

Rice Productivity in Myanmar

Assessment of the 2023 dry season

Key Findings

We analyze paddy rice productivity and profitability data for the dry seasons of 2022 and 2023, based on the Myanmar Agriculture Performance Survey (MAPS) fielded in the period of June 26th to July 25th, 2023. The survey covered plots of 659 rice paddy producers. It is found that:

- Prices of inputs used in paddy production fertilizer, labor, mechanization increased between these two growing seasons by between 13 and 21 percent, on average. On the other hand, paddy prices at the farm increased by 68 percent.
- Real profits, with nominal prices corrected by the change in the cost of an average food basket, from paddy rice farming during the dry season of 2023 increased by 41 percent compared to the dry season of 2022. While nominal profits for paddy rice farmers increased by 70 percent over the last two seasons, price inflation has been high in the country and real profit increased therefore much less.
- Rice farmers increased input expenditures on paddy production by 50 percent compared to last year. However, larger farmers invested more and doubled input expenditures, likely attracted by the increased profits in paddy farming.
- Rice productivity at the national level during the dry season of 2023 on farmers' largest rice plot was slightly larger (+1.2 percent) than in the previous dry season. But substantial declines are noted in the coastal areas (-29 percent) and the Dry Zone (-5 percent), seemingly due to impacts of cyclone Mocha.
- Thirteen percent of all crop farmers reported to have been affected by the cyclone Mocha and 3 percent of the crop farmers indicated that they lost their whole dry season harvest. Almost half of the affected farmers reported that the next monsoon season would not proceed as normal, likely affecting the production of rice – and other crops – in those areas during the next monsoon season.

Recommended Actions

- As paddy prices have gone up significantly, rice prices have gone up substantially as well, making the costs of Myanmar's staple food unaffordable for some consumers, especially for the most vulnerable ones. Expansion of safety nets, targeted or self-targeted to the poorest, would therefore be beneficial.
- The cyclone Mocha has destroyed harvests of farmers in Rakhine and part of the Dry Zone. As effects of the devastation of the cyclone will continue to be felt during the monsoon of 2023, further assistance for farmers in these areas is needed.





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Introduction

Rice is an extremely important product for farmers' livelihoods and for food security in Myanmar. Rice is the main staple, accounting for 51 and 62 percent of urban and rural calories consumed, respectively, making it crucial for food security in the country.¹ Large international changes in commodity markets and twin local crises – COVID-19 and political problems due to the military take-over – have raised doubts on the performance of the agricultural sector overall and the rice sector in particular. The assessment on farmers' rice productivity during the dry season – typically representing less than 20 percent of annual production of paddy – of 2023 presented in this research note is based on data from the Myanmar Agriculture Performance Survey (MAPS) that was conducted with 659 rice producers, spread over all states/regions of the country, over the period June 2023 – July 2023. Detailed questions were asked to farmers about their background, input use and input prices, farm management practices, rice output and output prices, and natural and other shocks during the dry season of 2022 and 2023.² This research note presents the results from that assessment.

Data

The Myanmar Agricultural Performance Survey (MAPS) is a sub-sample of 12,953 households interviewed by phone during the fifth round of the Myanmar Household Welfare Survey (MHWS) that was fielded in the second quarter of 2023 (MAPSA 2023a). In the MHWS, information was collected, among others, on the background of these households, welfare indicators, and livelihoods. The follow-up MAPS focused on the agricultural activities of 5,001 households that were identified as crop farmers in the MHWS. This survey was implemented by phone by Myanmar Survey Research (MSR) over the period June 26th until July 25th, 2023. Of the 5,001 crop farmers interviewed in the fourth round of MAPS, a relatively small share of crop farmers - 13 percent of the interviewed crop producers or 659 farmers cultivated rice in the 2023 dry season (Table 1). The majority of the interviewed paddy farmers reside in the Ayeyarwady (217 farmers) and Bago (111 farmers) regions, reflecting the importance of these regions in paddy production during the dry season of 2021.⁴

¹ Estimated in 2015 (based on Myanmar Poverty, Livelihood, and Consumption Survey).

² In this paper, rice refers to rice in paddy form throughout.

³ Covering the post- and pre-monsoon period, or winter and summer crops, typically crops that are harvested between February and July.

⁴ As reported by the Ministry of Agriculture, Livestock and Irrigation.

Table 1: Sample rice farmers, MAPS

	Crop	Rice Farmers	
	farmers	2022	2023
Kachin	157	6	5
Kayah	105	3	13
Kayin	122	19	19
Chin	117	1	0
Sagaing	744	80	109
Tanintharyi	131	7	8
Bago	509	95	111
Magway	488	21	16
Mandalay	539	50	51
Mon	143	13	13
Rakhine	242	6	9
Yangon	155	41	46
Shan	824	15	17
Ayeyawady	644	204	217
Nay Pyi Taw	81	26	25
Total	5,001	587	659

Source: Authors' calculations based on MAPS, round 4

To assure that crop farmers are representative of the crop farming population in their state or region, a weighting factor was calculated building on the method used for the MHWS (MAPSA 2022a). In this research note, we focus in particular on the information that was collected on the biggest rice plot of rice producers in the dry season of 2022 and 2023. Data for these plots were collected on input use and farm management practices, such as the use of seeds, agro-chemicals, fertilizers, labor and mechanization and rice output. Farmers were also asked to estimate overall monetary input expenditures on these plots. While we collected these data from 659 households, caution is warranted in interpretation and extrapolation to national and state/region-wide rice production as we only collected information on the largest rice plot.

