Accept
Kurtosis Normality of Residuals	0.7954	0.426368	Accept
Omnibus Normality of Residuals	0.8135	0.665812	Accept
Modified-Levene Equal-Variance Test	1.5008	0.181068	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	31517.15	3501.905	7.63	0.000002*	0.999976
S(A)	40	18350.53	458.7633			
Total (Adjusted)	49	49867.68				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_9
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=458.7633 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	11.94313	Local 1 Baygyar, Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	15.80952	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	50.39648	
Salt 3 Sinthwelatt	5	60.66667	
Salt 1 Pyimyanmarsein	5	67.26591	
Salt 2 IR-11T225	5	67.52137	
Local 3 Taungpyan	5	70.97087	
Local 1 Baygyar	5	72.66129	Flodding 3 IR-84649.1295.30
Flodding 1 Swarna Sub-1	5	83.97004	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan
Zero Treatment Pawsanyin	5	91.45299	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 10:

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-0.0594	0.952672	Accept
Kurtosis Normality of Residuals	0.0784	0.937486	Accept
Omnibus Normality of Residuals	0.0097	0.995175	Accept
Modified-Levene Equal-Variance Test	1.3830	0.228144	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	26807.59	2978.621	7.18	0.000004*	0.999942
S(A)	40	16593.13	414.8282			
Total (Adjusted)	49	43400.72				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_10
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=414.8282 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	12.60664	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Local 2 Kyarpyan	5	14.66667	Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin
Flodding 2 Mekyut	5	46.25551	
Salt 3 Sinthwelatt	5	57.80952	
Salt 1 Pyimyanmarsein	5	63.07116	
Local 1 Baygyar	5	65.48387	
Salt 2 IR-11T255	5	65.89744	
Local 3 Taungpyan	5	67.57281	
Flodding 1 Swarna Sub-1	5	76.32959	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan
Zero Treatment Pawsanyin	5	85.81197	Flodding 3 IR-84649.1295.30 Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Zokekali:
Summary

Date/Days after seeding	ANOVA significant (10 factors)	Significant diferences
1/4	Yes ($F_{9,40}$=14.04, p<0.01)	F2, F3, L2<L1, L3, S1, S3
2/7	Yes ($F_{9,40}$=15.35, p<0.01)	F2, F3, L2<F1, L1, L3, S1, S2, S3
3/9	Yes ($F_{9,40}$= 15.98, p<0.01)	F2, F3<L1, L3, S1, S2, S3 L2<L1, L3
4/11	Yes ($F_{9,40}$=14.93, p<0.01)	F2, F3<L1, L3, S1, S2, S3 L2<L1, L3
5/14	Yes ($F_{9,40}$=13.57, p<0.01)	F2, F3<L1, L3, S1, S2, S3 L2<L1, L3
6/16	Yes ($F_{9,40}$=12.05, p<0.01)	F3<L1, L3, S1, S2, S3 F2< L1, L3, S1, S3 L2<L1, L3
7/18	Yes ($F_{9,40}$=32.01, p<0.01)	F3<0T, F1, L1, L2, L3, S1, S2, S3 F2<0T, F1, L1, L3, S1, S2, S3 L2<L3, S3
8/21	Yes ($F_{9,40}$=34.48, p<0.01)	F3<0T, F1, L1, L2, L3, S1, S2, S3 F2<0T, F1, L1, L3, S1, S2, S3 L2<L1, L3, S3
9/23	Yes ($F_{9,40}$=36.67, p<0.01)	F3, F2<0T, F1, L1, L2, L3, S1, S2, S3 L2<L1, L3, S3
10/25	Yes ($F_{9,40}$=7.18, p<0.01)	F3, F2<0T, F1, L1, L2, L3, S1, S2, S3 L2<L1

Date 1:

Analysis of Variance Report

Page/Date/Time	1 09.10.2017 15:07:06
Database	Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response	Emergence_Rate_Date_1

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-1.0998	0.271437	Accept
Kurtosis Normality of Residuals	1.9187	0.055026	Accept
Omnibus Normality of Residuals	4.8908	0.086693	Accept
Modified-Levene Equal-Variance Test	1.8929	0.081241	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	22591.7	2510.189	14.04	0.000000*	1.000000
S(A)	40	7150.926	178.7732			
Total (Adjusted)	49	29742.63				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_1
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=178.7732 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Salt 1 Pyimyanmarsein, Local 3 Taungpyan Salt 3 Sinthwelatt, Local 1 Baygyar
Flodding 2 Mekyut	5	0	Salt 1 Pyimyanmarsein, Local 3 Taungpyan Salt 3 Sinthwelatt, Local 1 Baygyar
Local 2 Kyarpyan	5	3.428571	Salt 1 Pyimyanmarsein, Local 3 Taungpyan Salt 3 Sinthwelatt, Local 1 Baygyar
Salt 2 IR-11T225	5	19.82906	
Flodding 1 Swarna Sub-1	5	32.28465	
Zero Treatment Pawsanyin	5	36.32479	
Salt 1 Pyimyanmarsein	5	45.39326	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 3 Taungpyan	5	50.67961	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Salt 3 Sinthwelatt	5	53.80952	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 1 Baygyar	5	55.16129	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 2:

Analysis of Variance Report

Page/Date/Time 1 09.10.2017 15:12:31
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response C29

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-1.3471	0.177950	Accept
Kurtosis Normality of Residuals	1.2972	0.194565	Accept
Omnibus Normality of Residuals	3.4974	0.174003	Accept
Modified-Levene Equal-Variance Test	0.6228	0.733165	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	7	4.025836	0.5751194	15.35	0.000000*	1.000000
S(A)	32	1.198847	3.746396E-02			
Total (Adjusted)	39	5.224683				
Total	40					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: C29
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=32 MSE=3.746396E-02 Critical Value=4.0236

Group	Count	Mean	Different From Groups
Local 2 Kyarpyan	5	0.6289557	Salt 2 IR-11T225, Flodding 1 Swarna Sub-1 Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Local 3 Taungpyan Salt 3 Sinthwelatt, Local 1 Baygyar
Salt 2 IR-11T225	5	1.180854	Local 2 Kyarpyan
Flodding 1 Swarna Sub-1	5	1.378401	Local 2 Kyarpyan
Zero Treatment Pawsanyin	5	1.467836	Local 2 Kyarpyan
Salt 1 Pyimyanmarsein	5	1.474985	Local 2 Kyarpyan
Local 3 Taungpyan	5	1.57965	Local 2 Kyarpyan
Salt 3 Sinthwelatt	5	1.641875	Local 2 Kyarpyan

Analysis of Variance Report

Page/Date/Time 3 09.10.2017 15:12:31
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response C29

Scheffe's Multiple-Comparison Test

Response: C29
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=32 MSE=3.746396E-02 Critical Value=4.0236

Group	Count	Mean	Different From Groups
Local 1 Baygyar	5	1.656374	Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Without Transformation:

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	24.3715		24.3715
A: Variety				
Flodding 1 Swarna Sub-1	5	25.69288	4.689334	1.321385
Flodding 2 Mekyut	5	0	4.689334	-24.3715
Flodding 3 IR-84649.1295.30	5	0	4.689334	-24.3715
Local 1 Baygyar	5	45.64516	4.689334	21.27366
Local 2 Kyarpyan	5	4.761905	4.689334	-19.60959
Local 3 Taungpyan	5	41.94175	4.689334	17.57025
Salt 1 Pyimyanmarsein	5	32.13483	4.689334	7.763332
Salt 2 IR-11T225	5	17.77778	4.689334	-6.593721
Salt 3 Sinthwelatt	5	45.33333	4.689334	20.96183
Zero Treatment Pawsanyin	5	30.42735	4.689334	6.055851

Date 3:

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	1.6868	0.091640	Accept
Kurtosis Normality of Residuals	1.5556	0.119809	Accept
Omnibus Normality of Residuals	5.2651	0.071894	Accept
Modified-Levene Equal-Variance Test	1.2350	0.301901	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	29731.65	3303.517	15.98	0.000000*	1.000000
S(A)	40	8266.568	206.6642			
Total (Adjusted)	49	37998.22				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_3
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=206.6642 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Salt 2 IR-11T225, Salt 3 Sinthwelatt Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Local 1 Baygyar Local 3 Taungpyan
Flodding 2 Mekyut	5	0	Salt 2 IR-11T225, Salt 3 Sinthwelatt Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Local 1 Baygyar Local 3 Taungpyan
Local 2 Kyarpyan	5	22.09524	Local 1 Baygyar, Local 3 Taungpyan
Flodding 1 Swarna Sub-1	5	36.4045	
Salt 2 IR-11T225	5	42.90598	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	48.19048	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	51.62393	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 1 Pyimyanmarsein	5	54.30712	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Local 1 Baygyar	5	69.91936	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 3 Taungpyan	5	73.20388	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 4:

Analysis of Variance Report

Page/Date/Time 1 09.10.2017 15:15:32
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response Emergence_Rate_Date_4

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	1.6328	0.102511	Accept
Kurtosis Normality of Residuals	1.3298	0.183589	Accept
Omnibus Normality of Residuals	4.4344	0.108916	Accept
Modified-Levene Equal-Variance Test	1.1969	0.323758	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	32298.71	3588.746	14.93	0.000000*	1.000000
S(A)	40	9614.964	240.3741			
Total (Adjusted)	49	41913.68				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_4
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=240.3741 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Salt 1 Pyimyanmarsein, Salt 2 IR-11T225 Zero Treatment Pawsanyin Salt 3 Sinthwelatt, Local 1 Baygyar Local 3 Taungpyan
Flodding 2 Mekyut	5	0	Salt 1 Pyimyanmarsein, Salt 2 IR-11T225 Zero Treatment Pawsanyin Salt 3 Sinthwelatt, Local 1 Baygyar Local 3 Taungpyan
Local 2 Kyarpyan	5	20.47619	Local 1 Baygyar, Local 3 Taungpyan
Flodding 1 Swarna Sub-1	5	38.8015	
Salt 1 Pyimyanmarsein	5	49.3633	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 2 IR-11T225	5	50.76923	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	51.79487	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	62.09524	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Local 1 Baygyar	5	71.93549	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 3 Taungpyan	5	72.52427	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 5:

Analysis of Variance Report

Page/Date/Time 1 09.10.2017 15:15:47
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response Emergence_Rate_Date_5

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	1.4205	0.155473	Accept
Kurtosis Normality of Residuals	0.8376	0.402278	Accept
Omnibus Normality of Residuals	2.7192	0.256761	Accept
Modified-Levene Equal-Variance Test	1.3411	0.247300	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	35522.68	3946.964	13.57	0.000000*	1.000000
S(A)	40	11631.94	290.7985			
Total (Adjusted)	49	47154.62				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_5
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=290.7985 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Salt 1 Pyimyanmarsein, Salt 2 IR-11T225 Zero Treatment Pawsanyin Salt 3 Sinthwelatt, Local 1 Baygyar Local 3 Taungpyan
Flodding 2 Mekyut	5	0	Salt 1 Pyimyanmarsein, Salt 2 IR-11T225 Zero Treatment Pawsanyin Salt 3 Sinthwelatt, Local 1 Baygyar Local 3 Taungpyan
Local 2 Kyarpyan	5	22.85714	Local 1 Baygyar, Local 3 Taungpyan
Flodding 1 Swarna Sub-1	5	39.25093	
Salt 1 Pyimyanmarsein	5	52.8839	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 2 IR-11T225	5	53.4188	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	56.92308	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	61.52381	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Local 1 Baygyar	5	76.53226	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 3 Taungpyan	5	76.60194	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 6:

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	1.9323	0.053319	Accept
Kurtosis Normality of Residuals	1.4436	0.148854	Accept
Omnibus Normality of Residuals	5.8178	0.054535	Accept
Modified-Levene Equal-Variance Test	1.0463	0.421928	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	30270.49	3363.388	12.05	0.000000*	1.000000
S(A)	40	11167.52	279.188			
Total (Adjusted)	49	41438.01				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_6
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=279.188 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Salt 2 IR-11T225, Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Local 3 Taungpyan, Local 1 Baygyar
Flodding 2 Mekyut	5	8.193832	Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Local 3 Taungpyan, Local 1 Baygyar
Local 2 Kyarpyan	5	20.09524	Local 3 Taungpyan, Local 1 Baygyar
Flodding 1 Swarna Sub-1	5	40.07491	
Salt 2 IR-11T225	5	47.26496	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	5	51.36752	Flodding 3 IR-84649.1295.30
Salt 1 Pyimyanmarsein	5	55.95506	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	58.95238	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Local 3 Taungpyan	5	74.17476	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 1 Baygyar	5	74.27419	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Date 7:

Analysis of Variance Report

Page/Date/Time 1 09.10.2017 15:17:33
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response C30

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.8029	0.422048	Accept
Kurtosis Normality of Residuals	0.9414	0.346519	Accept
Omnibus Normality of Residuals	1.5308	0.465155	Accept
Modified-Levene Equal-Variance Test	0.9641	0.483260	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	364.4788	40.49764	32.01	0.000000*	1.000000
S(A)	40	50.60978	1.265244			
Total (Adjusted)	49	415.0886				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: C30
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=1.265244 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Local 2 Kyarpyan, Flodding 1 Swarna Sub-1 Salt 2 IR-11T225, Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Local 3 Taungpyan, Local 1 Baygyar
Flodding 2 Mekyut	5	1.651649	Flodding 1 Swarna Sub-1, Salt 2 IR-11T225 Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Local 3 Taungpyan, Local 1 Baygyar
Local 2 Kyarpyan	5	4.283682	Flodding 3 IR-84649.1295.30 Salt 3 Sinthwelatt, Local 3 Taungpyan Local 1 Baygyar
Flodding 1 Swarna Sub-1	5	5.870474	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 2 IR-11T225	5	6.470071	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	6.927653	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 1 Pyimyanmarsein	5	7.102643	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	7.396948	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 3 Taungpyan	5	8.356387	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Without Transformation:

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	40.32273		40.32273
A: Variety				
Flodding 1 Swarna Sub-1	5	36.92884	6.983036	-3.393887
Flodding 2 Mekyut	5	2.819383	6.983036	-37.50334
Flodding 3 IR-84649.1295.30	5	0	6.983036	-40.32273
Local 1 Baygyar	5	73.46774	6.983036	33.14502
Local 2 Kyarpyan	5	19.71428	6.983036	-20.60844
Local 3 Taungpyan	5	71.16505	6.983036	30.84232
Salt 1 Pyimyanmarsein	5	52.05993	6.983036	11.7372
Salt 2 IR-11T225	5	42.73504	6.983036	2.412317
Salt 3 Sinthwelatt	5	55.61905	6.983036	15.29632
Zero Treatment Pawsanyin	5	48.71795	6.983036	8.395223

Date 8:

Analysis of Variance Report

Page/Date/Time	1 09.10.2017 15:18:58
Database	Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response	C31

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.3272	0.743554	Accept
Kurtosis Normality of Residuals	0.9942	0.320110	Accept
Omnibus Normality of Residuals	1.0955	0.578242	Accept
Modified-Levene Equal-Variance Test	0.9352	0.505975	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	353.6102	39.29002	34.48	0.000000*	1.000000
S(A)	40	45.57774	1.139443			
Total (Adjusted)	49	399.188				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: C31
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=1.139443 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Local 2 Kyarpyan, Flodding 1 Swarna Sub-1 Salt 2 IR-11T225, Salt 1 Pyimyanmarsein Zero Treatment Pawsanyin Salt 3 Sinthwelatt, Local 1 Baygyar Local 3 Taungpyan
Flodding 2 Mekyut	5	1.290644	Flodding 1 Swarna Sub-1, Salt 2 IR-11T225 Salt 1 Pyimyanmarsein Zero Treatment Pawsanyin Salt 3 Sinthwelatt, Local 1 Baygyar Local 3 Taungpyan
Local 2 Kyarpyan	5	4.129037	Flodding 3 IR-84649.1295.30 Salt 3 Sinthwelatt, Local 1 Baygyar Local 3 Taungpyan
Flodding 1 Swarna Sub-1	5	5.690566	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 2 IR-11T225	5	5.844167	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 1 Pyimyanmarsein	5	6.943414	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	6.97888	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	7.154229	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Local 1 Baygyar	5	8.054657	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 3 Taungpyan	5	8.190391	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Without Transformation:

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	37.44258		37.44258
A: Variety				
Flodding 1 Swarna Sub-1	5	34.53183	6.203587	-2.91075
Flodding 2 Mekyut	5	1.85022	6.203587	-35.59237
Flodding 3 IR-84649.1295.30	5	0	6.203587	-37.44258
Local 1 Baygyar	5	65.40323	6.203587	27.96064
Local 2 Kyarpyan	5	18.66667	6.203587	-18.77592
Local 3 Taungpyan	5	68.25243	6.203587	30.80984
Salt 1 Pyimyanmarsein	5	49.4382	6.203587	11.99562
Salt 2 IR-11T225	5	34.8718	6.203587	-2.57079
Salt 3 Sinthwelatt	5	52.09524	6.203587	14.65265
Zero Treatment Pawsanyin	5	49.31624	6.203587	11.87365

Date 9:

Analysis of Variance Report

Page/Date/Time 1 09.10.2017 15:20:10
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response C32

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.5181	0.604408	Accept
Kurtosis Normality of Residuals	1.2214	0.221949	Accept
Omnibus Normality of Residuals	1.7601	0.414757	Accept
Modified-Levene Equal-Variance Test	1.2543	0.291263	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	364.9805	40.55339	36.37	0.000000*	1.000000
S(A)	40	44.59865	1.114966			
Total (Adjusted)	49	409.5792				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: C32
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=1.114966 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Local 2 Kyarpyan, Flodding 1 Swarna Sub-1 Salt 2 IR-11T225, Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Local 1 Baygyar, Local 3 Taungpyan
Flodding 2 Mekyut	5	1.297884	Local 2 Kyarpyan, Flodding 1 Swarna Sub-1 Salt 2 IR-11T225, Zero Treatment Pawsanyin Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Local 1 Baygyar, Local 3 Taungpyan
Local 2 Kyarpyan	5	4.218827	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Salt 3 Sinthwelatt Local 1 Baygyar, Local 3 Taungpyan
Flodding 1 Swarna Sub-1	5	5.81026	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 2 IR-11T225	5	6.270216	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	6.809451	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 1 Pyimyanmarsein	5	7.005553	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	7.187403	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan
Local 1 Baygyar	5	8.139907	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Analysis of Variance Report

Page/Date/Time 4 09.10.2017 15:20:10
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response C32

Scheffe's Multiple-Comparison Test

Response: C32
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=1.114966 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Local 3 Taungpyan	5	8.494177	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Notes:
This report provides multiple comparison tests for all possible contrasts among the
the means. These contrasts may involve more groups than just each pair, so the method
is much stricter than need be. The Tukey-Kramer method provides more accurate results when
only pairwise comparisons are needed.

Without Transformation:

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	38.69917		38.69917
A: Variety				
Flodding 1 Swarna Sub-1	5	36.32959	6.309644	-2.369587
Flodding 2 Mekyut	5	2.290749	6.309644	-36.40842
Flodding 3 IR-84649.1295.30	5	0	6.309644	-38.69917
Local 1 Baygyar	5	66.77419	6.309644	28.07502
Local 2 Kyarpyan	5	18.85714	6.309644	-19.84203
Local 3 Taungpyan	5	73.98058	6.309644	35.28141
Salt 1 Pyimyanmarsein	5	50.11236	6.309644	11.41319
Salt 2 IR-11T225	5	39.82906	6.309644	1.129885
Salt 3 Sinthwelatt	5	51.80952	6.309644	13.11035
Zero Treatment Pawsanyin	5	47.00855	6.309644	8.309372

Date 10:

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	0.4129	0.679679	Accept
Kurtosis Normality of Residuals	1.4691	0.141805	Accept
Omnibus Normality of Residuals	2.3287	0.312118	Accept
Modified-Levene Equal-Variance Test	0.7397	0.670586	Accept

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	307.1937	34.13263	35.76	0.000000*	1.000000
S(A)	40	38.17889	0.9544723			
Total (Adjusted)	49	345.3726				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: C33
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=0.9544723 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Local 2 Kyarpyan, Flodding 1 Swarna Sub-1 Salt 2 IR-11T225, Salt 1 Pyimyanmarsein Salt 3 Sinthwelatt Zero Treatment Pawsanyin Local 3 Taungpyan, Local 1 Baygyar
Flodding 2 Mekyut	5	1.319117	Local 2 Kyarpyan, Flodding 1 Swarna Sub-1 Salt 2 IR-11T225, Salt 1 Pyimyanmarsein Salt 3 Sinthwelatt Zero Treatment Pawsanyin Local 3 Taungpyan, Local 1 Baygyar
Local 2 Kyarpyan	5	4.482915	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 1 Baygyar
Flodding 1 Swarna Sub-1	5	5.210293	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 2 IR-11T255	5	5.662737	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 1 Pyimyanmarsein	5	6.774659	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	6.794161	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	6.872768	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut

Analysis of Variance Report

Page/Date/Time 4 09.10.2017 15:21:11
Database Z:\Users\Benjamin\Documents\ ... ursery\Emergence-Zokekali.S0
Response C33

WIthout Transformation:

Scheffe's Multiple-Comparison Test

Response: Emergence_Rate_Date_10
Term A: Variety

Alpha=0.050 Error Term=S(A) DF=40 MSE=146.7707 Critical Value=4.3722

Group	Count	Mean	Different From Groups
Flodding 3 IR-84649.1295.30	5	0	Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Zero Treatment Pawsanyin Local 3 Taungpyan, Local 1 Baygyar
Flodding 2 Mekyut	5	2.202643	Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt Zero Treatment Pawsanyin Local 3 Taungpyan, Local 1 Baygyar
Local 2 Kyarpyan	5	21.04762	Local 1 Baygyar
Flodding 1 Swarna Sub-1	5	28.83895	
Salt 2 IR-11T225	5	32.47863	
Salt 1 Pyimyanmarsein	5	46.66667	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Salt 3 Sinthwelatt	5	46.76191	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	48.20513	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Local 3 Taungpyan	5	52.52427	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut
Local 1 Baygyar	5	61.85484	Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut, Local 2 Kyarpyan

Notes:

Plant Height Nursery

Boyargyi:

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-2.6525	0.007989	Reject
Kurtosis Normality of Residuals	5.6954	0.000000	Reject
Omnibus Normality of Residuals	39.4738	0.000000	Reject
Modified-Levene Equal-Variance Test	7.1523	0.000000	Reject

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	9	77036.53	8559.615	243.67	0.000000*	1.000000
S(A)	490	17212.44	35.12743			
Total (Adjusted)	499	94248.98				
Total	500					

* Term significant at alpha = 0.05

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

H0: All medians are equal.

Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	9	413.5424	0.000000	Reject H0
Corrected for Ties	9	413.5504	0.000000	Reject H0

Number Sets of Ties	150
Multiplicity Factor	2418

Kruskal-Wallis Multiple-Comparison Z-Value Test (Dunn's Test)

Plant_Height	Swarna Sub-1	Mekyut	IR-84649.1295.30	Baygyar	Kyarpyan
Flodding 1 Swarna Sub-1	0.0000	10.5374	10.5374	5.5475	3.5832
Flodding 2 Mekyut	10.5374	0.0000	0.0000	4.9899	6.9542
Flodding 3 IR-84649.1295.30	10.5374	0.0000	0.0000	4.9899	6.9542
Local 1 Baygyar	5.5475	4.9899	4.9899	0.0000	1.9643
Local 2 Kyarpyan	3.5832	6.9542	6.9542	1.9643	0.0000
Local 3 Taungpyan	7.0767	3.4607	3.4607	1.5293	3.4936
Salt 1 Pyimyanmarsein	3.5088	14.0462	14.0462	9.0562	7.0920
Salt 2 IR-11T255	1.2109	11.7483	11.7483	6.7584	4.7941
Salt 3 Sinthwelatt	1.3701	9.1673	9.1673	4.1774	2.2131
Zero Treatment Pawsanyin	5.6817	4.8557	4.8557	0.1343	2.0986

Regular Test: Medians significantly different if z-value > 1.9600
Bonferroni Test: Medians significantly different if z-value > 3.2608

Analysis of Variance Report

Page/Date/Time 6 06.10.2017 15:13:19
Database
Response Plant_Height

Kruskal-Wallis Multiple-Comparison Z-Value Test (Dunn's Test)

Plant_Height	Taungpyan	Pyimyanmarsein	IR-11T255	Sinthwelatt	Pawsanyin
Flodding 1 Swarna Sub-1	7.0767	3.5088	1.2109	1.3701	5.6817
Flodding 2 Mekyut	3.4607	14.0462	11.7483	9.1673	4.8557
Flodding 3 IR-84649.1295.30	3.4607	14.0462	11.7483	9.1673	4.8557
Local 1 Baygyar	1.5293	9.0562	6.7584	4.1774	0.1343
Local 2 Kyarpyan	3.4936	7.0920	4.7941	2.2131	2.0986
Local 3 Taungpyan	0.0000	10.5855	8.2876	5.7067	1.3950
Salt 1 Pyimyanmarsein	10.5855	0.0000	2.2979	4.8789	9.1905
Salt 2 IR-11T255	8.2876	2.2979	0.0000	2.5810	6.8926
Salt 3 Sinthwelatt	5.7067	4.8789	2.5810	0.0000	4.3117
Zero Treatment Pawsanyin	1.3950	9.1905	6.8926	4.3117	0.0000

Regular Test: Medians significantly different if z-value > 1.9600
Bonferroni Test: Medians significantly different if z-value > 3.2608

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	56.9058		56.9058
A: Variety				
Flodding 1 Swarna Sub-1	50	46.432	0.8381817	-10.4738
Flodding 2 Mekyut	50	75.126	0.8381817	18.2202
Flodding 3 IR-84649.1295.30	50	75.126	0.8381817	18.2202
Local 1 Baygyar	50	60.892	0.8381817	3.9862
Local 2 Kyarpyan	50	55.448	0.8381817	-1.4578
Local 3 Taungpyan	50	65.398	0.8381817	8.4922
Salt 1 Pyimyanmarsein	50	36.752	0.8381817	-20.1538
Salt 2 IR-11T255	50	42.992	0.8381817	-13.9138
Salt 3 Sinthwelatt	50	49.408	0.8381817	-7.4978
Zero Treatment Pawsanyin	50	61.484	0.8381817	4.5782

Zokekali:

Analysis of Variance Report

Page/Date/Time	2 09.10.2017 15:27:00
Database	Z:\Users\Benjamin\Documents\ ... ery\Plant-Height-Zokekali.S0
Response	Plant_Height

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	36.89675		36.89675
A: Variety				
Flodding 1 Swarna Sub-1	50	32.08	0.5864503	-4.81675
Local 1 Baygyar	50	43.11	0.5864503	6.21325
Local 2 Kyarpyan	50	44.698	0.5864503	7.80125
Local 3 Taungpyan	50	41.364	0.5864503	4.46725
Salt 1 Pyimyanmarsein	50	23.77	0.5864503	-13.12675
Salt 2 IR-11T255	50	32.85	0.5864503	-4.04675
Salt 3 Sinthwelatt	50	32.402	0.5864503	-4.49475
Zero Treatment Pawsanyin	50	44.9	0.5864503	8.00325

Plots of Means Section

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	-1.9241	0.054342	Accept
Kurtosis Normality of Residuals	1.0580	0.290066	Accept
Omnibus Normality of Residuals	4.8215	0.089749	Accept
Modified-Levene Equal-Variance Test	3.5494	0.001033	Reject

Box Plot Section

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Variety	7	20778.2	2968.314	172.61	0.000000*	1.000000
S(A)	392	6740.91	17.1962			
Total (Adjusted)	399	27519.11				
Total	400					

* Term significant at alpha = 0.05

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

H0: All medians are equal.

Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	7	298.7877	0.000000	Reject H0
Corrected for Ties	7	298.7979	0.000000	Reject H0

Number Sets of Ties	112
Multiplicity Factor	2184

Group Detail

Kruskal-Wallis Multiple-Comparison Z-Value Test (Dunn's Test)

Plant_Height	Flodding 1 Swarna Sub-1	Local 1 Baygyar	Local 2 Kyarpyan	Local 3 Taungpyan	Salt 1 Pyimyanmarsein
Flodding 1 Swarna Sub-1	0.0000	7.1082	8.0878	5.9790	3.9879
Local 1 Baygyar	7.1082	0.0000	0.9796	1.1292	11.0961
Local 2 Kyarpyan	8.0878	0.9796	0.0000	2.1088	12.0757
Local 3 Taungpyan	5.9790	1.1292	2.1088	0.0000	9.9669
Salt 1 Pyimyanmarsein	3.9879	11.0961	12.0757	9.9669	0.0000
Salt 2 IR-11T255	0.5008	6.6074	7.5870	5.4782	4.4887
Salt 3 Sinthwelatt	0.1765	6.9318	7.9114	5.8026	4.1643
Zero Treatment Pawsanyin	8.1189	1.0107	0.0311	2.1399	12.1068

Regular Test: Medians significantly different if z-value > 1.9600
Bonferroni Test: Medians significantly different if z-value > 3.1237

Kruskal-Wallis Multiple-Comparison Z-Value Test (Dunn's Test)

Plant_Height	Salt 2 IR-11T255	Salt 3 Sinthwelatt	Zero Treatment Pawsanyin
Flodding 1 Swarna Sub-1	0.5008	0.1765	8.1189
Local 1 Baygyar	6.6074	6.9318	1.0107
Local 2 Kyarpyan	7.5870	7.9114	0.0311
Local 3 Taungpyan	5.4782	5.8026	2.1399
Salt 1 Pyimyanmarsein	4.4887	4.1643	12.1068
Salt 2 IR-11T255	0.0000	0.3244	7.6181
Salt 3 Sinthwelatt	0.3244	0.0000	7.9425
Zero Treatment Pawsanyin	7.6181	7.9425	0.0000

Regular Test: Medians significantly different if z-value > 1.9600
Bonferroni Test: Medians significantly different if z-value > 3.1237

Results Statistical Analysis Trials

Plant Height

Boyargyi
Summary

Weeks after Transplanting	Significance of Variety (Friedman Test, 10 Factors, 5 Blocks)	Significant differences (Wilcoxon-Wilcox Test n=5 k=10)
1	Yes (Q= 31.21, p<0.01)	S1<L1, L3, F2 S2<L3
2	Yes (Q= 28.94, p<0.01)	S1<L3, 0T
3	Yes (Q= 17.73, p=0.04)	
4	Yes (Q= 22.35, p<0.01)	S1, S2<L2
5	Yes (Q= 33.39, p<0.01)	S1, S2, F1< L2 S1, S2< L3
6	Yes (Q= 36.36, p<0.01)	S1, S2, F1< L2 S1, S2< L3
7	Yes (Q= 37.01, p<0.01)	S1, S2 <L1, L2, L3
8	Yes (Q= 34.96, p<0.01)	S1<L1 S1, S2< L2, L3
9	Yes (Q= 35.26, p<0.01)	S1< 0T, L1, L3 S1, S2 < L2
10	Yes (Q= 33.17, p<0.01)	S1< L1, L3 S1, S2< L2
11	Yes (Q= 28.05, p<0.01)	S1<L1, L2

Date 1:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 11:01:37
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date1

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	4264.45	1066.113	22.53	0.000000*	
B: Variety	9	11243.03	1249.226	8.87	0.000001*	0.999997
AB	36	5069.146	140.8096	2.98	0.000000*	
S	450	21296.56	47.32569			
Total (Adjusted)	499	41873.19				
Total	500					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	31.210909	9	0.000272	0.693576
Correction	31.210909	9	0.000272	0.693576

Multiplicity 0

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 11:01:37
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date1

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	46.7412		46.7412
A: Farmer_Village				
1	100	50.095	0.6879367	3.3538
2	100	47.961	0.6879367	1.2198
3	100	48.556	0.6879367	1.8148
4	100	45.309	0.6879367	-1.4322
5	100	41.785	0.6879367	-4.9562
B: Variety				
Flodding 1 Sawanar sat-1	50	45.754	1.678152	-0.9872
Flodding 2 Mekyut	50	51.422	1.678152	4.6808
Flodding 3 IR-84649.1295.30	50	42.002	1.678152	-4.7392
Local 1 Baygyar	50	50.586	1.678152	3.8448
Local 2 Kyarpyan	50	49.852	1.678152	3.1108
Local 3 Taungpyan	50	53.422	1.678152	6.6808
Salt 1 Pyimyanmarsein	50	37.25	1.678152	-9.4912
Salt 2 IR-225	50	42.716	1.678152	-4.0252
Salt 3 Sinthwelatt	50	45.842	1.678152	-0.8992
Zero Treatment Pawsanyin/Nagayar	50	48.566	1.678152	1.8248

AB: Farmer_Village,Variety

Plant_Height_Date1	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	6	3	13	26	18	7	9	8	15
Local 1 Baygyar	6	0	3	7	32	24	13	15	2	21
Local 2 Kyarpyan	3	3	0	10	29	21	10	12	5	18
Local 3 Taungpyan	13	7	10	0	39	31	20	22	5	28
Salt 1 Pyimyanmarsein	26	32	29	39	0	8	19	17	34	11
Salt 2 IR-11T225	18	24	21	31	8	0	11	9	26	3
Salt 3 Sinthwelatt	7	13	10	20	19	11	0	2	15	8
Flodding 1 Swarna Sub-1	9	15	12	22	17	9	2	0	17	6
Flodding 2 Mekyut	8	2	5	5	34	26	15	17	0	23
Flodding 3 IR-84649.1295.30	15	21	18	28	11	3	8	6	23	0

Date 2:

Analysis of Variance Report

Page/Date/Time 1 07.10.2017 11:32:27
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Height_Date2

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	5123.209	1280.802	16.07	0.000000*	
B: Variety	9	11645.31	1293.924	8.57	0.000001*	0.999994
AB	36	5435.6	150.9889	1.89	0.001902*	
S	385	30689.56	79.71313			
Total (Adjusted)	434	53850.68				
Total	435					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.941818	9	0.000663	0.643152
Correction	28.941818	9	0.000663	0.643152

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 11:32:27
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Height_Date2

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	435	51.0092		50.99812
A: Farmer_Village				
1	86	55.46511	0.9627548	4.325499
2	83	47.03133	0.9799996	-3.893707
3	84	53.68571	0.9741488	2.547995
4	97	52.27423	0.9065235	1.311884
5	85	46.29647	0.9684016	-4.291671
B: Variety				
Flodding 1 Sawanar sat-1	44	49.55227	1.852449	-1.539791
Flodding 2 Mekyut	43	54.72326	1.873865	2.746995
Flodding 3 IR-84649.1295.30	47	48.25319	1.792353	-2.64956
Local 1 Baygyar	39	54.2	1.967615	2.752321
Local 2 Kyarpyan	46	54.89348	1.81173	3.960829
Local 3 Taungpyan	43	59.13721	1.873865	7.99844
Salt 1 Pyimyanmarsein	46	39.6913	1.81173	-11.14373
Salt 2 IR-225	45	45.89333	1.83175	-5.148274
Salt 3 Sinthwelatt	45	49.75333	1.83175	-1.283227
Zero Treatment Pawsanyin/Nagayar	37	56.10811	2.020094	4.305995

AB: Farmer_Village Variety

Plant_Height_Date2	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	3	1	6	31	24	15	16	2	19
Local 1 Baygyar	3	0	2	9	28	21	12	13	1	16
Local 2 Kyarpyan	1	2	0	7	30	23	14	15	1	18
Local 3 Taungpyan	6	9	7	0	37	30	21	22	8	25
Salt 1 Pyimyanmarsein	31	28	30	37	0	7	16	15	29	12
Salt 2 IR-11T225	24	21	23	30	7	0	9	8	22	5
Salt 3 Sinthwelatt	15	12	14	21	16	9	0	1	13	4
Flodding 1 Swarna Sub-1	16	13	15	22	15	8	1	0	14	3
Flodding 2 Mekyut	2	1	1	8	29	22	13	14	0	17
Flodding 3 IR-84649.1295.30	19	16	18	25	12	5	4	3	17	0

Date 3:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 11:45:50
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date_3

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	6502.011	1625.503	13.25	0.000000*	
B: Variety	9	8110.166	901.1296	3.43	0.003843*	0.959345
AB	36	9453.615	262.6004	2.14	0.000234*	
S	397	48714.45	122.7064			
Total (Adjusted)	446	74995.42				
Total	447					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	17.727273	9	0.038473	0.393939
Correction	17.727273	9	0.038473	0.393939

Multiplicity 0

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 11:45:50
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date_3

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	447	43.00336		42.83585
A: Farmer_Village				
1	76	47.03026	1.270653	3.250376
2	95	43.37684	1.136506	0.2649587
3	94	42.4766	1.142536	-0.3691246
4	92	46.89565	1.154888	3.916677
5	90	35.78	1.167649	-7.062887
B: Variety				
Flodding 1 Sawanar sat-1	44	40.95	2.442988	-1.185847
Flodding 2 Mekyut	50	45.024	2.291726	2.188153
Flodding 3 IR-84649.1295.30	47	44.79149	2.363735	1.970542
Local 1 Baygyar	43	41.73023	2.471232	-1.070014
Local 2 Kyarpyan	49	50.58163	2.314993	7.502598
Local 3 Taungpyan	43	50.37907	2.471232	6.352344
Salt 1 Pyimyanmarsein	47	37.05106	2.363735	-5.882791
Salt 2 IR-225	41	36.26585	2.530788	-6.268736
Salt 3 Sinthwelatt	44	40.53864	2.442988	-2.613847
Zero Treatment Pawsanyin/Nagayar	39	41.36154	2.594869	-0.9924024
AB: Farmer_Village,Variety				

Plant_Height_Date3	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	1	16	11	14	13	4	2	6	6
Local 1 Baygyar	1	0	15	10	15	14	5	3	7	5
Local 2 Kyarpyan	16	15	0	5	30	29	20	18	22	10
Local 3 Taungpyan	11	10	5	0	25	24	15	13	17	5
Salt 1 Pyimyanmarsein	14	15	30	25	0	1	10	12	8	20
Salt 2 IR-11T225	13	14	29	24	1	0	9	11	7	19
Salt 3 Sinthwelatt	4	5	20	15	10	9	0	2	2	10
Flodding 1 Swarna Sub-1	2	3	18	13	12	11	2	0	4	8
Flodding 2 Mekyut	6	7	22	17	8	7	2	4	0	12
Flodding 3 IR-84649.1295.30	6	5	10	5	20	19	10	8	12	0

Date 4:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 11:54:15
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date4

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	7041.216	1760.304	16.09	0.000000*	
B: Variety	9	10069.08	1118.787	4.77	0.000327*	0.994580
AB	36	8450.286	234.7302	2.15	0.000223*	
S	396	43320.39	109.3949			
Total (Adjusted)	445	69213.97				
Total	446					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	22.352727	9	0.007826	0.496727
Correction	22.352727	9	0.007826	0.496727

Multiplicity 0

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 11:54:15
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date4

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	446	44.91637		44.83088
A: Farmer_Village				
1	86	47.82442	1.127845	2.707898
2	98	46.78878	1.056539	1.893009
3	81	47.51605	1.162134	2.926826
4	94	45.6383	1.078784	0.3954532
5	87	36.73219	1.121344	-7.923186
B: Variety				
Flodding 1 Sawanar sat-1	48	40.68542	2.211382	-4.349102
Flodding 2 Mekyut	44	47.88864	2.309713	2.892215
Flodding 3 IR-84649.1295.30	49	45.57143	2.188701	0.6131198
Local 1 Baygyar	45	46.04889	2.283906	1.109231
Local 2 Kyarpyan	43	54.9907	2.336416	10.80212
Local 3 Taungpyan	45	50.19778	2.283906	4.137786
Salt 1 Pyimyanmarsein	47	38.56383	2.234784	-6.335547
Salt 2 IR-225	39	39.50256	2.453308	-5.020952
Salt 3 Sinthwelatt	49	42.60408	2.188701	-2.287325
Zero Treatment Pawsanyin/Nagayar	37	43.33243	2.518741	-1.561547

AB: Farmer_Village Variety

Plant_Height_Date4	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T.	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	10	22	10	12	10	2	7	9	5
Local 1 Baygyar	10	0	12	0	22	20	12	17	1	5
Local 2 Kyarpyan	22	12	0	12	34	32	24	29	13	17
Local 3 Taungpyan	10	0	12	0	22	20	12	17	1	5
Salt 1 Pyimyanmarsein	12	22	34	22	0	2	10	5	21	17
Salt 2 IR-11T225	10	20	32	20	2	0	8	3	19	15
Salt 3 Sinthwelatt	2	12	24	12	10	8	0	5	11	7
Flodding 1 Swarna Sub-1	7	17	29	17	5	3	5	0	16	12
Flodding 2 Mekyut	9	1	13	1	21	19	11	16	0	4
Flodding 3 IR-84649.1295.30	5	5	17	5	17	15	7	12	4	0

Date 5:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 12:03:41
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date5

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	6597.187	1649.297	19.19	0.000000*	
B: Variety	9	10996.49	1221.832	10.38	0.000000*	1.000000
AB	36	4237.641	117.7122	1.37	0.080534	
S	404	34725.49	85.95418			
Total (Adjusted)	453	59402.18				
Total	454					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	33.392727	9	0.000114	0.742061
Correction	33.392727	9	0.000114	0.742061

Multiplicity 0

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 12:03:41
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date5

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	454	49.31211		49.41179
A: Farmer_Village				
1	92	52.26739	0.966584	2.88666
2	99	49.14848	0.9317854	-0.233673
3	81	55.04568	1.030128	5.264025
4	92	47.74891	0.966584	-1.505117
5	90	42.90889	0.9772648	-6.411895
B: Variety				
Flodding 1 Sawanar sat-1	47	46.74255	1.582566	-3.020006
Flodding 2 Mekyut	45	51.82889	1.617352	3.115549
Flodding 3 IR-84649.1295.30	48	50.63125	1.565994	1.203327
Local 1 Baygyar	48	49.68542	1.565994	0.1835492
Local 2 Kyarpyan	48	59.11875	1.565994	9.622661
Local 3 Taungpyan	41	56.91707	1.694412	6.132883
Salt 1 Pyimyanmarsein	48	41.83541	1.565994	-7.349784
Salt 2 IR-225	46	41.87391	1.599676	-7.329117
Salt 3 Sinthwelatt	45	46.83333	1.617352	-2.587054
Zero Treatment Pawsanyin/Nagayar	38	48.16316	1.760026	2.799365E-02
AB: Farmer_Village,Variety				
1 Flodding 1 Sawanar sat 1	9	52.18889	3.090383	2.910451

Plant_Height_Date5	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	3	22	17	17	14	5	9	12	6
Local 1 Baygyar	3	0	19	14	20	17	8	12	9	3
Local 2 Kyarpyan	22	19	0	5	39	36	27	31	10	16
Local 3 Taungpyan	17	14	5	0	34	31	22	26	5	11
Salt 1 Pyimyanmarsein	17	20	39	34	0	3	12	8	29	23
Salt 2 IR-11T225	14	17	36	31	3	0	9	5	26	20
Salt 3 Sinthwelatt	5	8	27	22	12	9	0	4	17	11
Flodding 1 Swarna Sub-1	9	12	31	26	8	5	4	0	21	15
Flodding 2 Mekyut	12	9	10	5	29	26	17	21	0	6
Flodding 3 IR-84649.1295.30	6	3	16	11	23	20	11	15	6	0

Date 6:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 12:18:45
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date6

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	7369.402	1842.351	27.97	0.000000*	
B: Variety	9	16852.88	1872.542	14.32	0.000000*	1.000000
AB	36	4708.109	130.7808	1.99	0.000814*	
S	443	29176.33	65.8608			
Total (Adjusted)	492	58467.63				
Total	493					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	36.360000	9	0.000034	0.808000
Correction	36.360000	9	0.000034	0.808000

Multiplicity 0

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 12:18:45
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date6

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	493	51.43692		51.41432
A: Farmer_Village				
1	96	53.19479	0.8282813	1.579461
2	100	50.318	0.8115467	-1.096317
3	100	57.643	0.8115467	6.228683
4	97	50.2299	0.8240008	-1.130511
5	100	45.833	0.8115467	-5.581316
B: Variety				
Flodding 1 Sawanar sat-1	50	47.156	1.617287	-4.258317
Flodding 2 Mekyut	50	54.244	1.617287	2.829683
Flodding 3 IR-84649.1295.30	50	50.85	1.617287	-0.5643167
Local 1 Baygyar	49	52.80204	1.633706	1.360794
Local 2 Kyarpyan	50	61.838	1.617287	10.42368
Local 3 Taungpyan	48	57.77708	1.650636	6.144183
Salt 1 Pyimyanmarsein	50	41.882	1.617287	-9.532316
Salt 2 IR-225	48	43.83958	1.650636	-7.520317
Salt 3 Sinthwelatt	49	48.86327	1.633706	-2.597206
Zero Treatment Pawsanyin/Nagayar	49	55.11633	1.633706	3.714128

AB: Farmer_Village,Variety

Plant_Height_Date6	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	6	12	4	30	27	14	20	2	12
Local 1 Baygyar	6	0	18	10	24	21	8	14	4	6
Local 2 Kyarpyan	12	18	0	8	42	39	26	32	14	24
Local 3 Taungpyan	4	10	8	0	34	31	18	24	6	16
Salt 1 Pyimyanmarsein	30	24	42	34	0	3	16	10	28	18
Salt 2 IR-11T225	27	21	39	31	3	0	13	7	25	15
Salt 3 Sinthwelatt	14	8	26	18	16	13	0	6	12	2
Flodding 1 Swarna Sub-1	20	14	32	24	10	7	6	0	18	8
Flodding 2 Mekyut	2	4	14	6	28	25	12	18	0	10
Flodding 3 IR-84649.1295.30	12	6	24	16	18	15	2	8	10	0

Date 7:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 12:22:54
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date7

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	4771.634	1192.908	18.26	0.000000*	
B: Variety	9	22447.65	2494.184	18.31	0.000000*	1.000000
AB	36	4904.425	136.234	2.08	0.000344*	
S	446	29142.28	65.34143			
Total (Adjusted)	495	61227.45				
Total	496					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	37.014545	9	0.000026	0.822545
Correction	37.014545	9	0.000026	0.822545

Multiplicity 0

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 12:22:54
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date7

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	496	55.90101		55.88878
A: Farmer_Village				
1	99	54.03637	0.8124127	-1.974333
2	100	53.416	0.8083405	-2.472778
3	99	60.87778	0.8124127	4.886778
4	98	58.24388	0.8165472	2.440111
5	100	53.009	0.8083405	-2.879778
B: Variety				
Flodding 1 Sawanar sat-1	50	51.09	1.650661	-4.798778
Flodding 2 Mekyut	50	56.872	1.650661	0.9832222
Flodding 3 IR-84649.1295.30	50	54.418	1.650661	-1.470778
Local 1 Baygyar	49	61.3898	1.667419	5.572333
Local 2 Kyarpyan	50	65.5	1.650661	9.611222
Local 3 Taungpyan	50	63.814	1.650661	7.925222
Salt 1 Pyimyanmarsein	49	45.30612	1.667419	-10.47567
Salt 2 IR-225	49	45.60816	1.667419	-10.35589
Salt 3 Sinthwelatt	50	54.308	1.650661	-1.580778
Zero Treatment Pawsanyin/Nagayar	49	60.48775	1.667419	4.589889
AB: Farmer_Village Variety				

Plant_Height_Date7	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	4	10	6	28	28	13	19	5	12
Local 1 Baygyar	4	0	6	2	32	32	17	23	9	16
Local 2 Kyarpyan	10	6	0	4	38	38	23	29	15	22
Local 3 Taungpyan	6	2	4	0	34	34	19	25	11	18
Salt 1 Pyimyanmarsein	28	32	38	34	0	0	15	9	23	16
Salt 2 IR-11T225	28	32	38	34	0	0	15	9	23	16
Salt 3 Sinthwelatt	13	17	23	19	15	15	0	6	8	1
Flodding 1 Swarna Sub-1	19	23	29	25	9	9	6	0	14	7
Flodding 2 Mekyut	5	9	15	11	23	23	8	14	0	7
Flodding 3 IR-84649.1295.30	12	16	22	18	16	16	1	7	7	0

Date 8:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 12:27:18
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date8

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	6847.004	1711.751	17.56	0.000000*	
B: Variety	9	21359.96	2373.329	12.64	0.000000*	1.000000
AB	36	6758.059	187.7239	1.93	0.001343*	
S	449	43777.71	97.50047			
Total (Adjusted)	498	78661.07				
Total	499					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	34.963636	9	0.000060	0.776970
Correction	34.963636	9	0.000060	0.776970

Multiplicity 0

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	499	64.75892		64.73364
A: Farmer_Village				
1	99	61.52727	0.9923977	-3.300422
2	100	62.054	0.9874232	-2.679644
3	100	68.889	0.9874232	4.155355
4	100	69.622	0.9874232	4.888356
5	100	61.67	0.9874232	-3.063644
B: Variety				
Flodding 1 Sawanar sat-1	50	60.606	1.937647	-4.127645
Flodding 2 Mekyut	50	64.03	1.937647	-0.7036445
Flodding 3 IR-84649.1295.30	50	62.974	1.937647	-1.759644
Local 1 Baygyar	50	70.492	1.937647	5.758356
Local 2 Kyarpyan	50	74.026	1.937647	9.292356
Local 3 Taungpyan	50	71.634	1.937647	6.900355
Salt 1 Pyimyanmarsein	50	53.662	1.937647	-11.07164
Salt 2 IR-225	49	55.25714	1.957319	-9.5392
Salt 3 Sinthwelatt	50	64.806	1.937647	7.235555E-02
Zero Treatment Pawsanyin/Nagayar	50	69.912	1.937647	5.178356
AB: Farmer_Village,Variety				

Plant_Height_Date8	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	5	13	8	27	25	6	13	8	12
Local 1 Baygyar	5	0	8	3	32	30	11	18	13	17
Local 2 Kyarpyan	13	8	0	5	40	38	19	26	21	25
Local 3 Taungpyan	8	3	5	0	35	33	14	21	16	20
Salt 1 Pyimyanmarsein	27	32	40	35	0	2	21	14	19	15
Salt 2 IR-11T225	25	30	38	33	2	0	19	12	17	13
Salt 3 Sinthwelatt	6	11	19	14	21	19	0	7	2	6
Flodding 1 Swarna Sub-1	13	18	26	21	14	12	7	0	5	1
Flodding 2 Mekyut	8	13	21	16	19	17	2	5	0	4
Flodding 3 IR-84649.1295.30	12	17	25	20	15	13	6	1	4	0

Date 9:

Analysis of Variance Report

Page/Date/Time	1	07.10.2017 12:43:08
Database		Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response		Hieght_Date9

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	13963.25	3490.813	40.59	0.000000*	
B: Variety	9	26174.09	2908.232	12.22	0.000000*	1.000000
AB	36	8567.155	237.9765	2.77	0.000001*	
S	448	38529.45	86.00323			
Total (Adjusted)	497	87412.98				
Total	498					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	35.269091	9	0.000053	0.783758
Correction	35.269091	9	0.000053	0.783758

Multiplicity 0

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	498	78.12249		78.11775
A: Farmer_Village				
1	100	77.53	0.9273793	-0.5877556
2	99	79.79495	0.9320512	1.607022
3	100	86.816	0.9273793	8.698244
4	100	75.947	0.9273793	-2.170756
5	99	70.46465	0.9320512	-7.546756
B: Variety				
Flodding 1 Sawanar sat-1	50	71.93	2.181635	-6.187756
Flodding 2 Mekyut	50	81.086	2.181635	2.968245
Flodding 3 IR-84649.1295.30	49	74.90816	2.203784	-3.2522
Local 1 Baygyar	49	84.57959	2.203784	6.392244
Local 2 Kyarpyan	50	87.068	2.181635	8.950245
Local 3 Taungpyan	50	84.804	2.181635	6.686244
Salt 1 Pyimyanmarsein	50	64.586	2.181635	-13.53176
Salt 2 IR-225	50	68.882	2.181635	-9.235756
Salt 3 Sinthwelatt	50	79.716	2.181635	1.598244
Zero Treatment Pawsanyin/Nagayar	50	83.73	2.181635	5.612245

_Height_Date9	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Treatment Pawsanyin	0	1	4	3	34	29	12	24	6	20
1 Baygyar	1	0	5	2	33	28	11	23	5	19
2 Kyarpyan	4	5	0	7	38	33	16	28	10	24
3 Taungpyan	3	2	7	0	31	26	9	21	3	17
Pyimyanmarsein	34	33	38	31	0	5	22	10	28	14
IR-11T225	29	28	33	26	5	0	17	5	23	9
Sinthwelatt	12	11	16	9	22	17	0	12	6	8
ling 1 Swarna Sub-1	24	23	28	21	10	5	12	0	18	4
ding 2 Mekyut	6	5	10	3	28	23	6	18	0	14
Flodding 3 IR-84649.1295.30	20	19	24	17	14	9	8	4	14	0

Date 10:

Analysis of Variance Report

Page/Date/Time 1 07.10.2017 12:39:06
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Height_Date10

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	26306.46	6576.615	57.33	0.000000*	
B: Variety	9	27309.13	3034.347	11.24	0.000000*	1.000000
AB	36	9715.516	269.8755	2.35	0.000030*	
S	449	51511.28	114.7244			
Total (Adjusted)	498	114922.6				
Total	499					

* Term significant at alpha = 0.05

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	33.174545	9	0.000125	0.737212
Correction	33.174545	9	0.000125	0.737212

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 12:39:06
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Height_Date10

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	499	84.9974		84.98182
A: Farmer_Village				
1	100	83.886	1.071095	-1.095822
2	100	89.412	1.071095	4.430178
3	100	96.065	1.071095	11.08318
4	99	80.6404	1.076491	-4.375711
5	100	74.94	1.071095	-10.04182
B: Variety				
Flodding 1 Sawanar sat-1	50	79.224	2.323254	-5.757822
Flodding 2 Mekyut	50	87.13	2.323254	2.148178
Flodding 3 IR-84649.1295.30	50	83.412	2.323254	-1.569822
Local 1 Baygyar	50	91.168	2.323254	6.186178
Local 2 Kyarpyan	50	94.75	2.323254	9.768178
Local 3 Taungpyan	50	91.706	2.323254	6.724178
Salt 1 Pyimyanmarsein	50	69.526	2.323254	-15.45582
Salt 2 IR-225	50	76.686	2.323254	-8.295822
Salt 3 Sinthwelatt	49	87.60408	2.346841	2.4144
Zero Treatment Pawsanyin/Nagayar	50	88.82	2.323254	3.838178

AB: Farmer_Village,Variety

Plant_Height_Date10	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	7	12	9	27	21	1	15	2	7
Local 1 Baygyar	7	0	5	2	34	28	8	22	9	14
Local 2 Kyarpyan	12	5	0	3	39	33	13	27	14	19
Local 3 Taungpyan	9	2	3	0	36	30	10	24	11	16
Salt 1 Pyimyanmarsein	27	34	39	36	0	6	26	12	25	20
Salt 2 IR-11T225	21	28	33	30	6	0	20	6	19	14
Salt 3 Sinthwelatt	1	8	13	10	26	20	0	14	1	6
Flodding 1 Swarna Sub-1	15	22	27	24	12	6	14	0	13	8
Flodding 2 Mekyut	2	9	14	11	25	19	1	13	0	5
Flodding 3 IR-84649.1295.30	7	14	19	16	20	14	6	8	5	0

Date 11:

Analysis of Variance Report

Page/Date/Time	1 07.10.2017 12:46:12
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date11

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	31315.24	7828.811	55.26	0.000000*	
B: Variety	9	25359.94	2817.771	7.43	0.000005*	0.999950
AB	36	13646.02	379.0562	2.68	0.000001*	
S	446	63183.98	141.6681			
Total (Adjusted)	495	134009.1				
Total	496					

* Term significant at alpha = 0.05

Treatment Ranks Section

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.014545	9	0.000949	0.622545
Correction	28.048544	9	0.000936	0.623301

Multiplicity 6

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 12:46:12
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Height_Date11

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	496	90.00907		90.05004
A: Farmer_Village				
1	99	91.73637	1.19624	1.739511
2	100	94.593	1.190244	4.542955
3	98	100.8694	1.202328	10.68784
4	99	85.59798	1.19624	-4.359267
5	100	77.439	1.190244	-12.61104
B: Variety				
Flodding 1 Sawanar sat-1	48	84.85833	2.810161	-4.807822
Flodding 2 Mekyut	50	91.83	2.753384	1.779956
Flodding 3 IR-84649.1295.30	50	86.96	2.753384	-3.090044
Local 1 Baygyar	50	96.464	2.753384	6.413956
Local 2 Kyarpyan	50	100.672	2.753384	10.62196
Local 3 Taungpyan	49	95.06939	2.781338	5.015511
Salt 1 Pyimyanmarsein	50	74.218	2.753384	-15.83204
Salt 2 IR-225	49	84.56734	2.781338	-5.239378
Salt 3 Sinthwelatt	50	90.968	2.753384	0.9179556
Zero Treatment Pawsanyin/Nagayar	50	94.27	2.753384	4.219955
AB: Farmer_Village,Variety				

Plant_Height_Date11	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T.	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	3	9	0	30	20	7	18	9	14
Local 1 Baygyar	3	0	6	3	33	23	10	21	12	17
Local 2 Kyarpyan	9	6	0	9	39	29	16	27	18	23
Local 3 Taungpyan	0	3	9	0	30	20	7	18	9	14
Salt 1 Pyimyanmarsein	30	33	39	30	0	11	23	12	21	17
Salt 2 IR-11T225	20	23	29	20	11	0	13	2	11	6
Salt 3 Sinthwelatt	7	10	16	7	23	13	0	11	2	7
Flodding 1 Swarna Sub-1	18	21	27	18	12	2	11	0	9	5
Flodding 2 Mekyut	9	12	18	9	21	11	2	9	0	5
Flodding 3 IR-84649.1295.30	14	17	23	14	17	6	7	5	5	0

Zokekali:

Summary

Weeks after Transplanting	Significance of Variety (Friedman Test, 8 Factors, 5 Blocks)	Significant differences (Wilcoxon-Wilcox Test n=5 k=8)
1	ANOVA: Yes ($F_{7,28}$= 28.05, p<0.01)	SMCT: F1, S2< 0T, L1, L2, L3 S1, S3<0T, L2
2	Yes (Q= 28.80, p<0.01)	S1<0T S1, S2, F1< L2
3	Yes (Q= 28.20, p<0.01)	S2<L2 S1, S2<0T
4	Yes (Q= 28.53, p<0.01)	F1, S2<0T, L2
5	Yes (Q= 28.73, p<0.01)	S2<L1, L2, L3 F1, S2<0T
6	Yes (Q= 28.46, p<0.01)	F1, S2<0T, L2, L3
7	Yes (Q= 29.73, p<0.01)	S2<L2 F1, S2<0T, L3
8	Yes (Q= 28.00, p<0.01)	F1<0T, L1, L2 F1, S2<L3
9	Yes (Q= 25.6, p<0.01)	F1, S2<0T
10	Yes (Q= 27.27, p<0.01)	S2<0T, L3
11	Yes (Q= 29.60, p<0.01)	S2<L2 F1,S1,S2<0T

Date 1:

Analysis of Variance Report

Page/Date/Time 1 08.10.2017 10:48:07
Database Z:\Users\Benjamin\Documents\ ... \\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date1

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_Village	4	2284.859	571.2147	13.79	0.000000*	
B: Variety	7	10972.39	1567.484	16.00	0.000000*	1.000000
AB	28	2742.3	97.93929	2.36	0.000170*	
S	360	14912.95	41.42487			
Total (Adjusted)	399	30912.5				
Total	400					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	38.63		38.63
A: Farmer_Village				
1	80	42.08625	0.7195907	3.45625
2	80	35.9275	0.7195907	-2.7025
3	80	36.25125	0.7195907	-2.37875
4	80	38.3625	0.7195907	-0.2675
5	80	40.5225	0.7195907	1.8925
B: Variety				
Flodding 1 Swarna Sub-1	50	32.106	1.399566	-6.524
Salt 2 IR-11T225	50	32.61	1.399566	-6.02
Local 1 Baygyar	50	42.298	1.399566	3.668
Local 2 Kyarpyan	50	45.144	1.399566	6.514
Local 3 Taungpyan	50	40.95	1.399566	2.32
Salt 1 Pyimyanmarsein	50	34.334	1.399566	-4.296
Salt 3 Sinthwelatt	50	35.724	1.399566	-2.906
Zero Treatment Pawsanyin	50	45.874	1.399566	7.244
AB: Farmer_Village,Variety				

Analysis of Variance Report

Page/Date/Time 3 08.10.2017 10:48:07
Database Z:\Users\Benjamin\Documents\ ... \\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date1

Scheffe's Multiple-Comparison Test

Response: Height_Date1
Term B: Variety

Alpha=0.050 Error Term=AB DF=28 MSE=97.93929 Critical Value=4.0638

Group	Count	Mean	Different From Groups
Flodding 1 Swarna Sub-1	50	32.106	Local 3 Taungpyan, Local 1 Baygyar Local 2 Kyarpyan, Zero Treatment Pawsanyin
Salt 2 IR-11T225	50	32.61	Local 3 Taungpyan, Local 1 Baygyar Local 2 Kyarpyan, Zero Treatment Pawsanyin
Salt 1 Pyimyanmarsein	50	34.334	Local 2 Kyarpyan, Zero Treatment Pawsanyin
Salt 3 Sinthwelatt	50	35.724	Local 2 Kyarpyan, Zero Treatment Pawsanyin
Local 3 Taungpyan	50	40.95	Flodding 1 Swarna Sub-1, Salt 2 IR-11T225
Local 1 Baygyar	50	42.298	Flodding 1 Swarna Sub-1, Salt 2 IR-11T225
Local 2 Kyarpyan	50	45.144	Flodding 1 Swarna Sub-1, Salt 2 IR-11T225 Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt
Zero Treatment Pawsanyin	50	45.874	Flodding 1 Swarna Sub-1, Salt 2 IR-11T225 Salt 1 Pyimyanmarsein, Salt 3 Sinthwelatt

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Page/Date/Time 4 08.10.2017 10:48:07
Database Z:\Users\Benjamin\Documents\ ... \\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date1

Tukey-Kramer Multiple-Comparison Test

Date2:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.800000	7	0.000157	0.822857
Correction	28.800000	7	0.000157	0.822857

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:44:59
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date2

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	395	42.44937		42.35883
A: Farmer_Village				
1	75	47.176	0.8000633	4.069083
2	80	39.165	0.774658	-3.193833
3	80	40.83625	0.774658	-1.522583
4	80	40.41625	0.774658	-1.942583
5	80	44.94875	0.774658	2.589917
B: Variety				
Flodding 1 Swarna Sub-1	46	36.38044	1.651922	-6.134167
Local 1 Baygyar	50	47.748	1.584468	5.389167
Local 2 Kyarpyan	50	49.854	1.584468	7.495167
Local 3 Taungpyan	50	46.018	1.584468	3.659167
Salt 1 Pyimyanmarsein	50	35.632	1.584468	-6.726833
Salt 2 IR-11T255	50	34.96	1.584468	-7.398833
Salt 3 Sinthwelatt	49	39.86735	1.600555	-2.522833
Zero Treatment Pawsanyin	50	48.598	1.584468	6.239167
AB: Farmer_Village Variety				

Plant_Height_Date2	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	2	4	5	24	14	20	23
Local 1 Baygyar	2	0	6	3	22	12	18	21
Local 2 Kyarpyan	4	6	0	9	28	18	24	27
Local 3 Taungpyan	5	3	9	0	19	9	15	18
Salt 1 Pyimyanmarsein	24	22	28	19	0	10	4	1
Salt 3 Sinthwelatt	14	12	18	9	10	0	6	9
Flodding 1 Swarna Sub-1	20	18	24	15	4	6	0	3
Salt 2 IR-11T225	23	21	27	18	1	9	3	0

Date 3:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.200000	7	0.000202	0.805714
Correction	28.200000	7	0.000202	0.805714

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:45:50
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date_3

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	397	51.11637		51.01231
A: Farmer_Village				
1	79	53.7443	1.050883	2.523528
2	79	46.83924	1.050883	-4.307445
3	79	48.99873	1.050883	-2.143972
4	80	51.2175	1.044295	0.2051944
5	80	54.735	1.044295	3.722694
B: Variety				
Flodding 1 Swarna Sub-1	49	42.59592	1.899613	-8.526972
Local 1 Baygyar	50	57.568	1.880521	6.555695
Local 2 Kyarpyan	50	59.39	1.880521	8.377694
Local 3 Taungpyan	50	58.588	1.880521	7.575695
Salt 1 Pyimyanmarsein	49	42.39388	1.899613	-8.694972
Salt 2 IR-11T255	49	40.96531	1.899613	-10.14453
Salt 3 Sinthwelatt	50	46.186	1.880521	-4.826305
Zero Treatment Pawsanyin	50	60.696	1.880521	9.683695

Plant_Height_Date3	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	5	1	4	24	18	23	25
Local 1 Baygyar	5	0	4	1	19	13	18	20
Local 2 Kyarpyan	1	4	0	3	23	17	22	24
Local 3 Taungpyan	4	1	3	0	20	14	19	21
Salt 1 Pyimyanmarsein	24	19	23	20	0	6	1	1
Salt 3 Sinthwelatt	18	13	17	14	6	0	5	7
Flodding 1 Swarna Sub-1	23	18	22	19	1	5	0	2
Salt 2 IR-11T225	25	20	24	21	1	7	2	0

Date 4:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.533333	7	0.000176	0.815238
Correction	28.533333	7	0.000176	0.815238

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:46:18
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date4

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	57.77795		57.75436
A: Farmer_Village				
1	80	59.95625	0.9784516	2.201889
2	80	51.635	0.9784516	-6.119361
3	79	54.2962	0.9846249	-3.532556
4	80	58.92125	0.9784516	1.166889
5	80	64.0375	0.9784516	6.283139
B: Variety				
Flodding 1 Swarna Sub-1	50	48.17	2.145791	-9.584361
Local 1 Baygyar	50	63.92	2.145791	6.165639
Local 2 Kyarpyan	50	67.14	2.145791	9.385639
Local 3 Taungpyan	50	64.792	2.145791	7.037639
Salt 1 Pyimyanmarsein	49	48.94898	2.167576	-8.817472
Salt 2 IR-11T255	50	46.118	2.145791	-11.63636
Salt 3 Sinthwelatt	50	54.54	2.145791	-3.214361
Zero Treatment Pawsanyin	50	68.418	2.145791	10.66364

Plant_Height_Date4	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	7	2	7	23	15	27	27
Local 1 Baygyar	7	0	5	0	16	8	20	20
Local 2 Kyarpyan	2	5	0	5	21	13	25	25
Local 3 Taungpyan	7	0	5	0	16	8	20	20
Salt 1 Pyimyanmarsein	23	16	21	16	0	8	4	4
Salt 3 Sinthwelatt	15	8	13	8	8	0	12	12
Flodding 1 Swarna Sub-1	27	20	25	20	4	12	0	0
Salt 2 IR-11T225	27	20	25	20	4	12	0	0

Date 5:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.733333	7	0.000162	0.820952
Correction	28.733333	7	0.000162	0.820952

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:46:33
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date5

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	65.06918		65.04447
A: Farmer_Village				
1	80	64.945	1.064831	-9.947222E-02
2	79	59.32152	1.07155	-5.774611
3	80	63.31875	1.064831	-1.725722
4	80	65.68125	1.064831	0.6367778
5	80	72.0075	1.064831	6.963028
B: Variety				
Flodding 1 Swarna Sub-1	50	53.726	2.383241	-11.31847
Local 1 Baygyar	50	72.75	2.383241	7.705528
Local 2 Kyarpyan	50	72.088	2.383241	7.043528
Local 3 Taungpyan	49	73.6347	2.407437	8.221306
Salt 1 Pyimyanmarsein	50	57.642	2.383241	-7.402472
Salt 2 IR-11T255	50	51.09	2.383241	-13.95447
Salt 3 Sinthwelatt	50	62.84	2.383241	-2.204472
Zero Treatment Pawsanyin	50	76.954	2.383241	11.90953

Plant_Height_Date5	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	4	5	3	20	14	25	29
Local 1 Baygyar	4	0	1	1	16	10	21	25
Local 2 Kyarpyan	5	1	0	2	15	9	20	24
Local 3 Taungpyan	3	1	2	0	17	11	22	26
Salt 1 Pyimyanmarsein	20	16	15	17	0	6	5	9
Salt 3 Sinthwelatt	14	10	9	11	6	0	11	15
Flodding 1 Swarna Sub-1	25	21	20	22	5	11	0	4
Salt 2 IR-11T225	29	25	24	26	9	15	4	0

Date 6:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.466667	7	0.000181	0.813333
Correction	28.466667	7	0.000181	0.813333

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:46:46
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date6

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	67.49787		67.45023
A: Farmer_Village				
1	79	67.86709	1.040055	0.1740694
2	80	60.83375	1.033534	-6.616486
3	80	67.18875	1.033534	-0.2614861
4	80	67.4675	1.033534	1.726389E-02
5	80	74.13687	1.033534	6.686639
B: Variety				
Flodding 1 Swarna Sub-1	49	55.0449	2.456061	-12.53735
Local 1 Baygyar	50	75.386	2.431376	7.935764
Local 2 Kyarpyan	50	75.534	2.431376	8.083764
Local 3 Taungpyan	50	76.49	2.431376	9.039763
Salt 1 Pyimyanmarsein	50	60.542	2.431376	-6.908236
Salt 2 IR-11T255	50	54.491	2.431376	-12.95924
Salt 3 Sinthwelatt	50	64.881	2.431376	-2.569236
Zero Treatment Pawsanyin	50	77.365	2.431376	9.914763
AB: Farmer_Village Variety				

Plant_Height_Date6	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	2	1	0	16	15	25	25
Local 1 Baygyar	2	0	1	2	14	13	23	23
Local 2 Kyarpyan	1	1	0	1	15	14	24	24
Local 3 Taungpyan	0	2	1	0	16	15	25	25
Salt 1 Pyimyanmarsein	16	14	15	16	0	1	9	9
Salt 3 Sinthwelatt	15	13	14	15	1	0	10	10
Flodding 1 Swarna Sub-1	25	23	24	25	9	10	0	0
Salt 2 IR-11T225	25	23	24	25	9	10	0	0

Date 7:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	29.733333	7	0.000106	0.849524
Correction	29.733333	7	0.000106	0.849524

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:46:56
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date7

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	69.222		69.222
A: Farmer_Village				
1	80	68.29125	0.947632	-0.93075
2	80	62.91875	0.947632	-6.30325
3	80	69.38	0.947632	0.158
4	80	69.25375	0.947632	0.03175
5	80	76.26625	0.947632	7.04425
B: Variety				
Flodding 1 Swarna Sub-1	50	54.968	2.37134	-14.254
Local 1 Baygyar	50	76.75	2.37134	7.528
Local 2 Kyarpyan	50	76.778	2.37134	7.556
Local 3 Taungpyan	50	78.728	2.37134	9.506
Salt 1 Pyimyanmarsein	50	63.32	2.37134	-5.902
Salt 2 IR-11T255	50	54.59	2.37134	-14.632
Salt 3 Sinthwelatt	50	68.752	2.37134	-0.47
Zero Treatment Pawsanyin	50	79.89	2.37134	10.668

AB: Farmer_Village Variety

Plant_Height_Date7	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	4	3	0	18	14	26	27
Local 1 Baygyar	4	0	1	4	14	10	22	23
Local 2 Kyarpyan	3	1	0	3	15	11	23	24
Local 3 Taungpyan	0	4	3	0	18	14	26	27
Salt 1 Pyimyanmarsein	18	14	15	18	0	4	8	9
Salt 3 Sinthwelatt	14	10	11	14	4	0	12	13
Flodding 1 Swarna Sub-1	26	22	23	26	8	12	0	1
Salt 2 IR-11T225	27	23	24	27	9	13	1	0

Date 8:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.000000	7	0.000220	0.800000
Correction	28.000000	7	0.000220	0.800000

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:47:08
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date8

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	71.2093		71.208
A: Farmer_Village				
1	80	67.45625	1.003449	-3.751747
2	79	65.42658	1.00978	-5.715636
3	80	75.1025	1.003449	3.894503
4	80	71.82762	1.003449	0.6196278
5	80	76.16125	1.003449	4.953253
B: Variety				
Flodding 1 Swarna Sub-1	50	55.1622	2.145728	-16.0458
Local 1 Baygyar	50	80.238	2.145728	9.030003
Local 2 Kyarpyan	50	79.038	2.145728	7.830003
Local 3 Taungpyan	49	81.88979	2.167512	10.45778
Salt 1 Pyimyanmarsein	50	62.096	2.145728	-9.111998
Salt 2 IR-11T255	50	56.444	2.145728	-14.764
Salt 3 Sinthwelatt	50	73.474	2.145728	2.266003
Zero Treatment Pawsanyin	50	81.546	2.145728	10.338
AB: Farmer_Village,Variety				

Plant_Height_Date8	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	0	1	2	17	8	24	22
Local 1 Baygyar	0	0	1	2	17	8	24	22
Local 2 Kyarpyan	1	1	0	1	18	9	25	23
Local 3 Taungpyan	2	2	1	0	19	10	26	24
Salt 1 Pyimyanmarsein	17	17	18	19	0	9	7	5
Salt 3 Sinthwelatt	8	8	9	10	9	0	16	14
Flodding 1 Swarna Sub-1	24	24	25	26	7	16	0	2
Salt 2 IR-11T225	22	22	23	24	5	14	2	0

Date 9:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	25.600000	7	0.000594	0.731429
Correction	25.600000	7	0.000594	0.731429
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:47:22
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Hieght_Date9

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	396	75.91641		75.75871
A: Farmer_Village				
1	80	74.59125	1.156622	-1.167465
2	80	68.75875	1.156622	-6.999965
3	79	80.91266	1.163919	4.981423
4	80	79.605	1.156622	3.846285
5	77	75.77143	1.178938	-0.6602778
B: Variety				
Flodding 1 Swarna Sub-1	49	60.11633	3.621022	-15.88671
Local 1 Baygyar	50	87.77	3.584629	12.01128
Local 2 Kyarpyan	50	85.764	3.584629	10.00528
Local 3 Taungpyan	50	90.714	3.584629	14.95529
Salt 1 Pyimyanmarsein	50	62.51	3.584629	-13.24872
Salt 2 IR-11T255	47	53.85957	3.697263	-21.27699
Salt 3 Sinthwelatt	50	73.582	3.584629	-2.176715
Zero Treatment Pawsanyin	50	91.376	3.584629	15.61728
AB: Farmer_Village,Variety				

Plant_Height_Date9	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	4	4	3	22	10	24	25
Local 1 Baygyar	4	0	0	1	18	6	20	21
Local 2 Kyarpyan	4	0	0	1	18	6	20	21
Local 3 Taungpyan	3	1	1	0	19	7	21	22
Salt 1 Pyimyanmarsein	22	18	18	19	0	12	2	3
Salt 3 Sinthwelatt	10	6	6	7	12	0	14	15
Flodding 1 Swarna Sub-1	24	20	20	21	2	14	0	1
Salt 2 IR-11T225	25	21	21	22	3	15	1	0

Date 10:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	27.266667	7	0.000298	0.779048
Correction	27.266667	7	0.000298	0.779048

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:47:34
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date10

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	393	84.25776		83.99607
A: Farmer_Village				
1	80	87.73875	1.474069	3.742681
2	79	73.91139	1.483369	-10.36051
3	79	86.03038	1.483369	1.633236
4	76	91.42632	1.512363	6.299139
5	79	82.41013	1.483369	-1.314542
B: Variety				
Flodding 1 Swarna Sub-1	50	64.31	4.545178	-19.68607
Local 1 Baygyar	49	98.80204	4.591323	14.91238
Local 2 Kyarpyan	50	98.104	4.545178	14.10793
Local 3 Taungpyan	50	106.184	4.545178	22.18793
Salt 1 Pyimyanmarsein	48	64.26458	4.638903	-19.90562
Salt 2 IR-11T255	47	55.37447	4.687994	-28.48618
Salt 3 Sinthwelatt	49	78.91633	4.591323	-4.892292
Zero Treatment Pawsanyin	50	105.758	4.545178	21.76193

Plant_Height_Date10	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	3	3	1	22	11	20	26
Local 1 Baygyar	3	0	0	4	19	8	17	23
Local 2 Kyarpyan	3	0	0	4	19	8	17	23
Local 3 Taungpyan	1	4	4	0	23	12	21	27
Salt 1 Pyimyanmarsein	22	19	19	23	0	11	2	4
Salt 3 Sinthwelatt	11	8	8	12	11	0	9	15
Flodding 1 Swarna Sub-1	20	17	17	21	2	9	0	6
Salt 2 IR-11T225	26	23	23	27	4	15	6	0

Date 11:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	29.600000	7	0.000112	0.845714
Correction	29.600000	7	0.000112	0.845714

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 08.10.2017 11:17:43
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Height_Date11

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	397	90.11108		89.9512
A: Farmer_Village				
1	80	94.15	1.195331	4.198799
2	80	83.2525	1.195331	-6.698701
3	80	88.74375	1.195331	-1.207451
4	78	93.67693	1.210559	3.262861
5	79	90.83038	1.202873	0.4444931
B: Variety				
Flodding 1 Swarna Sub-1	50	66.932	5.286386	-23.0192
Flodding 2 Mekyut	49	60.4449	5.340056	-29.59409
Local 1 Baygyar	50	111.096	5.286386	21.1448
Local 2 Kyarpyan	50	107.632	5.286386	17.6808
Local 3 Taungpyan	50	111.254	5.286386	21.3028
Salt 1 Pyimyanmarsein	50	66.222	5.286386	-23.7292
Salt 3 Sinthwelatt	48	80.4	5.395395	-9.760701
Zero Treatment Pawsanyin	50	115.926	5.286386	25.9748

AB: Farmer_Village Variety

Plant_Height_Date11	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	7	5	10	27	21	25	29
Local 1 Baygyar	7	0	2	3	20	14	18	22
Local 2 Kyarpyan	5	2	0	5	22	16	20	24
Local 3 Taungpyan	10	3	5	0	17	11	15	19
Salt 1 Pyimyanmarsein	27	20	22	17	0	6	2	2
Salt 3 Sinthwelatt	21	14	16	11	6	0	4	8
Flodding 1 Swarna Sub-1	25	18	20	15	2	4	0	4
Salt 2 IR-11T225	29	22	24	19	2	8	4	0

Tillers:

Boyargyi:
Summary:

Weeks after Transplanting	Significance of Variety (Friedman Test, 10 Factors, 5 Blocks)	Significant differences (Wilcoxon-Wilcox Test n=5 k=10)
1	No (Q= 7.25, p=0.62)	
2	No (Q= 7.16, p=0.62)	
3	No (Q= 14.82, p=0.10)	
4	No (Q= 15.44, p=0.08)	
5	No (Q= 15.00, p=0.09)	
6	No (Q= 12.00, p=0.21)	
7	No (Q= 14.77, p=0.10)	
8	No (Q= 6.81, p=0.66)	
9	No (Q= 7.90, p=0.54)	
10	No (Q= 6.83, p=0.65)	
11	No (Q= 14.61, p=0.10)	

Date 1:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	7.189091	9	0.617440	0.159758
Correction	7.250611	9	0.611045	0.161125

Multiplicity 42

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 14:47:20
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date1

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	5.752		5.752
A: Farmer_Village				
1	100	5.68	0.2845581	-0.072
2	100	5.06	0.2845581	-0.692
3	100	6.6	0.2845581	0.848
4	100	6.05	0.2845581	0.298
5	100	5.37	0.2845581	-0.382
B: Variety				
Flodding 1 Sawanar sat-1	50	6.74	0.4634005	0.988
Flodding 2 Mekyut	50	5.86	0.4634005	0.108
Flodding 3 IR-84649.1295.30	50	5.24	0.4634005	-0.512
Local 1 Baygyar	50	5.56	0.4634005	-0.192
Local 2 Kyarpyan	50	5.24	0.4634005	-0.512
Local 3 Taungpyan	50	5.24	0.4634005	-0.512
Salt 1 Pyimyanmarsein	50	6.04	0.4634005	0.288
Salt 2 IR-225	50	6.24	0.4634005	0.488
Salt 3 Sinthwelatt	50	5.48	0.4634005	-0.272
Zero Treatment Pawsanyin/Nagayar	50	5.88	0.4634005	0.128

Date 2:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	7.145455	9	0.621978	0.158788
Correction	7.162819	9	0.620172	0.159174

Multiplicity 12

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:04:00
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date2

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	434	5.497696		5.366714
A: Farmer_Village				
1	86	4.581395	0.285866	-0.8033413
2	84	3.964286	0.2892491	-1.484214
3	82	4.865854	0.2927553	-0.602627
4	97	8.319588	0.2691695	2.951063
5	85	5.329412	0.2875426	-6.088095E-02
B: Variety				
Flodding 1 Sawanar sat-1	44	6.25	0.5198771	0.6955873
Flodding 2 Mekyut	43	6.302326	0.5258874	0.8221746
Flodding 3 IR-84649.1295.30	45	4.622222	0.5140682	-0.9422699
Local 1 Baygyar	39	5.25641	0.5521979	-0.2508413
Local 2 Kyarpyan	46	4.978261	0.5084499	-0.4156032
Local 3 Taungpyan	44	5.795455	0.5198771	0.3738413
Salt 1 Pyimyanmarsein	46	5.630435	0.5084499	0.2066191
Salt 2 IR-225	45	5.733333	0.5140682	0.1783651
Salt 3 Sinthwelatt	45	5.155556	0.5140682	-0.2506032
Zero Treatment Pawsanyin/Nagayar	37	5.243243	0.5669257	-0.4172699
AB: Farmer_Village,Variety				

Date 3:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	14.781818	9	0.097106	0.328485
Correction	14.817740	9	0.096066	0.329283

Multiplicity 12

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:13:24
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date3

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	446	4.094171		3.991722
A: Farmer_Village				
1	76	3.118421	0.2434386	-1.106167
2	95	3.663158	0.2177381	-0.3589444
3	93	3.55914	0.2200669	-0.4756111
4	92	5.554348	0.2212597	1.539191
5	90	4.433333	0.2237046	0.4015318
B: Variety				
Flodding 1 Sawanar sat-1	44	4.340909	0.3712904	0.0705
Flodding 2 Mekyut	50	4.1	0.3483013	0.1082778
Flodding 3 IR-84649.1295.30	47	4.12766	0.3592453	0.1071667
Local 1 Baygyar	43	3.790698	0.3755829	-0.1917222
Local 2 Kyarpyan	48	4.291667	0.3554835	0.2432778
Local 3 Taungpyan	43	4.186047	0.3755829	0.1527222
Salt 1 Pyimyanmarsein	47	5.021276	0.3592453	0.9966111
Salt 2 IR-225	41	3.634146	0.3846344	-0.5478333
Salt 3 Sinthwelatt	44	4.113636	0.3712904	3.494444E-02
Zero Treatment Pawsanyin/Nagayar	39	3.102564	0.3943735	-0.9739444
AB: Farmer_Village,Variety				

Date 4:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	15.381818	9	0.080968	0.341818
Correction	15.437956	9	0.079587	0.343066

Multiplicity 18

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:14:15
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date4

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	447	4.957494		4.809294
A: Farmer_Village				
1	86	4.22093	0.324709	-0.7459603
2	98	5.408163	0.3041799	0.5384842
3	81	4.283951	0.3345808	-0.6503254
4	94	6.43617	0.3105844	1.472929
5	88	4.215909	0.3209979	-0.615127
B: Variety				
Flodding 1 Sawanar sat-1	48	4.979167	0.6094736	0.1440397
Flodding 2 Mekyut	44	5.772727	0.6365744	0.7948334
Flodding 3 IR-84649.1295.30	49	4.897959	0.6032224	9.515079E-02
Local 1 Baygyar	45	4.466667	0.6294616	-0.4848492
Local 2 Kyarpyan	43	5.348837	0.6439338	0.5407063
Local 3 Taungpyan	45	5.6	0.6294616	0.5751508
Salt 1 Pyimyanmarsein	48	6.104167	0.6094736	1.279595
Salt 2 IR-225	39	4.25641	0.6761502	-0.8421508
Salt 3 Sinthwelatt	49	4.816327	0.6032224	-2.262698E-02
Zero Treatment Pawsanyin/Nagayar	37	2.837838	0.6941841	-2.079849

Date 5:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	14.923636	9	0.093055	0.331636
Correction	14.996346	9	0.091036	0.333252

Multiplicity 24

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:14:57
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date5

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	453	6.253863		6.063548
A: Farmer_Village				
1	92	5.25	0.3823822	-0.8766032
2	99	7.333333	0.3686158	1.232008
3	81	5.82716	0.4075201	-0.6049762
4	92	7.978261	0.3823822	1.60423
5	89	4.696629	0.3887734	-1.354659
B: Variety				
Flodding 1 Sawanar sat-1	47	5.93617	0.8192188	-0.1774365
Flodding 2 Mekyut	45	6.711111	0.8372257	0.5164524
Flodding 3 IR-84649.1295.30	48	6.333333	0.8106403	0.2186746
Local 1 Baygyar	47	4.744681	0.8192188	-1.331325
Local 2 Kyarpyan	48	5.875	0.8106403	-0.1879921
Local 3 Taungpyan	41	6.902439	0.8771157	0.3247857
Salt 1 Pyimyanmarsein	48	8.4375	0.8106403	2.406452
Salt 2 IR-225	46	5.869565	0.8280755	-0.3024365
Salt 3 Sinthwelatt	45	7.133333	0.8372257	0.8469286
Zero Treatment Pawsanyin/Nagayar	38	4.31579	0.9110811	-2.314103

Date 6:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	11.967273	9	0.215161	0.265939
Correction	11.996355	9	0.213515	0.266586

Multiplicity 12

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:16:06
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date6

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	493	7.472617		7.449111
A: Farmer_Village				
1	96	6.53125	0.4248919	-0.943
2	100	8.44	0.4163073	0.9908889
3	100	7.97	0.4163073	0.5208889
4	97	7.484536	0.422696	-1.966667E-02
5	100	6.9	0.4163073	-0.5491111
B: Variety				
Flodding 1 Sawanar sat-1	50	8.22	0.8727891	0.7708889
Flodding 2 Mekyut	50	7.7	0.8727891	0.2508889
Flodding 3 IR-84649.1295.30	50	7.42	0.8727891	-2.911111E-02
Local 1 Baygyar	49	6.530612	0.8816501	-0.9002222
Local 2 Kyarpyan	50	7.4	0.8727891	-4.911111E-02
Local 3 Taungpyan	48	7.5	0.8907866	-5.911111E-02
Salt 1 Pyimyanmarsein	50	8.94	0.8727891	1.490889
Salt 2 IR-225	48	7.208333	0.8907866	-0.2591111
Salt 3 Sinthwelatt	49	8.530612	0.8816501	1.030889
Zero Treatment Pawsanyin/Nagayar	49	5.22449	0.8816501	-2.246889

Date 7:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	14.716364	9	0.099027	0.327030
Correction	14.770073	9	0.097448	0.328224
Multiplicity	18			

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:16:45
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date7

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	496	11.94355		11.94178
A: Farmer_Village				
1	99	11	0.6265038	-0.9395555
2	100	12.55	0.6233634	0.6082222
3	99	14.18182	0.6265038	2.219333
4	98	11.41837	0.6296921	-0.5162222
5	100	10.57	0.6233634	-1.371778
B: Variety				
Flodding 1 Sawanar sat-1	50	14.34	1.3789	2.398222
Flodding 2 Mekyut	50	12.12	1.3789	0.1782222
Flodding 3 IR-84649.1295.30	50	10.42	1.3789	-1.521778
Local 1 Baygyar	49	10.93878	1.392899	-0.9395555
Local 2 Kyarpyan	50	11.22	1.3789	-0.7217778
Local 3 Taungpyan	50	12.32	1.3789	0.3782222
Salt 1 Pyimyanmarsein	49	13.67347	1.392899	1.700444
Salt 2 IR-225	49	10.95918	1.392899	-0.9773333
Salt 3 Sinthwelatt	50	14.3	1.3789	2.358222
Zero Treatment Pawsanyin/Nagayar	49	9.081633	1.392899	-2.852889

Date 8:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	6.796364	9	0.658311	0.151030
Correction	6.812880	9	0.656594	0.151397
Multiplicity	12			

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:17:26
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date8

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	499	13.72545		13.722
A: Farmer_Village				
1	99	11.84848	0.752946	-1.872
2	100	12.37	0.7491718	-1.352
3	100	14.4	0.7491718	0.678
4	100	13.46	0.7491718	-0.262
5	100	16.53	0.7491718	2.808
B: Variety				
Flodding 1 Sawanar sat-1	50	14.62	1.293676	0.898
Flodding 2 Mekyut	50	14.7	1.293676	0.978
Flodding 3 IR-84649.1295.30	50	12.62	1.293676	-1.102
Local 1 Baygyar	50	13.84	1.293676	0.118
Local 2 Kyarpyan	50	13.86	1.293676	0.138
Local 3 Taungpyan	50	13.1	1.293676	-0.622
Salt 1 Pyimyanmarsein	50	14	1.293676	0.278
Salt 2 IR-225	49	12.44898	1.30681	-1.282
Salt 3 Sinthwelatt	50	15.58	1.293676	1.858
Zero Treatment Pawsanyin/Nagayar	50	12.46	1.293676	-1.262
AB: Farmer_Village Variety				

Date 9:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	7.898182	9	0.544439	0.175515
Correction	7.907767	9	0.543467	0.175728
Multiplicity	6			

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 15:18:18
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Tillers_Date9

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	498	12.61446		12.60111
A: Farmer_Village				
1	100	9.54	0.7093321	-3.061111
2	99	9.121212	0.7129056	-3.52
3	100	19.35	0.7093321	6.748889
4	100	10.33	0.7093321	-2.271111
5	99	14.71717	0.7129056	2.103333
B: Variety				
Flodding 1 Sawanar sat-1	50	12.6	1.26864	-1.111111E-03
Flodding 2 Mekyut	50	14.06	1.26864	1.458889
Flodding 3 IR-84649.1295.30	49	10.40816	1.28152	-2.298889
Local 1 Baygyar	49	14	1.28152	1.387778
Local 2 Kyarpyan	50	12.96	1.26864	0.3588889
Local 3 Taungpyan	50	13.42	1.26864	0.8188889
Salt 1 Pyimyanmarsein	50	11.48	1.26864	-1.121111
Salt 2 IR-225	50	11.42	1.26864	-1.181111
Salt 3 Sinthwelatt	50	13.56	1.26864	0.9588889
Zero Treatment Pawsanyin/Nagayar	50	12.22	1.26864	-0.3811111
AB: Farmer_Village,Variety				

Date 10:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	6.818182	9	0.656043	0.151515
Correction	6.834751	9	0.654319	0.151883
Multiplicity	12			

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 15:19:36
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Tillers_Date10

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	499	12.02405		12.01311
A: Farmer_Village				
1	100	11.29	0.6553212	-0.7231111
2	100	11.18	0.6553212	-0.8331111
3	100	15.2	0.6553212	3.186889
4	99	10.10101	0.6586226	-1.947556
5	100	12.33	0.6553212	0.3168889
B: Variety				
Flodding 1 Sawanar sat-1	50	11.32	1.380329	-0.6931111
Flodding 2 Mekyut	50	13.16	1.380329	1.146889
Flodding 3 IR-84649.1295.30	50	9.22	1.380329	-2.793111
Local 1 Baygyar	50	13.96	1.380329	1.946889
Local 2 Kyarpyan	50	12.1	1.380329	8.688889E-02
Local 3 Taungpyan	50	13.28	1.380329	1.266889
Salt 1 Pyimyanmarsein	50	11.28	1.380329	-0.7331111
Salt 2 IR-225	50	10.62	1.380329	-1.393111
Salt 3 Sinthwelatt	49	12.26531	1.394343	0.138
Zero Treatment Pawsanyin/Nagayar	50	13.04	1.380329	1.026889
AB: Farmer_Village,Variety				

Date 11:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	14.574545	9	0.103305	0.323879
Correction	14.609964	9	0.102222	0.324666

Multiplicity 12

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:21:19
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Tillers_Date11

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	496	11.57258		11.58289
A: Farmer_Village				
1	99	11.29293	0.656229	-0.2828889
2	100	10.53	0.6529396	-1.052889
3	98	15.33673	0.6595685	3.667111
4	99	9.777778	0.656229	-1.728444
5	100	10.98	0.6529396	-0.6028889
B: Variety				
Flodding 1 Sawanar sat-1	48	10.4375	1.453086	-1.096222
Flodding 2 Mekyut	50	13.74	1.423728	2.157111
Flodding 3 IR-84649.1295.30	50	7.96	1.423728	-3.622889
Local 1 Baygyar	50	14.38	1.423728	2.797111
Local 2 Kyarpyan	50	11.7	1.423728	0.1171111
Local 3 Taungpyan	49	12.59184	1.438182	1.106
Salt 1 Pyimyanmarsein	50	10.22	1.423728	-1.362889
Salt 2 IR-225	49	9.571428	1.438182	-1.989556
Salt 3 Sinthwelatt	50	12.18	1.423728	0.5971111
Zero Treatment Pawsanyin/Nagayar	50	12.88	1.423728	1.297111
AB: Farmer_Village,Variety				

Zokekali:

Summary:

Weeks after Transplanting	Significance of Variety (Friedman Test, 8 Factors, 5 Blocks)	Significant differences (Wilcoxon-Wilcox Test n=5 k=8)
1	No (Q= 3.44, p=0.84)	
2	No (Q= 7.76, p=0.35)	
3	No (Q= 3.36, p=0.85)	
4	No (Q= 8.40, p=0.30)	
5	No (Q= 10.18, p=0.18)	
6	No (Q= 6.40, p=0.49)	
7	No (Q= 6.26, p=0.51)	
8	No (Q= 11.20, p=0.13)	
9	Yes (Q= 17.00, p=0.01)	
10	No (Q= 12.98, p=0.07)	
11	No (Q= 9.75, p=0.20)	

Date 1:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	3.383333	7	0.847424	0.096667
Correction	3.440678	7	0.841468	0.098305
Multiplicity	42			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:51:24
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date1

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	6.445		6.445
A: Farmer_Village				
1	80	8.425	0.4218511	1.98
2	80	3.6375	0.4218511	-2.8075
3	80	6.8125	0.4218511	0.3675
4	80	4.475	0.4218511	-1.97
5	80	8.875	0.4218511	2.43
B: Variety				
Flodding 1 Swarna Sub-1	50	5.96	0.617654	-0.485
Local 1 Baygyar	50	6.68	0.617654	0.235
Local 2 Kyarpyan	50	5.98	0.617654	-0.465
Local 3 Taungpyan	50	6.22	0.617654	-0.225
Salt 1 Pyimyanmarsein	50	6.82	0.617654	0.375
Salt 2 IR-11T255	50	6.06	0.617654	-0.385
Salt 3 Sinthwelatt	50	6.66	0.617654	0.215
Zero Treatment Pawsanyin	50	7.18	0.617654	0.735
AB: Farmer_Village,Variety				

Date 2:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	7.750000	7	0.355154	0.221429
Correction	7.768496	7	0.353450	0.221957
Multiplicity	6			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:51:38
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date2

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	395	7.617722		7.570278
A: Farmer_Village				
1	75	7.64	0.4753053	-0.1688889
2	80	5.85	0.4602123	-1.720278
3	80	6.2125	0.4602123	-1.357778
4	80	7.825	0.4602123	0.2547222
5	80	10.5625	0.4602123	2.992222
B: Variety				
Flodding 1 Swarna Sub-1	46	8.23913	0.7424685	0.2497222
Local 1 Baygyar	50	7.36	0.7121507	-0.2102778
Local 2 Kyarpyan	50	7.98	0.7121507	0.4097222
Local 3 Taungpyan	50	7.46	0.7121507	-0.1102778
Salt 1 Pyimyanmarsein	50	6.98	0.7121507	-0.5902778
Salt 2 IR-11T255	50	6.44	0.7121507	-1.130278
Salt 3 Sinthwelatt	49	8	0.7193809	0.4119444
Zero Treatment Pawsanyin	50	8.54	0.7121507	0.9697222
AB: Farmer_Village,Variety				

Date 3:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	3.350000	7	0.850849	0.095714
Correction	3.357995	7	0.850030	0.095943

Multiplicity 6

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:51:50
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date3

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	397	8.743073		8.718056
A: Farmer_Village				
1	79	6.721519	0.5473801	-2.038889
2	79	6.316456	0.5473801	-2.423611
3	79	7.303797	0.5473801	-1.401389
4	80	9.875	0.5439482	1.156944
5	80	13.425	0.5439482	4.706944
B: Variety				
Flodding 1 Swarna Sub-1	49	8.857142	0.865624	2.861111E-02
Local 1 Baygyar	50	8.52	0.8569241	-0.1980556
Local 2 Kyarpyan	50	8.64	0.8569241	-7.805555E-02
Local 3 Taungpyan	50	8.14	0.8569241	-0.5780556
Salt 1 Pyimyanmarsein	49	8.612245	0.865624	-0.1113889
Salt 2 IR-11T255	49	8.061225	0.865624	-0.7269444
Salt 3 Sinthwelatt	50	9.16	0.8569241	0.4419445
Zero Treatment Pawsanyin	50	9.94	0.8569241	1.221944

Date 4:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	8.400000	7	0.298646	0.240000
Correction	8.400000	7	0.298646	0.240000

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:52:04
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date4

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	12.69674		12.70278
A: Farmer_Village				
1	80	9.8	0.8276996	-2.902778
2	80	9.8125	0.8276996	-2.890278
3	79	11.35443	0.8329217	-1.301389
4	80	14.375	0.8276996	1.672222
5	80	18.125	0.8276996	5.422222
B: Variety				
Flodding 1 Swarna Sub-1	50	13.08	1.247576	0.3772222
Local 1 Baygyar	50	12.9	1.247576	0.1972222
Local 2 Kyarpyan	50	12.16	1.247576	-0.5427778
Local 3 Taungpyan	50	12.8	1.247576	9.722222E-02
Salt 1 Pyimyanmarsein	49	13.55102	1.260242	0.8794444
Salt 2 IR-11T255	50	10.26	1.247576	-2.442778
Salt 3 Sinthwelatt	50	11.72	1.247576	-0.9827778
Zero Treatment Pawsanyin	50	15.12	1.247576	2.417222
AB: Farmer_Village Variety				

Date 5:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	10.133333	7	0.181143	0.289524
Correction	10.181818	7	0.178502	0.290909
Multiplicity	12			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:52:16
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date5

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	15.40351		15.385
A: Farmer_Village				
1	80	14.85	0.9301736	-0.535
2	79	12.79747	0.9360422	-2.6475
3	80	15.925	0.9301736	0.54
4	80	16.275	0.9301736	0.89
5	80	17.1375	0.9301736	1.7525
B: Variety				
Flodding 1 Swarna Sub-1	50	14.3	1.746218	-1.085
Local 1 Baygyar	50	16.86	1.746218	1.475
Local 2 Kyarpyan	50	15.22	1.746218	-0.165
Local 3 Taungpyan	49	16.06122	1.763946	0.515
Salt 1 Pyimyanmarsein	50	16.56	1.746218	1.175
Salt 2 IR-11T255	50	12.92	1.746218	-2.465
Salt 3 Sinthwelatt	50	13.52	1.746218	-1.865
Zero Treatment Pawsanyin	50	17.8	1.746218	2.415
AB: Farmer_Village Variety				

Date 6:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	6.366667	7	0.497646	0.181905
Correction	6.397129	7	0.494217	0.182775
Multiplicity	12			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:52:27
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date6

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	13.55138		13.54139
A: Farmer_Village				
1	79	13.67089	0.7717857	7.805555E-02
2	80	9.9625	0.7669469	-3.578889
3	80	14.7125	0.7669469	1.171111
4	80	14.35	0.7669469	0.8086111
5	80	15.0625	0.7669469	1.521111
B: Variety				
Flodding 1 Swarna Sub-1	49	13.26531	1.239963	-0.3502778
Local 1 Baygyar	50	14.46	1.227501	0.9186111
Local 2 Kyarpyan	50	13.58	1.227501	3.861111E-02
Local 3 Taungpyan	50	14	1.227501	0.4586111
Salt 1 Pyimyanmarsein	50	13.74	1.227501	0.1986111
Salt 2 IR-11T255	50	11.72	1.227501	-1.821389
Salt 3 Sinthwelatt	50	12.36	1.227501	-1.181389
Zero Treatment Pawsanyin	50	15.28	1.227501	1.738611

Date 7:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	6.250000	7	0.510880	0.178571
Correction	6.264916	7	0.509179	0.178998
Multiplicity	6			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:52:41
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date7

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	17.83		17.83
A: Farmer_Village				
1	80	19.6625	1.001475	1.8325
2	80	12.9625	1.001475	-4.8675
3	80	21.1	1.001475	3.27
4	80	17.65	1.001475	-0.18
5	80	17.775	1.001475	-0.055
B: Variety				
Flodding 1 Swarna Sub-1	50	18.38	1.711692	0.55
Local 1 Baygyar	50	19.38	1.711692	1.55
Local 2 Kyarpyan	50	17.66	1.711692	-0.17
Local 3 Taungpyan	50	17.78	1.711692	-0.05
Salt 1 Pyimyanmarsein	50	18.48	1.711692	0.65
Salt 2 IR-11T255	50	13.9	1.711692	-3.93
Salt 3 Sinthwelatt	50	17.06	1.711692	-0.77
Zero Treatment Pawsanyin	50	20	1.711692	2.17
AB: Farmer_Village.Variety				

Date 8:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	11.200000	7	0.130130	0.320000
Correction	11.200000	7	0.130130	0.320000
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:52:54
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date8

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	14.59398		14.57389
A: Farmer_Village				
1	80	19.0875	0.8001615	4.513611
2	79	10.58228	0.8052099	-4.041945
3	80	19.6375	0.8001615	5.063611
4	80	12.4	0.8001615	-2.173889
5	80	11.2125	0.8001615	-3.361389
B: Variety				
Flodding 1 Swarna Sub-1	50	16.86	1.51929	2.286111
Local 1 Baygyar	50	16.64	1.51929	2.066111
Local 2 Kyarpyan	50	15.38	1.51929	0.8061111
Local 3 Taungpyan	49	14.22449	1.534714	-0.5027778
Salt 1 Pyimyanmarsein	50	12.54	1.51929	-2.033889
Salt 2 IR-11T255	50	10.74	1.51929	-3.833889
Salt 3 Sinthwelatt	50	13.84	1.51929	-0.7338889
Zero Treatment Pawsanyin	50	16.52	1.51929	1.946111

Date 9:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	17.000000	7	0.017396	0.485714
Correction	17.000000	7	0.017396	0.485714

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:53:07
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date9

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	396	14.63384		14.57382
A: Farmer_Village				
1	80	21.575	0.825675	7.001181
2	80	9.7	0.825675	-4.873819
3	79	18.55696	0.8308843	3.885903
4	80	13.55	0.825675	-1.023819
5	77	9.649351	0.8416058	-4.989444
B: Variety				
Flodding 1 Swarna Sub-1	49	18.67347	1.967836	3.886181
Local 1 Baygyar	50	16.46	1.948058	1.886181
Local 2 Kyarpyan	50	16.42	1.948058	1.846181
Local 3 Taungpyan	50	15.38	1.948058	0.8061805
Salt 1 Pyimyanmarsein	50	12.12	1.948058	-2.45382
Salt 2 IR-11T255	47	7.510638	2.009268	-6.983264
Salt 3 Sinthwelatt	50	12.62	1.948058	-1.953819
Zero Treatment Pawsanyin	50	17.54	1.948058	2.966181
AB: Farmer_Village Variety				

Tillers_Date9	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 3 Sinthw	Flodding 1 Sv	Salt 2 IR-11T225
Zero Treatment Pawsanyin	0	0	1	4	15	11	1	22
Local 1 Baygyar	0	0	1	4	15	11	1	22
Local 2 Kyarpyan	1	1	0	3	14	10	2	21
Local 3 Taungpyan	4	4	3	0	11	7	5	18
Salt 1 Pyimyanmarsein	15	15	14	11	0	4	16	7
Salt 3 Sinthwelatt	11	11	10	7	4	0	12	11
Flodding 1 Swarna Sub-1	1	1	2	5	16	12	0	23
Salt 2 IR-11T225	22	22	21	18	7	11	23	0

Date 10:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	12.950000	7	0.073336	0.370000
Correction	12.980907	7	0.072575	0.370883
Multiplicity	6			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:53:18
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date10

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	393	11.95929		11.87451
A: Farmer_Village				
1	80	18.275	0.7096192	6.400486
2	79	6.481013	0.7140964	-5.402292
3	79	15.77215	0.7140964	3.847708
4	76	7.894737	0.728054	-4.118611
5	79	11.13924	0.7140964	-0.7272916
B: Variety				
Flodding 1 Swarna Sub-1	50	16.9	2.183704	5.025486
Local 1 Baygyar	49	12	2.205875	0.1210417
Local 2 Kyarpyan	50	12.7	2.183704	0.8254861
Local 3 Taungpyan	50	11.18	2.183704	-0.6945139
Salt 1 Pyimyanmarsein	48	10.10417	2.228734	-1.963403
Salt 2 IR-11T255	47	7.531915	2.252319	-4.333958
Salt 3 Sinthwelatt	49	11.28571	2.205875	-0.725625
Zero Treatment Pawsanyin	50	13.62	2.183704	1.745486
AB: Farmer_Village Variety				

Date 11:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	9.666667	7	0.208263	0.276190
Correction	9.759615	7	0.202610	0.278846
Multiplicity	24			

Analysis of Variance Report

Page/Date/Time 2 09.10.2017 15:53:32
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Tillers_Date11

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	397	12.36776		12.34771
A: Farmer_Village				
1	80	17.275	0.6636225	4.927292
2	80	9.825	0.6636225	-2.522708
3	80	11.875	0.6636225	-0.4727083
4	78	11.29487	0.6720766	-1.100833
5	79	11.53165	0.6678094	-0.8310417
B: Variety				
Flodding 1 Swarna Sub-1	50	16.94	1.612247	4.592292
Local 1 Baygyar	50	12.26	1.612247	-8.770833E-02
Local 2 Kyarpyan	50	12.58	1.612247	0.2322917
Local 3 Taungpyan	50	12.94	1.612247	0.5922917
Salt 1 Pyimyanmarsein	50	10.24	1.612247	-2.107708
Salt 2 IR-11T255	49	9.816326	1.628615	-2.521042
Salt 3 Sinthwelatt	48	11.41667	1.645493	-1.012708
Zero Treatment Pawsanyin	50	12.66	1.612247	0.3122917
AB: Farmer_Village Variety				

Leaf Colour:

Boyargyi:
Summary:

Weeks after Transplanting	Significance of Variety (Friedman Test, 10 Factors, 5 Blocks)	Significant differences (Wilcoxon-Wilcox Test n=5 k=10)
1	Yes (Q= 28.24, p<0.01)	L1<F3 0T<F3, S1
2	No (Q= 11.32, p=0.25)	
3	Yes (Q= 22.77, p<0.01)	L1, S2<S1
4	Yes (Q= 25.05, p<0.01)	0T, L1, S2<S1
5	No (Q= 13.22, p=0.15)	
6	Yes (Q= 29.56, p<0.01)	0T, F2, L1<S1
7	Yes (Q= 22.90, p<0.01)	0T<S1
8	Yes (Q= 28.93, p<0.01)	F2<F1, S1, S3
9	No (Q= 12.23, p=0.20)	
10	Yes (Q= 17.26, p=0.04)	
11	Yes (Q= 29.43, p<0.01)	0T, F2, L3<S1

Date 1:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	27.556364	9	0.001131	0.612364
Correction	28.240994	9	0.000869	0.627578
Multiplicity	120			

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 15:58:42
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Colour_Date1

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.522		2.522
A: Farmer_Village				
1	100	2.54	5.836666E-02	0.018
2	100	2.34	5.836666E-02	-0.182
3	100	2.55	5.836666E-02	0.028
4	100	2.49	5.836666E-02	-0.032
5	100	2.69	5.836666E-02	0.168
B: Variety				
Flodding 1 Sawanar sat-1	50	2.44	0.1296405	-0.082
Flodding 2 Mekyut	50	2.48	0.1296405	-0.042
Flodding 3 IR-84649.1295.30	50	2.94	0.1296405	0.418
Local 1 Baygyar	50	2.24	0.1296405	-0.282
Local 2 Kyarpyan	50	2.68	0.1296405	0.158
Local 3 Taungpyan	50	2.46	0.1296405	-0.062
Salt 1 Pyimyanmarsein	50	2.92	0.1296405	0.398
Salt 2 IR-225	50	2.72	0.1296405	0.198
Salt 3 Sinthwelatt	50	2.18	0.1296405	-0.342
Zero Treatment Pawsanyin/Nagayar	50	2.16	0.1296405	-0.362

Leaf_Colour_Date1	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	2	20	8	32	22	7	9	12	34
Local 1 Baygyar	2	0	18	6	30	20	5	7	10	32
Local 2 Kyarpyan	20	18	0	12	12	2	13	12	8	14
Local 3 Taungpyan	8	6	12	0	24	14	1	1	4	26
Salt 1 Pyimyanmarsein	32	30	12	24	0	10	25	23	20	3
Salt 2 IR-11T225	22	20	2	14	10	0	15	14	10	12
Salt 3 Sinthwelatt	7	5	13	1	25	15	0	2	5	27
Flodding 1 Swarna Sub-1	9	7	12	1	23	14	2	0	4	26
Flodding 2 Mekyut	12	10	8	4	20	10	5	4	0	22
Flodding 3 IR-84649.1295.3(	34	32	14	26	3	12	27	26	22	0

Date 2:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	11.072727	9	0.270757	0.246061
Correction	11.319703	9	0.254430	0.251549
Multiplicity	108			

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 16:02:39
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Coulour_Date2

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	0.656		0.656
A: Farmer_Village				
1	100	0.41	7.797436E-02	-0.246
2	100	0.85	7.797436E-02	0.194
3	100	0.41	7.797436E-02	-0.246
4	100	1.02	7.797436E-02	0.364
5	100	0.59	7.797436E-02	-0.066
B: Variety				
Flodding 1 Sawanar sat-1	50	0.38	0.1775262	-0.276
Flodding 2 Mekyut	50	0.74	0.1775262	0.084
Flodding 3 IR-84649.1295.30	50	1.12	0.1775262	0.464
Local 1 Baygyar	50	0.32	0.1775262	-0.336
Local 2 Kyarpyan	50	0.74	0.1775262	0.084
Local 3 Taungpyan	50	0.78	0.1775262	0.124
Salt 1 Pyimyanmarsein	50	0.72	0.1775262	0.064
Salt 2 IR-225	50	0.72	0.1775262	0.064
Salt 3 Sinthwelatt	50	0.62	0.1775262	-0.036
Zero Treatment Pawsanyin/Nagayar	50	0.42	0.1775262	-0.236

Date 3:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	22.352727	9	0.007826	0.496727
Correction	22.766667	9	0.006742	0.505926

Multiplicity 90

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 16:03:19
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Colour_Date3

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	1.64		1.64
A: Farmer_Village				
1	100	1.44	9.526571E-02	-0.2
2	100	2.24	9.526571E-02	0.6
3	100	1.79	9.526571E-02	0.15
4	100	1.81	9.526571E-02	0.17
5	100	0.92	9.526571E-02	-0.72
B: Variety				
Flodding 1 Sawanar sat-1	50	1.56	0.2136196	-0.08
Flodding 2 Mekyut	50	1.76	0.2136196	0.12
Flodding 3 IR-84649.1295.30	50	1.84	0.2136196	0.2
Local 1 Baygyar	50	1.3	0.2136196	-0.34
Local 2 Kyarpyan	50	1.76	0.2136196	0.12
Local 3 Taungpyan	50	1.68	0.2136196	0.04
Salt 1 Pyimyanmarsein	50	2.36	0.2136196	0.72
Salt 2 IR-225	50	1.18	0.2136196	-0.46
Salt 3 Sinthwelatt	50	1.78	0.2136196	0.14
Zero Treatment Pawsanyin/Nagayar	50	1.18	0.2136196	-0.46
AB: Farmer_Village Variety				

Leaf_Colour_Date3	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	3	9	9	29	4	10	0	7	14
Local 1 Baygyar	3	0	11	11	31	2	13	3	9	16
Local 2 Kyarpyan	9	11	0	0	20	13	2	9	2	5
Local 3 Taungpyan	9	11	0	0	20	13	2	9	2	5
Salt 1 Pyimyanmarsein	29	31	20	20	0	33	19	29	22	15
Salt 2 IR-11T225	4	2	13	13	33	0	14	4	11	18
Salt 3 Sinthwelatt	10	13	2	2	19	14	0	10	4	4
Flodding 1 Swarna Sub-1	0	3	9	9	29	4	10	0	7	14
Flodding 2 Mekyut	7	9	2	2	22	11	4	7	0	7
Flodding 3 IR-84649.1295.3(	14	16	5	5	15	18	4	14	7	0

Date 4:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	24.109091	9	0.004132	0.535758
Correction	25.050378	9	0.002916	0.556675

Multiplicity 186

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 16:05:21
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Colour_Date4

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.33		2.33
A: Farmer_Village				
1	100	2.28	9.735388E-02	-0.05
2	100	2.78	9.735388E-02	0.45
3	100	2.08	9.735388E-02	-0.25
4	100	2.52	9.735388E-02	0.19
5	100	1.99	9.735388E-02	-0.34
B: Variety				
Flodding 1 Sawanar sat-1	50	2.48	0.2381876	0.15
Flodding 2 Mekyut	50	2.18	0.2381876	-0.15
Flodding 3 IR-84649.1295.30	50	2.78	0.2381876	0.45
Local 1 Baygyar	50	2.04	0.2381876	-0.29
Local 2 Kyarpyan	50	2.28	0.2381876	-0.05
Local 3 Taungpyan	50	2.4	0.2381876	0.07
Salt 1 Pyimyanmarsein	50	3.24	0.2381876	0.91
Salt 2 IR-225	50	1.92	0.2381876	-0.41
Salt 3 Sinthwelatt	50	2.36	0.2381876	0.03
Zero Treatment Pawsanyin/Nagayar	50	1.62	0.2381876	-0.71
AB: Farmer_Village Variety				

Leaf_Colour_Date4	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	3	13	21	36	5	18	19	11	26
Local 1 Baygyar	3	0	10	18	33	2	15	16	8	23
Local 2 Kyarpyan	13	10	0	8	23	9	5	6	2	13
Local 3 Taungpyan	21	18	8	0	15	17	4	3	10	5
Salt 1 Pyimyanmarsein	36	33	23	15	0	32	19	18	25	11
Salt 2 IR-11T225	5	2	9	17	32	0	13	14	7	21
Salt 3 Sinthwelatt	18	15	5	4	19	13	0	1	7	8
Flodding 1 Swarna Sub-1	19	16	6	3	18	14	1	0	8	7
Flodding 2 Mekyut	11	8	2	10	25	7	7	8	0	15
Flodding 3 IR-84649.1295.3(	26	23	13	5	11	21	8	7	15	0

Date 5:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	12.981818	9	0.163431	0.288485
Correction	13.222222	9	0.152806	0.293827

Multiplicity 90

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 16:07:39
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Colour_Date5

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.872		2.872
A: Farmer_Village				
1	100	2.7	8.656404E-02	-0.172
2	100	2.9	8.656404E-02	0.028
3	100	2.47	8.656404E-02	-0.402
4	100	3.41	8.656404E-02	0.538
5	100	2.88	8.656404E-02	0.008
B: Variety				
Flodding 1 Sawanar sat-1	50	2.86	0.2790579	-0.012
Flodding 2 Mekyut	50	2.72	0.2790579	-0.152
Flodding 3 IR-84649.1295.30	50	3	0.2790579	0.128
Local 1 Baygyar	50	3.08	0.2790579	0.208
Local 2 Kyarpyan	50	2.98	0.2790579	0.108
Local 3 Taungpyan	50	2.44	0.2790579	-0.432
Salt 1 Pyimyanmarsein	50	3.66	0.2790579	0.788
Salt 2 IR-225	50	2.98	0.2790579	0.108
Salt 3 Sinthwelatt	50	2.76	0.2790579	-0.112
Zero Treatment Pawsanyin/Nagayar	50	2.24	0.2790579	-0.632
AB: Farmer_Village Variety				

Date 6:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.843636	9	0.000689	0.640970
Correction	29.560248	9	0.000521	0.656894
Multiplicity	120			

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 16:08:23
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Colour_Date6

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.908		2.908
A: Farmer_Village				
1	100	2.82	5.838569E-02	-0.088
2	100	2.88	5.838569E-02	-0.028
3	100	3.12	5.838569E-02	0.212
4	100	2.76	5.838569E-02	-0.148
5	100	2.96	5.838569E-02	0.052
B: Variety				
Flodding 1 Sawanar sat-1	50	2.94	0.1080946	0.032
Flodding 2 Mekyut	50	2.56	0.1080946	-0.348
Flodding 3 IR-84649.1295.30	50	3.24	0.1080946	0.332
Local 1 Baygyar	50	2.6	0.1080946	-0.308
Local 2 Kyarpyan	50	2.74	0.1080946	-0.168
Local 3 Taungpyan	50	2.7	0.1080946	-0.208
Salt 1 Pyimyanmarsein	50	3.78	0.1080946	0.872
Salt 2 IR-225	50	2.88	0.1080946	-0.028
Salt 3 Sinthwelatt	50	3.08	0.1080946	0.172
Zero Treatment Pawsanyin/Nagayar	50	2.56	0.1080946	-0.348

AB: Farmer_Village_Variety

Leaf_Colour_Date6	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	0	7	7	35	9	21	17	1	26
Local 1 Baygyar	0	0	7	7	35	9	21	17	1	26
Local 2 Kyarpyan	7	7	0	0	28	3	15	11	7	20
Local 3 Taungpyan	7	7	0	0	28	3	15	11	7	20
Salt 1 Pyimyanmarsein	35	35	28	28	0	26	14	18	35	9
Salt 2 IR-11T225	9	9	3	3	26	0	12	8	10	17
Salt 3 Sinthwelatt	21	21	15	15	14	12	0	4	22	5
Flodding 1 Swarna Sub-1	17	17	11	11	18	8	4	0	18	9
Flodding 2 Mekyut	1	1	7	7	35	10	22	18	0	27
Flodding 3 IR-84649.1295.3(	26	26	20	20	9	17	5	9	27	0

Date 7:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	21.796364	9	0.009547	0.484364
Correction	22.907006	9	0.006409	0.509045
Multiplicity	240			

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 16:11:15
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Colour_Date7

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.62		2.62
A: Farmer_Village				
1	100	2.67	5.159673E-02	0.05
2	100	2.55	5.159673E-02	-0.07
3	100	2.62	5.159673E-02	0
4	100	2.67	5.159673E-02	0.05
5	100	2.59	5.159673E-02	-0.03
B: Variety				
Flodding 1 Sawanar sat-1	50	2.88	0.116046	0.26
Flodding 2 Mekyut	50	2.32	0.116046	-0.3
Flodding 3 IR-84649.1295.30	50	2.82	0.116046	0.2
Local 1 Baygyar	50	2.44	0.116046	-0.18
Local 2 Kyarpyan	50	2.6	0.116046	-0.02
Local 3 Taungpyan	50	2.54	0.116046	-0.08
Salt 1 Pyimyanmarsein	50	2.96	0.116046	0.34
Salt 2 IR-225	50	2.66	0.116046	0.04
Salt 3 Sinthwelatt	50	2.76	0.116046	0.14
Zero Treatment Pawsanyin/Nagayar	50	2.22	0.116046	-0.4
AB: Farmer_Village Variety				

Leaf_Colour_Date7	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	16	12	16	33	20	24	29	5	27
Local 1 Baygyar	16	0	4	1	17	5	8	14	11	12
Local 2 Kyarpyan	12	4	0	4	21	8	12	17	8	15
Local 3 Taungpyan	16	1	4	0	17	4	8	13	12	11
Salt 1 Pyimyanmarsein	33	17	21	17	0	13	9	4	28	6
Salt 2 IR-11T225	20	5	8	4	13	0	4	9	16	7
Salt 3 Sinthwelatt	24	8	12	8	9	4	0	6	19	4
Flodding 1 Swarna Sub-1	29	14	17	13	4	9	6	0	25	2
Flodding 2 Mekyut	5	11	8	12	28	16	19	25	0	23
Flodding 3 IR-84649.1295.3(	27	12	15	11	6	7	4	2	23	0

Date 8:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	26.301818	9	0.001823	0.584485
Correction	28.932000	9	0.000665	0.642933

Multiplicity 450

Analysis of Variance Report

Page/Date/Time 2 07.10.2017 16:13:30
Database Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response Leaf_Colour_Date8

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	3.61		3.61
A: Farmer_Village				
1	100	3.37	4.353798E-02	-0.24
2	100	3.37	4.353798E-02	-0.24
3	100	3.92	4.353798E-02	0.31
4	100	3.67	4.353798E-02	0.06
5	100	3.72	4.353798E-02	0.11
B: Variety				
Flodding 1 Sawanar sat-1	50	3.88	9.267626E-02	0.27
Flodding 2 Mekyut	50	3.1	9.267626E-02	-0.51
Flodding 3 IR-84649.1295.30	50	3.6	9.267626E-02	-0.01
Local 1 Baygyar	50	3.5	9.267626E-02	-0.11
Local 2 Kyarpyan	50	3.62	9.267626E-02	0.01
Local 3 Taungpyan	50	3.34	9.267626E-02	-0.27
Salt 1 Pyimyanmarsein	50	3.86	9.267626E-02	0.25
Salt 2 IR-225	50	3.8	9.267626E-02	0.19
Salt 3 Sinthwelatt	50	3.92	9.267626E-02	0.31
Zero Treatment Pawsanyin/Nagayar	50	3.48	9.267626E-02	-0.13
AB: Farmer_Village Variety				

Leaf_Colour_Date8	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	2	6	8	14	13	20	18	17	7
Local 1 Baygyar	2	0	8	7	16	14	21	19	15	8
Local 2 Kyarpyan	6	8	0	14	8	7	14	12	23	1
Local 3 Taungpyan	8	7	14	0	22	21	28	26	9	15
Salt 1 Pyimyanmarsein	14	16	8	22	0	2	6	4	31	8
Salt 2 IR-11T225	13	14	7	21	2	0	7	5	29	6
Salt 3 Sinthwelatt	20	21	14	28	6	7	0	2	36	13
Flodding 1 Swarna Sub-1	18	19	12	26	4	5	2	0	34	11
Flodding 2 Mekyut	17	15	23	9	31	29	36	34	0	23
Flodding 3 IR-84649.1295.3(	7	8	1	15	8	6	13	11	23	0

Date 9:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	11.978182	9	0.214542	0.266182
Correction	12.230198	9	0.200641	0.271782

Multiplicity 102

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 16:15:11
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Leaf_Colour_Date9

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.856		2.856
A: Farmer_Village				
1	100	2.64	5.601587E-02	-0.216
2	100	3.08	5.601587E-02	0.224
3	100	3.11	5.601587E-02	0.254
4	100	2.8	5.601587E-02	-0.056
5	100	2.65	5.601587E-02	-0.206
B: Variety				
Flodding 1 Sawanar sat-1	50	3.02	0.1377356	0.164
Flodding 2 Mekyut	50	2.48	0.1377356	-0.376
Flodding 3 IR-84649.1295.30	50	2.94	0.1377356	0.084
Local 1 Baygyar	50	2.82	0.1377356	-0.036
Local 2 Kyarpyan	50	2.88	0.1377356	0.024
Local 3 Taungpyan	50	2.76	0.1377356	-0.096
Salt 1 Pyimyanmarsein	50	3.06	0.1377356	0.204
Salt 2 IR-225	50	3.02	0.1377356	0.164
Salt 3 Sinthwelatt	50	3	0.1377356	0.144
Zero Treatment Pawsanyin/Nagayar	50	2.58	0.1377356	-0.276
AB: Farmer_Village Variety				

Date 10:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	16.843636	9	0.051222	0.374303
Correction	17.262112	9	0.044766	0.383602

Multiplicity	120

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 16:16:04
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Leaf_Colour_Date10

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.936		2.936
A: Farmer_Village				
1	100	3.12	5.024385E-02	0.184
2	100	3.13	5.024385E-02	0.194
3	100	2.88	5.024385E-02	-0.056
4	100	2.66	5.024385E-02	-0.276
5	100	2.89	5.024385E-02	-0.046
B: Variety				
Flodding 1 Sawanar sat-1	50	2.84	0.2077766	-0.096
Flodding 2 Mekyut	50	2.48	0.2077766	-0.456
Flodding 3 IR-84649.1295.30	50	3.44	0.2077766	0.504
Local 1 Baygyar	50	2.7	0.2077766	-0.236
Local 2 Kyarpyan	50	2.96	0.2077766	0.024
Local 3 Taungpyan	50	2.74	0.2077766	-0.196
Salt 1 Pyimyanmarsein	50	3.64	0.2077766	0.704
Salt 2 IR-225	50	2.84	0.2077766	-0.096
Salt 3 Sinthwelatt	50	3.04	0.2077766	0.104
Zero Treatment Pawsanyin/Nagayar	50	2.68	0.2077766	-0.256
AB: Farmer_Village,Variety				

Leaf_Colour_Date10	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	2	11	4	28	6	10	8	1	22
Local 1 Baygyar	2	0	9	2	26	4	8	6	1	20
Local 2 Kyarpyan	11	9	0	7	18	5	1	3	10	12
Local 3 Taungpyan	4	2	7	0	25	2	7	4	3	19
Salt 1 Pyimyanmarsein	28	26	18	25	0	23	18	21	27	6
Salt 2 IR-11T225	6	4	5	2	23	0	5	2	5	17
Salt 3 Sinthwelatt	10	8	1	7	18	5	0	3	9	12
Flodding 1 Swarna Sub-1	8	6	3	4	21	2	3	0	7	15
Flodding 2 Mekyut	1	1	10	3	27	5	9	7	0	21
Flodding 3 IR-84649.1295.3(	22	20	12	19	6	17	12	15	21	0

Date 11:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	29.040000	9	0.000638	0.645333
Correction	29.432432	9	0.000548	0.654054
Multiplicity	66			

Analysis of Variance Report

Page/Date/Time	2 07.10.2017 16:17:07
Database	Z:\Users\Benjamin\Documents\ ... ial\PH+T+LC-Data-Boyargyi.S0
Response	Leaf_Colour_Date11

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	500	2.944		2.944
A: Farmer_Village				
1	100	3.27	5.509588E-02	0.326
2	100	3.19	5.509588E-02	0.246
3	100	2.95	5.509588E-02	0.006
4	100	2.6	5.509588E-02	-0.344
5	100	2.71	5.509588E-02	-0.234
B: Variety				
Flodding 1 Sawanar sat-1	50	3.12	0.155077	0.176
Flodding 2 Mekyut	50	2.5	0.155077	-0.444
Flodding 3 IR-84649.1295.30	50	3.26	0.155077	0.316
Local 1 Baygyar	50	2.7	0.155077	-0.244
Local 2 Kyarpyan	50	3.1	0.155077	0.156
Local 3 Taungpyan	50	2.6	0.155077	-0.344
Salt 1 Pyimyanmarsein	50	3.6	0.155077	0.656
Salt 2 IR-225	50	3.12	0.155077	0.176
Salt 3 Sinthwelatt	50	2.86	0.155077	-0.084
Zero Treatment Pawsanyin/Nagayar	50	2.58	0.155077	-0.364

Leaf_Colour_Date11	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	4	20	0	31	21	10	23	3	25
Local 1 Baygyar	4	0	16	4	27	17	6	19	7	21
Local 2 Kyarpyan	20	16	0	20	11	1	11	3	23	5
Local 3 Taungpyan	0	4	20	0	31	21	10	23	3	25
Salt 1 Pyimyanmarsein	31	27	11	31	0	11	22	9	34	7
Salt 2 IR-11T225	21	17	1	21	11	0	11	2	23	4
Salt 3 Sinthwelatt	10	6	11	10	22	11	0	13	12	15
Flodding 1 Swarna Sub-1	23	19	3	23	9	2	13	0	25	2
Flodding 2 Mekyut	3	7	23	3	34	23	12	25	0	27
Flodding 3 IR-84649.1295.3(	25	21	5	25	7	4	15	2	27	0

Zokekali:
Summary:

Weeks after Transplanting	Significance of Variety (Friedman Test, 8 Factors, 5 Blocks)	Significant differences (Wilcoxon-Wilcox Test n=5 k=8)
1	No (Q= 13.29, p=0.07)	
2	No (Q= 8.08, p=0.32)	
3	Yes (Q= 14.14, p=0.05)	
4	Yes (Q= 14.88, p=0.04)	
5	Yes (Q= 21.54, p<0.01)	L3<F1
6	Yes (Q= 23.44, p<0.01)	L3<F1
7	Yes (Q= 22.97, p<0.01)	0T, L1, L3<F1
8	Yes (Q= 14.53, p=0.04)	
9	No (Q= 10.79, p=0.15)	
10	Yes (Q= 27.76, p<0.01)	S2<0T, L1, L2
11	No (Q= 13.57, p=0.06)	

Date 1:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	12.633333	7	0.081562	0.360952
Correction	13.298246	7	0.065167	0.379950
Multiplicity	126			

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:36:30
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Colour_Date1

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	2.645		2.645
A: Farmer_No				
1	80	2.625	5.898446E-02	-0.02
2	80	2.8875	5.898446E-02	0.2425
3	80	2.35	5.898446E-02	-0.295
4	80	2.65	5.898446E-02	0.005
5	80	2.7125	5.898446E-02	0.0675
B: Variety				
Flodding 1 Swarna Sub-1	50	2.86	9.671386E-02	0.215
Local 1 Baygyar	50	2.64	9.671386E-02	-0.005
Local 2 Kyarpyan	50	2.68	9.671386E-02	0.035
Local 3 Taungpyan	50	2.5	9.671386E-02	-0.145
Salt 1 Pyimyanmarsein	50	2.4	9.671386E-02	-0.245
Salt 2 IR-11T255	50	2.68	9.671386E-02	0.035
Salt 3 Sinthwelatt	50	2.82	9.671386E-02	0.175
Zero Treatment Pawsanyin	50	2.58	9.671386E-02	-0.065
AB: Farmer_No,Variety				

Date 2:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	7.800000	7	0.350560	0.222857
Correction	8.088889	7	0.324821	0.231111
Multiplicity	90			

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:37:26
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Coulour_Date2

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	2.5925		2.5925
A: Farmer_No				
1	80	2.6	6.452282E-02	0.0075
2	80	2.575	6.452282E-02	-0.0175
3	80	2.45	6.452282E-02	-0.1425
4	80	2.6375	6.452282E-02	0.045
5	80	2.7	6.452282E-02	0.1075
B: Variety				
Flodding 1 Swarna Sub-1	50	2.54	0.1404584	-0.0525
Local 1 Baygyar	50	2.58	0.1404584	-0.0125
Local 2 Kyarpyan	50	2.72	0.1404584	0.1275
Local 3 Taungpyan	50	2.58	0.1404584	-0.0125
Salt 1 Pyimyanmarsein	50	2.36	0.1404584	-0.2325
Salt 2 IR-11T255	50	2.62	0.1404584	0.0275
Salt 3 Sinthwelatt	50	2.66	0.1404584	0.0675
Zero Treatment Pawsanyin	50	2.68	0.1404584	0.0875
AB: Farmer_No,Variety				

Date 3:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	13.466667	7	0.061522	0.384762
Correction	14.140000	7	0.048747	0.404000
Multiplicity	120			

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:37:45
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Colour_Date3

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	2.8275		2.8275
A: Farmer_No				
1	80	2.675	6.294288E-02	-0.1525
2	80	2.8	6.294288E-02	-0.0275
3	80	2.6	6.294288E-02	-0.2275
4	80	2.9375	6.294288E-02	0.11
5	80	3.125	6.294288E-02	0.2975
B: Variety				
Flodding 1 Swarna Sub-1	50	3.16	0.1510203	0.3325
Local 1 Baygyar	50	2.6	0.1510203	-0.2275
Local 2 Kyarpyan	50	2.7	0.1510203	-0.1275
Local 3 Taungpyan	50	2.66	0.1510203	-0.1675
Salt 1 Pyimyanmarsein	50	2.64	0.1510203	-0.1875
Salt 2 IR-11T255	50	3.18	0.1510203	0.3525
Salt 3 Sinthwelatt	50	2.92	0.1510203	0.0925
Zero Treatment Pawsanyin	50	2.76	0.1510203	-0.0675

AB: Farmer_No Variety

Leaf_Colour_Date3	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	10	4	6	4	11	7	10
Local 1 Baygyar	10	0	6	4	6	21	16	19
Local 2 Kyarpyan	4	6	0	2	0	15	11	14
Local 3 Taungpyan	6	4	2	0	2	17	12	15
Salt 1 Pyimyanmarsein	4	6	0	2	0	15	11	14
Salt 2 IR-11T225	11	21	15	17	15	0	5	2
Salt 3 Sinthwelatt	7	16	11	12	11	5	0	3
Flodding 1 Swarna Sub-1	10	19	14	15	14	2	3	0

Date 4:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	14.450000	7	0.043733	0.412857
Correction	14.875000	7	0.037636	0.425000

Multiplicity 72

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:38:01
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Colour_Date4

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	3.36		3.36
A: Farmer_No				
1	80	3.0875	6.083904E-02	-0.2725
2	80	3.1	6.083904E-02	-0.26
3	80	2.975	6.083904E-02	-0.385
4	80	3.925	6.083904E-02	0.565
5	80	3.7125	6.083904E-02	0.3525
B: Variety				
Flodding 1 Swarna Sub-1	50	3.92	0.1293804	0.56
Local 1 Baygyar	50	3.1	0.1293804	-0.26
Local 2 Kyarpyan	50	3.2	0.1293804	-0.16
Local 3 Taungpyan	50	3.08	0.1293804	-0.28
Salt 1 Pyimyanmarsein	50	3.22	0.1293804	-0.14
Salt 2 IR-11T255	50	3.78	0.1293804	0.42
Salt 3 Sinthwelatt	50	3.46	0.1293804	0.1
Zero Treatment Pawsanyin	50	3.12	0.1293804	-0.24
AB: Farmer No.Variety				

Leaf_Colour_Date4	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	3	3	2	2	18	11	15
Local 1 Baygyar	3	0	6	1	5	20	14	18
Local 2 Kyarpyan	3	6	0	5	1	15	8	12
Local 3 Taungpyan	2	1	5	0	4	20	13	17
Salt 1 Pyimyanmarsein	2	5	1	4	0	16	9	13
Salt 2 IR-11T225	18	20	15	20	16	0	7	3
Salt 3 Sinthwelatt	11	14	8	13	9	7	0	4
Flodding 1 Swarna Sub-1	15	18	12	17	13	3	4	0

Date 5:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	21.133333	7	0.003578	0.603810
Correction	21.543689	7	0.003044	0.615534

Multiplicity 48

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:38:22
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Colour_Date5

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	3.195		3.195
A: Farmer_No				
1	80	3.275	6.135054E-02	0.08
2	80	3.05	6.135054E-02	-0.145
3	80	3.1875	6.135054E-02	-0.0075
4	80	3.1375	6.135054E-02	-0.0575
5	80	3.325	6.135054E-02	0.13
B: Variety				
Flodding 1 Swarna Sub-1	50	3.6	8.776999E-02	0.405
Local 1 Baygyar	50	3.12	8.776999E-02	-0.075
Local 2 Kyarpyan	50	3.16	8.776999E-02	-0.035
Local 3 Taungpyan	50	2.92	8.776999E-02	-0.275
Salt 1 Pyimyanmarsein	50	3.3	8.776999E-02	0.105
Salt 2 IR-11T255	50	3.4	8.776999E-02	0.205
Salt 3 Sinthwelatt	50	3	8.776999E-02	-0.195
Zero Treatment Pawsanyin	50	3.06	8.776999E-02	-0.135
AB: Farmer_No,Variety				

Leaf_Colour_Date5	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	3	12	9	11	13	3	21
Local 1 Baygyar	3	0	9	12	9	10	6	18
Local 2 Kyarpyan	12	9	0	21	1	1	15	9
Local 3 Taungpyan	9	12	21	0	20	22	6	30
Salt 1 Pyimyanmarsein	11	9	1	20	0	2	14	10
Salt 2 IR-11T225	13	10	1	22	2	0	16	8
Salt 3 Sinthwelatt	3	6	15	6	14	16	0	24
Flodding 1 Swarna Sub-1	21	18	9	30	10	8	24	0

Date 6:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	22.100000	7	0.002441	0.631429
Correction	23.439394	7	0.001429	0.669697

Multiplicity 144

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:38:32
Database Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Colour_Date6

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	3.19		3.19
A: Farmer_No				
1	80	3.2375	4.617298E-02	0.0475
2	80	3.1625	4.617298E-02	-0.0275
3	80	3.15	4.617298E-02	-0.04
4	80	3.1875	4.617298E-02	-0.0025
5	80	3.2125	4.617298E-02	0.0225
B: Variety				
Flodding 1 Swarna Sub-1	50	3.64	0.0747854	0.45
Local 1 Baygyar	50	3.06	0.0747854	-0.13
Local 2 Kyarpyan	50	3.02	0.0747854	-0.17
Local 3 Taungpyan	50	2.94	0.0747854	-0.25
Salt 1 Pyimyanmarsein	50	3.24	0.0747854	0.05
Salt 2 IR-11T255	50	3.38	0.0747854	0.19
Salt 3 Sinthwelatt	50	3.26	0.0747854	0.07
Zero Treatment Pawsanyin	50	2.98	0.0747854	-0.21
AB: Farmer_No,Variety				

Leaf_Colour_Date6	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	7	2	4	15	20	13	24
Local 1 Baygyar	7	0	5	10	9	13	7	17
Local 2 Kyarpyan	2	5	0	6	13	18	11	22
Local 3 Taungpyan	4	10	6	0	19	23	17	27
Salt 1 Pyimyanmarsein	15	9	13	19	0	5	2	9
Salt 2 IR-11T225	20	13	18	23	5	0	7	4
Salt 3 Sinthwelatt	13	7	11	17	2	7	0	11
Flodding 1 Swarna Sub-1	24	17	22	27	9	4	11	0

Date 7:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	21.716667	7	0.002842	0.620476
Correction	22.974811	7	0.001722	0.656423

Multiplicity 138

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:38:42
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Colour_Date7

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	3.17		3.17
A: Farmer_No				
1	80	3.3125	4.887626E-02	0.1425
2	80	3.2375	4.887626E-02	0.0675
3	80	3.3625	4.887626E-02	0.1925
4	80	2.85	4.887626E-02	-0.32
5	80	3.0875	4.887626E-02	-0.0825
B: Variety				
Flodding 1 Swarna Sub-1	50	3.6	8.811519E-02	0.43
Local 1 Baygyar	50	2.94	8.811519E-02	-0.23
Local 2 Kyarpyan	50	3.06	8.811519E-02	-0.11
Local 3 Taungpyan	50	3.04	8.811519E-02	-0.13
Salt 1 Pyimyanmarsein	50	3.18	8.811519E-02	0.01
Salt 2 IR-11T255	50	3.26	8.811519E-02	0.09
Salt 3 Sinthwelatt	50	3.32	8.811519E-02	0.15
Zero Treatment Pawsanyin	50	2.96	8.811519E-02	-0.21
AB: Farmer_No,Variety				

Leaf_Colour_Date7	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	2	8	2	13	18	20	26
Local 1 Baygyar	2	0	7	1	12	17	18	25
Local 2 Kyarpyan	8	7	0	6	5	10	12	18
Local 3 Taungpyan	2	1	6	0	11	16	18	24
Salt 1 Pyimyanmarsein	13	12	5	11	0	5	7	13
Salt 2 IR-11T225	18	17	10	16	5	0	2	8
Salt 3 Sinthwelatt	20	18	12	18	7	2	0	7
Flodding 1 Swarna Sub-1	26	25	18	24	13	8	7	0

Date 8:

Friedman Test Section

Ties	**Friedman (Q)**	**DF**	**Prob Level**	**Concordance (W)**
Ignored	12.700000	7	0.079764	0.362857
Correction	14.534060	7	0.042458	0.415259
Multiplicity	318			

Analysis of Variance Report

Page/Date/Time	2 22.01.2018 12:38:57
Database	Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response	Leaf_Colour_Date8

Means and Effects Section

Term	**Count**	**Mean**	**Standard Error**	**Effect**
All	400	2.84		2.84
A: Farmer_No				
1	80	2.85	5.210833E-02	0.01
2	80	2.7625	5.210833E-02	-0.0775
3	80	2.9375	5.210833E-02	0.0975
4	80	2.825	5.210833E-02	-0.015
5	80	2.825	5.210833E-02	-0.015
B: Variety				
Flodding 1 Swarna Sub-1	50	3.06	0.080689	0.22
Local 1 Baygyar	50	2.86	0.080689	0.02
Local 2 Kyarpyan	50	2.78	0.080689	-0.06
Local 3 Taungpyan	50	2.82	0.080689	-0.02
Salt 1 Pyimyanmarsein	50	2.64	0.080689	-0.2
Salt 2 IR-11T255	50	2.92	0.080689	0.08
Salt 3 Sinthwelatt	50	2.78	0.080689	-0.06
Zero Treatment Pawsanyin	50	2.86	0.080689	0.02

Leaf_Colour_Date8	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	1	6	3	8	4	7	15
Local 1 Baygyar	1	0	5	2	7	5	7	16
Local 2 Kyarpyan	6	5	0	3	2	10	2	21
Local 3 Taungpyan	3	2	3	0	5	7	5	18
Salt 1 Pyimyanmarsein	8	7	2	5	0	12	1	23
Salt 2 IR-11T225	4	5	10	7	12	0	11	11
Salt 3 Sinthwelatt	7	7	2	5	1	11	0	22
Flodding 1 Swarna Sub-1	15	16	21	18	23	11	22	0

Date 9:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	10.200000	7	0.177520	0.291429
Correction	10.790932	7	0.148002	0.308312
Multiplicity	138			

Analysis of Variance Report

Page/Date/Time	2 22.01.2018 12:39:13
Database	Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response	Leaf_Colour_Date9

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	2.6825		2.6825
A: Farmer_No				
1	80	2.8375	6.479133E-02	0.155
2	80	2.6375	6.479133E-02	-0.045
3	80	2.65	6.479133E-02	-0.0325
4	80	2.85	6.479133E-02	0.1675
5	80	2.4375	6.479133E-02	-0.245
B: Variety				
Flodding 1 Swarna Sub-1	50	2.8	0.1145956	0.1175
Local 1 Baygyar	50	2.9	0.1145956	0.2175
Local 2 Kyarpyan	50	2.76	0.1145956	0.0775
Local 3 Taungpyan	50	2.62	0.1145956	-0.0625
Salt 1 Pyimyanmarsein	50	2.42	0.1145956	-0.2625
Salt 2 IR-11T255	50	2.46	0.1145956	-0.2225
Salt 3 Sinthwelatt	50	2.7	0.1145956	0.0175
Zero Treatment Pawsanyin	50	2.8	0.1145956	0.1175
AB: Farmer_No,Variety				

Date 10:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	26.633333	7	0.000388	0.760952
Correction	27.756824	7	0.000243	0.793052

Multiplicity 102

Analysis of Variance Report

Page/Date/Time 2 22.01.2018 12:39:29
Database Z:\Users\Benjamin\Documents\ ... I\PH+T+LC+G-Data-Zokekali.S0
Response Leaf_Colour_Date10

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	2.9025		2.9025
A: Farmer_No				
1	80	3.4125	6.103847E-02	0.51
2	80	2.6875	6.103847E-02	-0.215
3	80	2.7875	6.103847E-02	-0.115
4	80	2.9125	6.103847E-02	0.01
5	80	2.7125	6.103847E-02	-0.19
B: Variety				
Flodding 1 Swarna Sub-1	50	2.4	0.1761087	-0.5025
Local 1 Baygyar	50	3.6	0.1761087	0.6975
Local 2 Kyarpyan	50	3.48	0.1761087	0.5775
Local 3 Taungpyan	50	3.16	0.1761087	0.2575
Salt 1 Pyimyanmarsein	50	2.22	0.1761087	-0.6825
Salt 2 IR-11T255	50	2.1	0.1761087	-0.8025
Salt 3 Sinthwelatt	50	2.84	0.1761087	-0.0625
Zero Treatment Pawsanyin	50	3.42	0.1761087	0.5175

Leaf_Colour_Date10	Zero Treatme	Local 1 Baygy	Local 2 Kyarp	Local 3 Taung	Salt 1 Pyimya	Salt 2 IR-11T2	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	4	3	9	20	24	8	18
Local 1 Baygyar	4	0	1	12	24	28	11	22
Local 2 Kyarpyan	3	1	0	11	23	27	10	21
Local 3 Taungpyan	9	12	11	0	12	16	1	10
Salt 1 Pyimyanmarsein	20	24	23	12	0	4	13	2
Salt 2 IR-11T225	24	28	27	16	4	0	17	6
Salt 3 Sinthwelatt	8	11	10	1	13	17	0	11
Flodding 1 Swarna Sub-1	18	22	21	10	2	6	11	0

Date 11:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	13.183333	7	0.067766	0.376667
Correction	13.571078	7	0.059358	0.387745
Multiplicity	72			

Analysis of Variance Report

Page/Date/Time	2 22.01.2018 12:39:40
Database	Z:\Users\Benjamin\Documents\ ... l\PH+T+LC+G-Data-Zokekali.S0
Response	Leaf_Colour_Date11

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	3.4125		3.4125
A: Farmer_No				
1	80	3.4875	6.648412E-02	0.075
2	80	3.4375	6.648412E-02	0.025
3	80	3.475	6.648412E-02	0.0625
4	80	3.2875	6.648412E-02	-0.125
5	80	3.375	6.648412E-02	-0.0375
B: Variety				
Flodding 1 Swarna Sub-1	50	3.8	0.1130897	0.3875
Local 1 Baygyar	50	3.38	0.1130897	-0.0325
Local 2 Kyarpyan	50	3.38	0.1130897	-0.0325
Local 3 Taungpyan	50	3.16	0.1130897	-0.2525
Salt 1 Pyimyanmarsein	50	3.3	0.1130897	-0.1125
Salt 2 IR-11T255	50	3.46	0.1130897	0.0475
Salt 3 Sinthwelatt	50	3.42	0.1130897	0.0075
Zero Treatment Pawsanyin	50	3.4	0.1130897	-0.0125
AB: Farmer_No,Variety				

Statistical Analysis Harvest

Summary

Number of Plants and Plant Height

Boyargyi

Nr. Hills	Yes ($F_{9,36}$= 16.44, $p<0.01$)	F1, F2<0T, L1, L2, S3 F3, S2<0T, L3 S1<L3
Plant Height	Yes (Q= 41.99, $p<0.01$)	F1<0T, F2, L1, L3 S2<F2, L1 F3<F2

Zokekali

Nr. Hills	No (Q= 7.71, p= 0.36)	
Plant Height	Yes (Q=31.47, $p<0.01$)	S2< L1, L2, L3 S1< L1, L3

Number of Tillers and Panicles

Boyargyi

Nr. Tillers	Yes (Q=19.35, p=0.02)	
Nr. Panicles WP	Yes (Q= 21.66, $p<0.01$)	
Nr Panicles SP	Yes (Q= 20.34, p=0.02)	
Panicles per Tiller WP	Yes (Q= 23.44, $p<0.01$)	F2<L1

Zokekali

Nr Tillers	Yes (Q=21.23, $p<0.01$)	S3<F1
Nr Panicles WP	Yes (Q=20.01, $p<0.01$)	S2<F1
Nr. Panicles SP	Yes (Q= 19.80, $p<0.01$)	L1, S2<F1
Panicles per Tiller WP	Yes (Q= 22.33, $p<0.01$)	F1<0T, L1, S3

Panicle Length and Number of Spikelets

Boyargyi

Panicle Length	Yes (Q= 29.90, $p<0.01$)	F1, L3<F2, S3
Number of Spikelets WP	Yes (+= 28.81, $p<0.01$)	F1<F2, S1, S3
Number of Spikelets SP	Yes (Q= 28.41, $p<0.01$)	F1<F2, S1, S3

Zokekali

Panicle Length	Yes (Q= 28.47, p<0.01)	S2<F1, S3 S1< S3
Number of Spikelets WP	Yes (Q= 26.33, p<0.01)	S1, S2<L2, S3
Number of Spikelets SP	Yes (Q= 26.73, p<0.01)	S1, S2<L2, S3

Yield

Boyargyi

Basket/Acre WP	Yes (F9,36= 10.52, p<0.01)	S2<L2, L3, S3 F1, F3, S1< L2, S3 F2<S3
Basket/Acre SP	Yes (F9,36= 5.19, p<0.01)	S2<S3
t/ha WP	Yes (Q=25.23, p<0.01)	S2<S3
t/ha SP	Yes (F9, 36= 4.42, p<0.01)	S2<S3

Zokekali

Basket/Acre WP	Yes (Q= 28.87, p<0.01)	F1, S2< 0T, L2 S1<L2
Basket/Acre SP	Yes (F7,28= 10.32, p<0.01)	F1, S1, S2<L2, S3
t/ha WP	Yes (Q= 38.90, p<0.01)	S2<0T, L2
t/ha SP	Yes (Q= 38.71, p<0.01)	S2<L2, S3

Nr. Hills:

Boyargyi

Analysis of Variance Report

Page/Date/Time	1	18.01.2018 12:05:18
Database		
Response		Sample_Plot_Nr_Hills

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_No	4	1309.8	327.45			
B: Variety	9	4477.3	497.4778	16.44	0.000000*	1.000000
AB	36	1089.4	30.26111			
S	0	0				
Total (Adjusted)	49	6876.5				
Total	50					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	63.7		63.7
A: Farmer_No				
6	10	67.4	0	3.7
7	10	65.6	0	1.9
8	10	67.9	0	4.2
9	10	63.7	0	0
10	10	53.9	0	-9.8
B: Variety				
Flodding 1 Swarna Sub-1	5	47	2.460126	-16.7
Flodding 2 Mekyut	5	54.6	2.460126	-9.1
Flodding 3 IR-84649.1295.30	5	57.2	2.460126	-6.5
Local 1 Baygyar	5	67.2	2.460126	3.5
Local 2 Kyarpyan	5	71.4	2.460126	7.7
Local 3 Taungpyan	5	80	2.460126	16.3
Salt 1 Pyimyanmarsein	5	61.6	2.460126	-2.1
Salt 2 IR-11T255	5	59	2.460126	-4.7
Salt 3 Sinthwelatt	5	64	2.460126	0.3
Zero Treatment Pawsanyin	5	75	2.460126	11.3
AB: Farmer_No,Variety				

Scheffe's Multiple-Comparison Test

Response: Sample_Plot_Nr_Hills
Term B: Variety

Alpha=0.050 Error Term=AB DF=36 MSE=30.26111 Critical Value=4.4015

Group	Count	Mean	Different From Groups
Flodding 1 Swarna Sub-1	5	47	Salt 3 Sinthwelatt, Local 1 Baygyar Local 2 Kyarpyan, Zero Treatment Pawsanyin Local 3 Taungpyan
Flodding 2 Mekyut	5	54.6	Local 2 Kyarpyan, Zero Treatment Pawsanyin Local 3 Taungpyan
Flodding 3 IR-84649.1295.30	5	57.2	Zero Treatment Pawsanyin Local 3 Taungpyan
Salt 2 IR-11T255	5	59	Zero Treatment Pawsanyin Local 3 Taungpyan
Salt 1 Pyimyanmarsein	5	61.6	Local 3 Taungpyan
Salt 3 Sinthwelatt	5	64	Flodding 1 Swarna Sub-1, Local 3 Taungpyan
Local 1 Baygyar	5	67.2	Flodding 1 Swarna Sub-1
Local 2 Kyarpyan	5	71.4	Flodding 1 Swarna Sub-1, Flodding 2 Mekyut
Zero Treatment Pawsanyin	5	75	Flodding 1 Swarna Sub-1, Flodding 2 Mekyut Flodding 3 IR-84649.1295.30 Salt 2 IR-11T255
Local 3 Taungpyan	5	80	Flodding 1 Swarna Sub-1, Flodding 2 Mekyut Flodding 3 IR-84649.1295.30 Salt 2 IR-11T255, Salt 1 Pyimyanmarsein Salt 3 Sinthwelatt

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Zokekali:

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	7.566667	7	0.372349	0.216190
Correction	7.713592	7	0.358525	0.220388

Multiplicity 48

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 13:20:10
Database
Response Sample_Plot_Nr_Hills

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	40	66.525		66.525
A: Farmer_No				
1	8	64	0	-2.525
2	8	64.25	0	-2.275
3	8	65.125	0	-1.4
4	8	74.25	0	7.725
5	8	65	0	-1.525
B: Variety				
Flodding 1 Swarna Sub-1	5	67	4.183215	0.475
Local 1 Baygyar	5	69.2	4.183215	2.675
Local 2 Kyarpyan	5	71.8	4.183215	5.275
Local 3 Taungpyan	5	58.6	4.183215	-7.925
Salt 1 Pyimyanmarsein	5	62.8	4.183215	-3.725
Salt 2 IR-11T255	5	63.4	4.183215	-3.125
Salt 3 Sinthwelatt	5	69	4.183215	2.475
Zero Treatment Pawsanyin	5	70.4	4.183215	3.875

Plant Height

Boyargyi

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	41.989091	9	0.000003	0.933091
Correction	41.989091	9	0.000003	0.933091
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 16:37:19
Database
Response Whole_Plot_Plant_Height

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	501	117.5557		117.5966
A: Farmer_No				
6	100	118.565	1.174007	0.9683818
7	100	119.963	1.174007	2.366382
8	100	114.415	1.174007	-3.181618
9	100	118.01	1.174007	0.4133818
10	101	116.8327	1.16818	-0.5665272
B: Variety				
Flodding 1 Swarna Sub-1	50	94.272	2.883185	-23.32462
Flodding 2 Mekyut	50	149.53	2.883185	31.93338
Flodding 3 IR-84649.1295.30	51	97.8549	2.854778	-19.72644
Local 1 Baygyar	50	134.538	2.883185	16.94138
Local 2 Kyarpyan	50	115.936	2.883185	-1.660618
Local 3 Taungpyan	50	130.396	2.883185	12.79938
Salt 1 Pyimyanmarsein	50	105.802	2.883185	-11.79462
Salt 2 IR-11T255	50	96.266	2.883185	-21.33062
Salt 3 Sinthwelatt	50	118.83	2.883185	1.233382
Zero Treatment Pawsanyin	50	132.526	2.883185	14.92938

Plant Height	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	5	11	1	15	27	7	32	13	22
Local 1 Baygyar	5	0	16	4	20	32	12	37	8	27
Local 2 Kyarpyan	11	16	0	12	4	16	4	21	24	11
Local 3 Taungpyan	1	4	12	0	16	28	8	33	12	23
Salt 1 Pyimyanmarsein	15	20	4	16	0	12	8	17	28	7
Salt 2 IR-11T225	27	32	16	28	12	0	20	5	40	5
Salt 3 Sinthwelatt	7	12	4	8	8	20	0	25	20	15
Flodding 1 Swarna Sub-1	32	37	21	33	17	5	25	0	45	10
Flodding 2 Mekyut	13	8	24	12	28	40	20	45	0	35
Flodding 3 IR-84649.1295.30	22	27	11	23	7	5	15	10	35	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	31.466667	7	0.000051	0.899048
Correction	31.466667	7	0.000051	0.899048
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:11:38
Database
Response Whole_Plot_Plant_Height

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	109.5113		109.5113
A: Farmer_No				
1	80	111.16	0.9608631	1.6487
2	80	107.2726	0.9608631	-2.238675
3	80	108.5001	0.9608631	-1.011175
4	80	109.615	0.9608631	0.1037
5	80	111.0088	0.9608631	1.49745
B: Variety				
Flodding 1 Swarna Sub-1	50	96.078	4.227305	-13.4333
Local 1 Baygyar	50	137.504	4.227305	27.9927
Local 2 Kyarpyan	50	132.01	4.227305	22.4987
Local 3 Taungpyan	50	136.146	4.227305	26.6347
Salt 1 Pyimyanmarsein	50	69.3564	4.227305	-40.1549
Salt 2 IR-11T255	50	63.458	4.227305	-46.0533
Salt 3 Sinthwelatt	50	105.842	4.227305	-3.6693
Zero Treatment Pawsanyin	50	135.696	4.227305	26.1847

Plant Height	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	8	2	4	20	23	10	13
Local 1 Baygyar	8	0	6	4	28	31	18	21
Local 2 Kyarpyan	2	6	0	2	22	25	12	15
Local 3 Taungpyan	4	4	2	0	24	27	14	17
Salt 1 Pyimyanmarsein	20	28	22	24	0	3	10	7
Salt 2 IR-11T225	23	31	25	27	3	0	13	10
Salt 3 Sinthwelatt	10	18	12	14	10	13	0	3
Flodding 1 Swarna Sub-1	13	21	15	17	7	10	3	0

Nr. Tillers

Boyargyi

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	19.189091	9	0.023632	0.426424
Correction	19.353301	9	0.022351	0.430073

Multiplicity 42

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 16:45:12
Database
Response Whole_Plot_Nr_Tillers

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	501	10.23553		10.23945
A: Farmer_No				
6	100	9.9	0.4392314	-0.3394545
7	100	9.79	0.4392314	-0.4494545
8	100	10.88	0.4392314	0.6405454
9	100	9.8	0.4392314	-0.4394546
10	101	10.80198	0.4370516	0.5878182
B: Variety				
Flodding 1 Swarna Sub-1	50	8.8	1.136151	-1.439455
Flodding 2 Mekyut	50	9.12	1.136151	-1.119455
Flodding 3 IR-84649.1295.30	51	8.90196	1.124957	-1.324909
Local 1 Baygyar	50	16.1	1.136151	5.860546
Local 2 Kyarpyan	50	9.48	1.136151	-0.7594545
Local 3 Taungpyan	50	8.46	1.136151	-1.779455
Salt 1 Pyimyanmarsein	50	8.64	1.136151	-1.599455
Salt 2 IR-11T255	50	12.44	1.136151	2.200546
Salt 3 Sinthwelatt	50	9.32	1.136151	-0.9194546
Zero Treatment Pawsanyin	50	11.12	1.136151	0.8805454

AB: Farmer_No Variety

Nr .Tillers	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 S	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	1	18	23	23	2	17	19	20	18
Local 1 Baygyar	1	0	18	22	23	3	16	18	20	18
Local 2 Kyarpyan	18	18	0	5	5	20	2	1	2	0
Local 3 Taungpyan	23	22	5	0	1	25	6	4	3	5
Salt 1 Pyimyanmarsein	23	23	5	1	0	25	7	5	3	5
Salt 2 IR-11T225	2	3	20	25	25	0	19	21	22	20
Salt 3 Sinthwelatt	17	16	2	6	7	19	0	2	4	2
Flodding 1 Swarna Sub-1	19	18	1	4	5	21	2	0	2	1
Flodding 2 Mekyut	20	20	2	3	3	22	4	2	0	2
Flodding 3 IR-84649.1295.30	18	18	0	5	5	20	2	1	2	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	21.133333	7	0.003578	0.603810
Correction	21.234450	7	0.003438	0.606699

Multiplicity 12

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:18:51
Database
Response Whole_Plot_Nr_Tillers

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	11.435		11.435
A: Farmer_No				
1	80	11.7125	0.4791268	0.2775
2	80	11.3625	0.4791268	-0.0725
3	80	12.9875	0.4791268	1.5525
4	80	9.4625	0.4791268	-1.9725
5	80	11.65	0.4791268	0.215
B: Variety				
Flodding 1 Swarna Sub-1	50	18.08	1.039437	6.645
Local 1 Baygyar	50	12.68	1.039437	1.245
Local 2 Kyarpyan	50	10.88	1.039437	-0.555
Local 3 Taungpyan	50	9.44	1.039437	-1.995
Salt 1 Pyimyanmarsein	50	10.58	1.039437	-0.855
Salt 2 IR-11T255	50	7.36	1.039437	-4.075
Salt 3 Sinthwelatt	50	9.84	1.039437	-1.595
Zero Treatment Pawsanyin	50	12.62	1.039437	1.185

AB: Farmer_No,Variety

Nr. Tillers	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	3	5	14	8	21	13	8
Local 1 Baygyar	3	0	8	17	11	24	16	5
Local 2 Kyarpyan	5	8	0	10	3	16	8	13
Local 3 Taungpyan	14	17	10	0	7	7	2	22
Salt 1 Pyimyanmarsein	8	11	3	7	0	13	5	16
Salt 2 IR-11T225	21	24	16	7	13	0	8	29
Salt 3 Sinthwelatt	13	16	8	2	5	8	0	21
Flodding 1 Swarna Sub-1	8	5	13	22	16	29	21	0

Nr. Panicles (WP)

Boyargyi

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	21.458182	9	0.010764	0.476848
Correction	21.668299	9	0.009992	0.481518
Multiplicity	48			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 16:46:31
Database
Response Whole_Plot_Nr_Panicles

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	501	9.774451		9.778363
A: Farmer_No				
6	100	9.59	0.4263478	-0.1883636
7	100	9.49	0.4263478	-0.2883636
8	100	10.24	0.4263478	0.4616364
9	100	9.23	0.4263478	-0.5483636
10	101	10.31683	0.4242319	0.5634546
B: Variety				
Flodding 1 Swarna Sub-1	50	8.3	1.116541	-1.478364
Flodding 2 Mekyut	50	8.44	1.116541	-1.338364
Flodding 3 IR-84649.1295.30	51	8.490196	1.105541	-1.274727
Local 1 Baygyar	50	15.8	1.116541	6.021636
Local 2 Kyarpyan	50	9	1.116541	-0.7783636
Local 3 Taungpyan	50	8.14	1.116541	-1.638364
Salt 1 Pyimyanmarsein	50	8.24	1.116541	-1.538364
Salt 2 IR-11T255	50	11.74	1.116541	1.961636
Salt 3 Sinthwelatt	50	9.1	1.116541	-0.6783636
Zero Treatment Pawsanyin	50	10.52	1.116541	0.7416363
AB: Farmer_No Variety				

Nr. Pannicles	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	2	18	21	23	3	13	22	22	18
Local 1 Baygyar	2	0	19	23	24	2	14	23	24	19
Local 2 Kyarpyan	18	19	0	4	5	21	5	4	5	0
Local 3 Taungpyan	21	23	4	0	2	24	9	1	1	4
Salt 1 Pyimyanmarsein	23	24	5	2	0	26	10	1	1	5
Salt 2 IR-11T225	3	2	21	24	26	0	16	25	25	21
Salt 3 Sinthwelatt	13	14	5	9	10	16	0	9	10	5
Flodding 1 Swarna Sub-1	22	23	4	1	1	25	9	0	1	4
Flodding 2 Mekyut	22	24	5	1	1	25	10	1	0	5
Flodding 3 IR-84649.1295.30	18	19	0	4	5	21	5	4	5	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	19.916667	7	0.005753	0.569048
Correction	20.011962	7	0.005544	0.571770

Multiplicity 12

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:21:39
Database
Response Whole_Plot_Nr_Panicles

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	10.285		10.285
A: Farmer_No				
1	80	10.175	0.4904929	-0.11
2	80	10.1875	0.4904929	-0.0975
3	80	11.725	0.4904929	1.44
4	80	9.1625	0.4904929	-1.1225
5	80	10.175	0.4904929	-0.11
B: Variety				
Flodding 1 Swarna Sub-1	50	13.68	0.8148685	3.395
Local 1 Baygyar	50	12.18	0.8148685	1.895
Local 2 Kyarpyan	50	10.08	0.8148685	-0.205
Local 3 Taungpyan	50	8.8	0.8148685	-1.485
Salt 1 Pyimyanmarsein	50	9.66	0.8148685	-0.625
Salt 2 IR-11T255	50	6.64	0.8148685	-3.645
Salt 3 Sinthwelatt	50	9.24	0.8148685	-1.045
Zero Treatment Pawsanyin	50	12	0.8148685	1.715
AB: Farmer_No Variety				

Nr. Pannicles	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	3	5	14	9	21	12	7
Local 1 Baygyar	3	0	8	17	12	24	15	4
Local 2 Kyarpyan	5	8	0	9	4	16	7	12
Local 3 Taungpyan	14	17	9	0	5	7	2	21
Salt 1 Pyimyanmarsein	9	12	4	5	0	12	3	16
Salt 2 IR-11T225	21	24	16	7	12	0	9	28
Salt 3 Sinthwelatt	12	15	7	2	3	9	0	19
Flodding 1 Swarna Sub-1	7	4	12	21	16	28	19	0

Nr Panicles (SP)

Boyargyi

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	20.225455	9	0.016571	0.449455
Correction	20.348780	9	0.015878	0.452195

Multiplicity 30

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 17:10:28
Database
Response Sample_Plot_Nr_Pannicles

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	501	9.978044		9.982364
A: Farmer_No				
6	100	9.63	0.4090261	-0.3523636
7	100	9.67	0.4090261	-0.3123636
8	100	10.66	0.4090261	0.6776364
9	100	9.36	0.4090261	-0.6223636
10	101	10.56436	0.4069962	0.6094546
B: Variety				
Flodding 1 Swarna Sub-1	50	8.3	1.076183	-1.682364
Flodding 2 Mekyut	50	8.7	1.076183	-1.282364
Flodding 3 IR-84649.1295.30	51	8.764706	1.06558	-1.198727
Local 1 Baygyar	50	15.08	1.076183	5.097636
Local 2 Kyarpyan	50	9.3	1.076183	-0.6823636
Local 3 Taungpyan	50	8.26	1.076183	-1.722364
Salt 1 Pyimyanmarsein	50	9	1.076183	-0.9823636
Salt 2 IR-11T255	50	12.2	1.076183	2.217636
Salt 3 Sinthwelatt	50	9.38	1.076183	-0.6023636
Zero Treatment Pawsanyin	50	10.82	1.076183	0.8376364
AB: Farmer_No,Variety				

Sample Plot Nr. Panicles	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	3	17	23	10	2	11	25	19	15
Local 1 Baygyar	3	0	20	26	13	1	13	28	22	18
Local 2 Kyarpyan	17	20	0	6	7	19	7	8	2	2
Local 3 Taungpyan	23	26	6	0	13	25	13	2	4	8
Salt 1 Pyimyanmarsein	10	13	7	13	0	12	1	15	9	5
Salt 2 IR-11T225	2	1	19	25	12	0	13	27	21	17
Salt 3 Sinthwelatt	11	13	7	13	1	13	0	15	9	5
Flodding 1 Swarna Sub-1	25	28	8	2	15	27	15	0	6	10
Flodding 2 Mekyut	19	22	2	4	9	21	9	6	0	4
Flodding 3 IR-84649.1295.30	15	18	2	8	5	17	5	10	4	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	19.750000	7	0.006136	0.564286
Correction	19.797136	7	0.006025	0.565632
Multiplicity	6			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:38:18
Database
Response Sample_Plot_Nr_Pannicles

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	10.235		10.235
A: Farmer_No				
1	80	9.5125	0.4283366	-0.7225
2	80	10.7375	0.4283366	0.5025
3	80	11.6625	0.4283366	1.4275
4	80	8.925	0.4283366	-1.31
5	80	10.3375	0.4283366	0.1025
B: Variety				
Flodding 1 Swarna Sub-1	50	12.58	0.7970167	2.345
Local 1 Baygyar	50	12.72	0.7970167	2.485
Local 2 Kyarpyan	50	9.88	0.7970167	-0.355
Local 3 Taungpyan	50	8.9	0.7970167	-1.335
Salt 1 Pyimyanmarsein	50	9.78	0.7970167	-0.455
Salt 2 IR-11T255	50	6.66	0.7970167	-3.575
Salt 3 Sinthwelatt	50	9.22	0.7970167	-1.015
Zero Treatment Pawsanyin	50	12.14	0.7970167	1.905

SP Nr. Panicles	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	5	5	13	9	21	14	4
Local 1 Baygyar	5	0	10	18	14	26	19	1
Local 2 Kyarpyan	5	10	0	8	4	16	9	9
Local 3 Taungpyan	13	18	8	0	5	8	1	17
Salt 1 Pyimyanmarsein	9	14	4	5	0	13	5	13
Salt 2 IR-11T225	21	26	16	8	13	0	8	25
Salt 3 Sinthwelatt	14	19	9	1	5	8	0	18
Flodding 1 Swarna Sub-1	4	1	9	17	13	25	18	0

Panicle per Tiller

Boyargyi

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	23.443636	9	0.005273	0.520970
Correction	23.443636	9	0.005273	0.520970

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 17:09:36
Database
Response Whole_Plot_Pannicles_Per_Tiller

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	501	0.9536144		0.9536029
A: Farmer_No				
6	100	0.9699428	7.566584E-03	1.633991E-02
7	100	0.9682852	7.566584E-03	1.468229E-02
8	100	0.9364108	7.566584E-03	-1.719207E-02
9	100	0.9375448	7.566584E-03	-1.605805E-02
10	101	0.9558658	7.529032E-03	2.227909E-03
B: Variety				
Flodding 1 Swarna Sub-1	50	0.9473149	8.563128E-03	-6.287985E-03
Flodding 2 Mekyut	50	0.920516	8.563128E-03	-3.308696E-02
Flodding 3 IR-84649.1295.30	51	0.9604837	8.478761E-03	6.903142E-03
Local 1 Baygyar	50	0.9775661	8.563128E-03	2.396315E-02
Local 2 Kyarpyan	50	0.9415284	8.563128E-03	-1.207446E-02
Local 3 Taungpyan	50	0.9665864	8.563128E-03	1.298347E-02
Salt 1 Pyimyanmarsein	50	0.9557215	8.563128E-03	2.118608E-03
Salt 2 IR-11T255	50	0.9438	8.563128E-03	-9.802853E-03
Salt 3 Sinthwelatt	50	0.9749596	8.563128E-03	0.0213567
Zero Treatment Pawsanyin	50	0.9475301	8.563128E-03	-6.072812E-03
AB: Farmer_No,Variety				

Panicle per Tiller	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	22	8	9	2	3	20	5	9	7
Local 1 Baygyar	22	0	30	13	20	25	2	27	31	15
Local 2 Kyarpyan	8	30	0	17	10	5	28	3	1	15
Local 3 Taungpyan	9	13	17	0	7	12	11	14	18	2
Salt 1 Pyimyanmarsein	2	20	10	7	0	5	18	7	11	5
Salt 2 IR-11T225	3	25	5	12	5	0	23	2	6	10
Salt 3 Sinthwelatt	20	2	28	11	18	23	0	25	29	13
Flodding 1 Swarna Sub-1	5	27	3	14	7	2	25	0	4	12
Flodding 2 Mekyut	9	31	1	18	11	6	29	4	0	16
Flodding 3 IR-84649.1295.30	7	15	15	2	5	10	13	12	16	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	22.333333	7	0.002225	0.638095
Correction	22.333333	7	0.002225	0.638095

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:34:56
Database
Response Whole_Plot_Pannicles_Per_Tiller

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	0.9070814		0.9070814
A: Farmer_No				
1	80	0.8842391	0.010668	-2.284228E-02
2	80	0.9065564	0.010668	-5.249203E-04
3	80	0.9078488	0.010668	7.674787E-04
4	80	0.9606298	0.010668	5.354846E-02
5	80	0.8761326	0.010668	-3.094874E-02
B: Variety				
Flodding 1 Swarna Sub-1	50	0.759058	1.704697E-02	-0.1480234
Local 1 Baygyar	50	0.9621345	1.704697E-02	5.505316E-02
Local 2 Kyarpyan	50	0.925913	1.704697E-02	1.883169E-02
Local 3 Taungpyan	50	0.9266433	1.704697E-02	1.956191E-02
Salt 1 Pyimyanmarsein	50	0.9053235	1.704697E-02	-1.757878E-03
Salt 2 IR-11T255	50	0.887845	1.704697E-02	-1.923641E-02
Salt 3 Sinthwelatt	50	0.9365886	1.704697E-02	0.0295072
Zero Treatment Pawsanyin	50	0.9531451	1.704697E-02	4.606371E-02

Pannicle per Tiller	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	4	9	7	13	16	1	26
Local 1 Baygyar	4	0	13	11	17	20	5	30
Local 2 Kyarpyan	9	13	0	2	4	7	8	17
Local 3 Taungpyan	7	11	2	0	6	9	6	19
Salt 1 Pyimyanmarsein	13	17	4	6	0	3	12	13
Salt 2 IR-11T225	16	20	7	9	3	0	15	10
Salt 3 Sinthwelatt	1	5	8	6	12	15	0	25
Flodding 1 Swarna Sub-1	26	30	17	19	13	10	25	0

Panicle Length

Boyargyi

Friedman Test Section

Ties	**Friedman (Q)**	**DF**	**Prob Level**	**Concordance (W)**
Ignored	29.901818	9	0.000456	0.664485
Correction	29.901818	9	0.000456	0.664485

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 16:56:48
Database
Response Whole_Plot_Pannicle_Length

Means and Effects Section

Term	**Count**	**Mean**	**Standard Error**	**Effect**
All	501	24.02435		24.02989
A: Farmer_No				
6	100	24.669	0.2354872	0.6391091
7	100	23.6	0.2354872	-0.4298909
8	100	24.444	0.2354872	0.4141091
9	100	23.691	0.2354872	-0.3388909
10	101	23.72079	0.2343185	-0.2844364
B: Variety				
Flodding 1 Swarna Sub-1	50	21.724	0.542784	-2.305891
Flodding 2 Mekyut	50	27.228	0.542784	3.198109
Flodding 3 IR-84649.1295.30	51	22.99608	0.5374363	-0.9989818
Local 1 Baygyar	50	23.358	0.542784	-0.6718909
Local 2 Kyarpyan	50	23.082	0.542784	-0.9478909
Local 3 Taungpyan	50	21.682	0.542784	-2.347891
Salt 1 Pyimyanmarsein	50	23.832	0.542784	-0.1978909
Salt 2 IR-11T255	50	23.53	0.542784	-0.4998909
Salt 3 Sinthwelatt	50	29.292	0.542784	5.262109
Zero Treatment Pawsanyin	50	23.54	0.542784	-0.4898909

Panicle Length	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimy	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 S	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	1	1	16	5	0	22	15	20	1
Local 1 Baygyar	1	0	2	17	4	1	21	16	19	2
Local 2 Kyarpyan	1	2	0	15	6	1	23	14	21	0
Local 3 Taungpyan	16	17	15	0	21	16	38	1	36	15
Salt 1 Pyimyanmarsein	5	4	6	21	0	5	17	20	15	6
Salt 2 IR-11T225	0	1	1	16	5	0	22	15	20	1
Salt 3 Sinthwelatt	22	21	23	38	17	22	0	37	2	23
Flodding 1 Swarna Sub-1	15	16	14	1	20	15	37	0	35	14
Flodding 2 Mekyut	20	19	21	36	15	20	2	35	0	21
Flodding 3 IR-84649.1295.30	1	2	0	15	6	1	23	14	21	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.466667	7	0.000181	0.813333
Correction	28.466667	7	0.000181	0.813333

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:30:58
Database
Response Whole_Plot_Pannicle_Length

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	22.626		22.626
A: Farmer_No				
1	80	22.535	0.2874755	-0.091
2	80	22.82	0.2874755	0.194
3	80	22.78375	0.2874755	0.15775
4	80	22.295	0.2874755	-0.331
5	80	22.69625	0.2874755	0.07025
B: Variety				
Flodding 1 Swarna Sub-1	50	23.622	0.6488179	0.996
Local 1 Baygyar	50	22.958	0.6488179	0.332
Local 2 Kyarpyan	50	23.532	0.6488179	0.906
Local 3 Taungpyan	50	23.264	0.6488179	0.638
Salt 1 Pyimyanmarsein	50	18.09	0.6488179	-4.536
Salt 2 IR-11T255	50	17.642	0.6488179	-4.984
Salt 3 Sinthwelatt	50	28.19	0.6488179	5.564
Zero Treatment Pawsanyin	50	23.71	0.6488179	1.084

Pannicle Length	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	5	4	1	17	20	14	5
Local 1 Baygyar	5	0	1	4	12	15	19	10
Local 2 Kyarpyan	4	1	0	3	13	16	18	9
Local 3 Taungpyan	1	4	3	0	16	19	15	6
Salt 1 Pyimyanmarsein	17	12	13	16	0	3	31	22
Salt 2 IR-11T225	20	15	16	19	3	0	34	25
Salt 3 Sinthwelatt	14	19	18	15	31	34	0	9
Flodding 1 Swarna Sub-1	5	10	9	6	22	25	9	0

Nr. Spikelets (WP)

Boyargyi

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.810909	9	0.000697	0.640242
Correction	28.810909	9	0.000697	0.640242

Multiplicity 0

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 16:55:17
Database
Response Whole_Plot_Nr_Spikelets

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	501	134.7325		134.8155
A: Farmer_No				
6	100	141.31	3.026305	6.494545
7	100	130.71	3.026305	-4.105454
8	100	140.25	3.026305	5.434546
9	100	124.19	3.026305	-10.62545
10	101	137.1782	3.011286	2.801818
B: Variety				
Flodding 1 Swarna Sub-1	50	83.18	10.38757	-51.63546
Flodding 2 Mekyut	50	159.12	10.38757	24.30455
Flodding 3 IR-84649.1295.30	51	109.2549	10.28523	-25.24091
Local 1 Baygyar	50	134.22	10.38757	-0.5954546
Local 2 Kyarpyan	50	117.24	10.38757	-17.57545
Local 3 Taungpyan	50	115.24	10.38757	-19.57545
Salt 1 Pyimyanmarsein	50	168.3	10.38757	33.48455
Salt 2 IR-11T255	50	145.48	10.38757	10.66455
Salt 3 Sinthwelatt	50	162.48	10.38757	27.66455
Zero Treatment Pawsanyin	50	153.32	10.38757	18.50455

Nr. Spikelets	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	12	17	20	7	6	2	30	1	20
Local 1 Baygyar	12	0	5	8	19	6	14	18	13	8
Local 2 Kyarpyan	17	5	0	3	24	11	19	13	18	3
Local 3 Taungpyan	20	8	3	0	27	14	22	10	21	0
Salt 1 Pyimyanmarsein	7	19	24	27	0	13	5	37	6	27
Salt 2 IR-11T225	6	6	11	14	13	0	8	24	7	14
Salt 3 Sinthwelatt	2	14	19	22	5	8	0	32	1	22
Flodding 1 Swarna Sub-1	30	18	13	10	37	24	32	0	31	10
Flodding 2 Mekyut	1	13	18	21	6	7	1	31	0	21
Flodding 3 IR-84649.1295.30	20	8	3	0	27	14	22	10	21	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	26.333333	7	0.000439	0.752381
Correction	26.333333	7	0.000439	0.752381
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:26:15
Database
Response Whole_Plot_Nr_Spikelets

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	400	100.95		100.95
A: Farmer_No				
1	80	101.675	2.882007	0.725
2	80	100.4	2.882007	-0.55
3	80	102.2875	2.882007	1.3375
4	80	100.2375	2.882007	-0.7125
5	80	100.15	2.882007	-0.8
B: Variety				
Flodding 1 Swarna Sub-1	50	105.1	5.93395	4.15
Local 1 Baygyar	50	106.82	5.93395	5.87
Local 2 Kyarpyan	50	122.04	5.93395	21.09
Local 3 Taungpyan	50	104.18	5.93395	3.23
Salt 1 Pyimyanmarsein	50	54.88	5.93395	-46.07
Salt 2 IR-11T255	50	62.92	5.93395	-38.03
Salt 3 Sinthwelatt	50	138.92	5.93395	37.97
Zero Treatment Pawsanyin	50	112.74	5.93395	11.79

AB: Farmer_No Variety

Nr. Spikelets	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	7	4	8	22	21	7	5
Local 1 Baygyar	7	0	11	1	15	14	14	2
Local 2 Kyarpyan	4	11	0	12	26	25	3	9
Local 3 Taungpyan	8	1	12	0	14	13	15	3
Salt 1 Pyimyanmarsein	22	15	26	14	0	1	29	17
Salt 2 IR-11T225	21	14	25	13	1	0	28	16
Salt 3 Sinthwelatt	7	14	3	15	29	28	0	12
Flodding 1 Swarna Sub-1	5	2	9	3	17	16	12	0

Nr. Spikelets (SP)

Boyargyi

Friedman Test Section

Ties	**Friedman (Q)**	**DF**	**Prob Level**	**Concordance (W)**
Ignored	28.418182	9	0.000812	0.631515
Correction	28.418182	9	0.000812	0.631515
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 17:15:01
Database
Response Sample_Plot_Nr_Spikelets

Means and Effects Section

Term	**Count**	**Mean**	**Standard Error**	**Effect**
All	501	134.7006		134.7944
A: Farmer_No				
6	100	141.31	3.066877	6.515636
7	100	132.27	3.066877	-2.524364
8	100	140.52	3.066877	5.725636
9	100	122.81	3.066877	-11.98436
10	101	136.5743	3.051656	2.267455
B: Variety				
Flodding 1 Swarna Sub-1	50	85.2	10.38005	-49.59436
Flodding 2 Mekyut	50	162.14	10.38005	27.34564
Flodding 3 IR-84649.1295.30	51	106.9608	10.27778	-27.45073
Local 1 Baygyar	50	133.82	10.38005	-0.9743636
Local 2 Kyarpyan	50	115.2	10.38005	-19.59436
Local 3 Taungpyan	50	117.14	10.38005	-17.65436
Salt 1 Pyimyanmarsein	50	162.2	10.38005	27.40564
Salt 2 IR-11T255	50	146.8	10.38005	12.00564
Salt 3 Sinthwelatt	50	165.16	10.38005	30.36564
Zero Treatment Pawsanyin	50	152.94	10.38005	18.14564

Sample Plot Nr. Spikelets	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sv	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	12	17	19	4	6	3	30	3	21
Local 1 Baygyar	12	0	5	7	16	6	15	18	15	9
Local 2 Kyarpyan	17	5	0	2	21	11	20	13	20	4
Local 3 Taungpyan	19	7	2	0	23	13	22	11	22	2
Salt 1 Pyimyanmarsein	4	16	21	23	0	10	1	34	1	25
Salt 2 IR-11T225	6	6	11	13	10	0	9	24	9	15
Salt 3 Sinthwelatt	3	15	20	22	1	9	0	33	0	24
Flodding 1 Swarna Sub-1	30	18	13	11	34	24	33	0	33	9
Flodding 2 Mekyut	3	15	20	22	1	9	0	33	0	24
Flodding 3 IR-84649.1295.30	21	9	4	2	25	15	24	9	24	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	26.733333	7	0.000372	0.763810
Correction	26.733333	7	0.000372	0.763810
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 14:40:50
Database
Response Sample_Plot_Nr_Spikelets

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	399	100.9925		101.0228
A: Farmer_No				
1	79	103.8101	2.962467	2.903611
2	80	99.4125	2.943893	-1.610278
3	80	101.8375	2.943893	0.8147222
4	80	99.7875	2.943893	-1.235278
5	80	100.15	2.943893	-0.8727778
B: Variety				
Flodding 1 Swarna Sub-1	50	102.26	6.14649	1.237222
Local 1 Baygyar	50	111.26	6.14649	10.23722
Local 2 Kyarpyan	50	120.18	6.14649	19.15722
Local 3 Taungpyan	49	106.9184	6.208893	6.019444
Salt 1 Pyimyanmarsein	50	58.04	6.14649	-42.98278
Salt 2 IR-11T255	50	61.76	6.14649	-39.26278
Salt 3 Sinthwelatt	50	137.48	6.14649	36.45722
Zero Treatment Pawsanyin	50	110.16	6.14649	9.137222

SP Nr. Spikelets	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	1	8	5	20	19	8	7
Local 1 Baygyar	1	0	9	4	19	18	9	6
Local 2 Kyarpyan	8	9	0	13	28	27	0	15
Local 3 Taungpyan	5	4	13	0	15	14	13	2
Salt 1 Pyimyanmarsein	20	19	28	15	0	1	28	13
Salt 2 IR-11T225	19	18	27	14	1	0	27	12
Salt 3 Sinthwelatt	8	9	0	13	28	27	0	15
Flodding 1 Swarna Sub-1	7	6	15	2	13	12	15	0

Yield Basket/acre (WP)

Boyargyi

Analysis of Variance Report

Page/Date/Time 1 18.01.2018 12:04:15
Database
Response Whole_Plot_Yield_Volume_Basket_acre

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_No	4	6886.861	1721.715			
B: Variety	9	9845.76	1093.973	10.52	0.000000*	1.000000
AB	36	3744.265	104.0073			
S	0	0				
Total (Adjusted)	49	20476.89				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Whole_Plot_Yield_Volume_Basket_acre
Term B: Variety

Alpha=0.050 Error Term=AB DF=36 MSE=104.0073 Critical Value=4.4015

Group	Count	Mean	Different From Groups
Salt 2 IR-11T255	5	11.886	Local 3 Taungpyan, Local 2 Kyarpyan Salt 3 Sinthwelatt
Flodding 1 Swarna Sub-1	5	18.038	Local 2 Kyarpyan, Salt 3 Sinthwelatt
Salt 1 Pyimyanmarsein	5	19.428	Local 2 Kyarpyan, Salt 3 Sinthwelatt
Flodding 3 IR-84649.1295.30	5	21.856	Local 2 Kyarpyan, Salt 3 Sinthwelatt
Flodding 2 Mekyut	5	25.302	Salt 3 Sinthwelatt
Local 1 Baygyar	5	33.714	
Zero Treatment Pawsanyin	5	39.436	
Local 3 Taungpyan	5	41.282	Salt 2 IR-11T255
Local 2 Kyarpyan	5	52.19	Salt 2 IR-11T255, Flodding 1 Swarna Sub-1 Salt 1 Pyimyanmarsein Flodding 3 IR-84649.1295.30
Salt 3 Sinthwelatt	5	54.634	Salt 2 IR-11T255, Flodding 1 Swarna Sub-1 Salt 1 Pyimyanmarsein Flodding 3 IR-84649.1295.30 Flodding 2 Mekyut

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	28.866667	7	0.000153	0.824762
Correction	28.866667	7	0.000153	0.824762
Multiplicity	0			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 13:26:50
Database
Response Whole_Plot_Yield_Volume_Basket_acre

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	40	44.58675		44.58675
A: Farmer_No				
1	8	50.66875	0	6.082
2	8	46.455	0	1.86825
3	8	43.11	0	-1.47675
4	8	41.415	0	-3.17175
5	8	41.285	0	-3.30175
B: Variety				
Flodding 1 Swarna Sub-1	5	16.49	6.189917	-28.09675
Local 1 Baygyar	5	51.688	6.189917	7.10125
Local 2 Kyarpyan	5	68.742	6.189917	24.15525
Local 3 Taungpyan	5	56.914	6.189917	12.32725
Salt 1 Pyimyanmarsein	5	20.758	6.189917	-23.82875
Salt 2 IR-11T255	5	16.252	6.189917	-28.33475
Salt 3 Sinthwelatt	5	62.412	6.189917	17.82525
Zero Treatment Pawsanyin	5	63.438	6.189917	18.85125

Yield WP Basket/acre	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	7	4	9	21	24	3	24
Local 1 Baygyar	7	0	11	2	14	17	4	17
Local 2 Kyarpyan	4	11	0	13	25	28	7	28
Local 3 Taungpyan	9	2	13	0	12	15	6	15
Salt 1 Pyimyanmarsein	21	14	25	12	0	3	18	3
Salt 2 IR-11T225	24	17	28	15	3	0	21	0
Salt 3 Sinthwelatt	3	4	7	6	18	21	0	21
Flodding 1 Swarna Sub-1	24	17	28	15	3	0	21	0

Yield Basket/acre (SP)

Boyargyi

Analysis of Variance Report

Page/Date/Time 1 18.01.2018 12:03:01
Database
Response Sample_Plot_Yield_Volume_Basket_acre

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_No	4	3913.155	978.2888			
B: Variety	9	11914.45	1323.828	5.19	0.000157*	0.997296
AB	36	9180.798	255.0222			
S	0	0				
Total (Adjusted)	49	25008.4				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Sample_Plot_Yield_Volume_Basket_acre
Term B: Variety

Alpha=0.050 Error Term=AB DF=36 MSE=255.0222 Critical Value=4.4015

Group	Count	Mean	Different From Groups
Salt 2 IR-11T255	5	12.458	Salt 3 Sinthwelatt
Flodding 3 IR-84649.1295.30	5	21.676	
Flodding 1 Swarna Sub-1	5	23.46	
Salt 1 Pyimyanmarsein	5	23.554	
Flodding 2 Mekyut	5	33.452	
Local 1 Baygyar	5	34.828	
Zero Treatment Pawsanyin	5	39.918	
Local 3 Taungpyan	5	50.382	
Local 2 Kyarpyan	5	56.342	
Salt 3 Sinthwelatt	5	61.844	Salt 2 IR-11T255

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Zokekali

Analysis of Variance Report

Page/Date/Time 1 18.01.2018 13:25:21
Database
Response Sample_Plot_Yield_Volume_Basket_acre

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_No	4	739.5316	184.8829			
B: Variety	7	17826.3	2546.614	10.32	0.000002*	0.999991
AB	28	6909.111	246.754			
S	0	0				
Total (Adjusted)	39	25474.94				
Total	40					

* Term significant at alpha = 0.05

Analysis of Variance Report

Page/Date/Time 4 18.01.2018 13:25:21
Database
Response Sample_Plot_Yield_Volume_Basket_acre

Scheffe's Multiple-Comparison Test

Response: Sample_Plot_Yield_Volume_Basket_acre
Term B: Variety

Alpha=0.050 Error Term=AB DF=28 MSE=246.754 Critical Value=4.0638

Group	Count	Mean	Different From Groups
Salt 2 IR-11T255	5	17.692	Local 2 Kyarpyan, Salt 3 Sinthwelatt
Flodding 1 Swarna Sub-1	5	21.99	Local 2 Kyarpyan, Salt 3 Sinthwelatt
Salt 1 Pyimyanmarsein	5	28.188	Local 2 Kyarpyan, Salt 3 Sinthwelatt
Local 1 Baygyar	5	45.292	
Local 3 Taungpyan	5	50.602	
Zero Treatment Pawsanyin	5	55.74	
Local 2 Kyarpyan	5	72.608	Salt 2 IR-11T255, Flodding 1 Swarna Sub-1 Salt 1 Pyimyanmarsein
Salt 3 Sinthwelatt	5	78.348	Salt 2 IR-11T255, Flodding 1 Swarna Sub-1 Salt 1 Pyimyanmarsein

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Yield t/ha (WP)

Boyargyi

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	25.200000	9	0.002758	0.560000
Correction	25.230583	9	0.002726	0.560680

Multiplicity 6

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 11:45:18

Database

Response Whole_Plot_Yield_Weight_t_ha

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	1.5705		1.5705
A: Farmer_No				
6	10	1.973	0	0.4025
7	10	2.465	0	0.8945
8	10	1.4695	0	-0.101
9	10	1.328	0	-0.2425
10	10	0.617	0	-0.9535
B: Variety				
Flodding 1 Swarna Sub-1	5	1.005	0.254438	-0.5655
Flodding 2 Mekyut	5	1.471	0.254438	-0.0995
Flodding 3 IR-84649.1295.30	5	1.101	0.254438	-0.4695
Local 1 Baygyar	5	1.808	0.254438	0.2375
Local 2 Kyarpyan	5	1.92	0.254438	0.3495
Local 3 Taungpyan	5	1.873	0.254438	0.3025
Salt 1 Pyimyanmarsein	5	1.115	0.254438	-0.4555
Salt 2 IR-11T255	5	0.645	0.254438	-0.9255
Salt 3 Sinthwelatt	5	2.56	0.254438	0.9895
Zero Treatment Pawsanyin	5	2.207	0.254438	0.6365

Yield WP t/ha	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Sw	Flodding 2 M	Flodding 3 IR-84649.1295.30
Zero Treatment Pawsanyin	0	6	0	2	21	27	7	22	9	16
Local 1 Baygyar	6	0	6	5	15	21	13	16	3	10
Local 2 Kyarpyan	0	6	0	2	21	27	7	22	9	16
Local 3 Taungpyan	2	5	2	0	19	26	9	21	8	15
Salt 1 Pyimyanmarsein	21	15	21	19	0	7	28	2	12	5
Salt 2 IR-11T225	27	21	27	26	7	0	34	5	18	11
Salt 3 Sinthwelatt	7	13	7	9	28	34	0	29	16	23
Flodding 1 Swarna Sub-1	22	16	22	21	2	5	29	0	13	6
Flodding 2 Mekyut	9	3	9	8	12	18	16	13	0	7
Flodding 3 IR-84649.1295.30	16	10	16	15	5	11	23	6	7	0

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	38.661818	9	0.000013	0.859152
Correction	38.897561	9	0.000012	0.864390

Multiplicity 30

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 13:27:45
Database
Response Whole_Plot_Yield_Weight_t_ha

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	1.5157		1.5157
A: Farmer_No				
1	10	1.8035	0	0.2878
2	10	1.6675	0	0.1518
3	10	1.4135	0	-0.1022
4	10	1.33	0	-0.1857
5	10	1.364	0	-0.1517
B: Variety				
Flodding 1 Swarna Sub-1	5	0.928	0.2937116	-0.5877
Flodding 2 Mekyut	5	0	0.2937116	-1.5157
Flodding 3 IR-84649.1295.30	5	0	0.2937116	-1.5157
Local 1 Baygyar	5	2.217	0.2937116	0.7013
Local 2 Kyarpyan	5	2.654	0.2937116	1.1383
Local 3 Taungpyan	5	1.913	0.2937116	0.3973
Salt 1 Pyimyanmarsein	5	0.988	0.2937116	-0.5277
Salt 2 IR-11T255	5	0.797	0.2937116	-0.7187
Salt 3 Sinthwelatt	5	2.901	0.2937116	1.3853
Zero Treatment Pawsanyin	5	2.759	0.2937116	1.2433

Yield WP t/ha	Zero Treatm	Local 1 Baygy	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimya	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	5	0	9	22	25	2	22
Local 1 Baygyar	5	0	5	4	17	20	3	17
Local 2 Kyarpyan	0	5	0	9	22	25	2	22
Local 3 Taungpyan	9	4	9	0	13	16	7	13
Salt 1 Pyimyanmarsein	22	17	22	13	0	3	20	0
Salt 2 IR-11T225	25	20	25	16	3	0	23	3
Salt 3 Sinthwelatt	2	3	2	7	20	23	0	20
Flodding 1 Swarna Sub-1	22	17	22	13	0	3	20	0

Yield t/ha (SP)

Boyargyi

Analysis of Variance Report

Page/Date/Time 1 18.01.2018 12:03:54
Database
Response Sample_Plot_Yield_Weight_t_ha

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Farmer_No	4	22.49987	5.624969			
B: Variety	9	28.55675	3.172972	4.42	0.000602*	0.990645
AB	36	25.83088	0.7175243			
S	0	0				
Total (Adjusted)	49	76.8875				
Total	50					

* Term significant at alpha = 0.05

Scheffe's Multiple-Comparison Test

Response: Sample_Plot_Yield_Weight_t_ha
Term B: Variety

Alpha=0.050 Error Term=AB DF=36 MSE=0.7175243 Critical Value=4.4015

Group	Count	Mean	Different From Groups
Salt 2 IR-11T255	5	0.95	Salt 3 Sinthwelatt
Flodding 3 IR-84649.1295.30	5	1.235	
Flodding 2 Mekyut	5	1.475	
Salt 1 Pyimyanmarsein	5	1.53	
Flodding 1 Swarna Sub-1	5	1.64	
Local 1 Baygyar	5	2.08	
Local 3 Taungpyan	5	2.56	
Zero Treatment Pawsanyin	5	2.57	
Local 2 Kyarpyan	5	2.935	
Salt 3 Sinthwelatt	5	3.375	Salt 2 IR-11T255

Notes:
This report provides multiple comparison tests for all possible contrasts among the the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Zokekali

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	38.432727	9	0.000015	0.854061
Correction	38.714286	9	0.000013	0.860317
Multiplicity	36			

Analysis of Variance Report

Page/Date/Time 2 18.01.2018 13:26:07
Database
Response Sample_Plot_Yield_Weight_t_ha

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	50	2.0335		2.0335
A: Farmer_No				
1	10	2.1225	0	0.089
2	10	2.1275	0	0.094
3	10	2.055	0	0.0215
4	10	1.84	0	-0.1935
5	10	2.0225	0	-0.011
B: Variety				
Flodding 1 Swarna Sub-1	5	1.445	0.3207299	-0.5885
Flodding 2 Mekyut	5	0	0.3207299	-2.0335
Flodding 3 IR-84649.1295.30	5	0	0.3207299	-2.0335
Local 1 Baygyar	5	2.705	0.3207299	0.6715
Local 2 Kyarpyan	5	3.99	0.3207299	1.9565
Local 3 Taungpyan	5	2.215	0.3207299	0.1815
Salt 1 Pyimyanmarsein	5	1.535	0.3207299	-0.4985
Salt 2 IR-11T255	5	0.985	0.3207299	-1.0485
Salt 3 Sinthwelatt	5	4.045	0.3207299	2.0115
Zero Treatment Pawsanyin	5	3.415	0.3207299	1.3815

Yield SP t/ha	Zero Treatm	Local 1 Bayg	Local 2 Kyarp	Local 3 Taun	Salt 1 Pyimy	Salt 2 IR-11T	Salt 3 Sinthw	Flodding 1 Swarna Sub-1
Zero Treatment Pawsanyin	0	8	8	10	15	22	6	15
Local 1 Baygyar	8	0	16	2	7	14	14	7
Local 2 Kyarpyan	8	16	0	17	22	29	2	22
Local 3 Taungpyan	10	2	17	0	5	12	15	5
Salt 1 Pyimyanmarsein	15	7	22	5	0	7	20	0
Salt 2 IR-11T225	22	14	29	12	7	0	27	7
Salt 3 Sinthwelatt	6	14	2	15	20	27	0	20
Flodding 1 Swarna Sub-1	15	7	22	5	0	7	20	0