We divide the country into four major agro-ecological zones that are commonly used in Myanmar and present (some of the) results at that level.⁵ The average farm size of the interviewed rice farmers was 5.7 acres (Table 2). The biggest rice farms are seen in the Delta region (7.0 acres) while farms in the Hills and Mountains and Coastal agro-ecological zones are substantially smaller (3.1 acres). Nationally, the size of the largest plot was on average 1.2 acres while the median was 1. Almost all rice plots that were cultivated during the dry season are situated in the lowlands (97 percent).

	Dry Season 2023					
	Unit	National	Hills	Dry	Delta	Coastal
Total number of rice farmers	Number	659	54	201	387	17
Background rice farm						
Average size rice farm - mean	Acres	5.7	3.1	3.8	7.0	3.1
Size largest plot - mean	Acres	1.2	0.9	1.2	1.2	1.3
Size largest plot - median	Acres	1.0	0.8	1.0	1.0	1.0
Land type largest plot						
Upland	%	3.1	10.8	3.4	2.2	0.0
Lowland	%	96.9	89.2	96.6	97.8	100.0

Table 2: Descriptive statistics of rice farmers, MAPS

Source: Authors' calculations based on MAPS, round 4

⁵ Delta (Ayeyawaddy, Bago, Mon, Yangon); Coastal (Rakhine, Tanintharyi); Central Dry (Mandalay, Magwe, NPT, Sagaing); Hills and Mountains (Chin, Kachin, Kayah, Kayin, Shan).

Incentives for rice cultivation - input and output prices

Input prices for rice farmers have increased over the last two dry seasons (Table 3). First, chemical fertilizer prices – as measured by the price of urea, the most important fertilizer used by rice farmers – increased by 14 percent on average (the median by 11 percent) during the dry season of 2023 compared to a year earlier. These fertilizer price increases were mostly driven by international price changes (which decreased a bit), by the depreciation of the local currency, and increased fuel and transportation costs locally.

Second, Table 3 also presents the prices for plowing 1 acre of land by a four-wheel tractor. Paddy farmers report that those costs have increased by 16 percent on average. A survey of mechanization service providers at the beginning of the monsoon of 2023 showed that despite the slow-down in price increases for fuel and repair services, rising prices of machines, parts, and operators (despite their improved availability) continue to raise the cost of mechanization services (MAPSA 2023b).

Third, average daily wages of hired labor – widely used by paddy farmers – of men and women increased by 13 and 21 percent respectively. While wages increased in nominal terms, wages stabilized in real terms given the high food price inflation in the country (MAPSA 2023a).

At the same time, we see substantial increases in paddy prices. Table 3 shows that at the national level average prices for paddy increased by 68 percent (the median changed by 60 percent). This paddy price development has improved incentives and profitability of paddy farming compared to the dry season of 2022.

		Dry S	% chan <u>ge</u>	
	Unit	2022	2023	
Inputs				
Urea price (kg)	Mean	1,769	2,019	14.1
	Median	1,800	2,000	11.1
	Nr. Obs	590	556	
Costs plowing 1 acre (4-wheel)	Mean	41,435	48,153	16.2
	Median	40,000	45,000	12.5
	Nr. Obs	450	402	
Daily wage man	Mean	7082	8002	13.0
	Median	7000	8000	14.3
	Nr. Obs	674	659	
Daily wage woman	Mean	5,295	6,410	21.0
	Median	5,000	6,000	20.0
	Nr. Obs	672	650	
Output				
Paddy price (kg)	Mean	468	789	68.5
	Median	478	766	60.0
	Nr. Obs	623	635	

Table 3: Input and output prices in paddy rice cultivation, dry season 2022 and 2023

Source: Authors' calculations based on MAPS, round 4 and 2

Input use

Table 4 gives an overview of average fertilizer use on the largest rice plot in the two last dry seasons. During the dry season of 2023, rice farmers used 99 kgs of fertilizer per acre on average (Table 4). Despite the (slight) price increases of fertilizers, we see an increase in use, of 40 percent on average, in the amounts of chemical fertilizer used between the two seasons, suggesting that chemical fertilizer is seen by farmers as a priority input for rice productivity in the dry season. The median increased by 50 percent. It is to be noted that fertilizer use is higher during the dry season than during the monsoon – e.g., paddy farmers used 54 kgs per acre on average in the last monsoon (MAPSA 2023c). As paddy production is often done under irrigated conditions in the dry season –

and therefore more predictable given less uncertainty with rainfall patterns – returns to fertilizer use is typically more certain during that period and farmers therefore tend to use more.

	,		/
	Dry Se		Season
	Unit	2022	2023
Urea - kg	mean	44.8	65.7
Ammonium sulphate - kg	mean	0.9	1.2
Other fertilizer - kg (compound 15_15_15)	mean	8.4	10.1
Other fertilizer - kg (other compound combined)	mean	8.9	9.0
Other fertilizer - kg (T super)	mean	5.6	10.4
Other fertilizer - kg (Potash)	mean	1.1	2.1
Other fertilizer - kg (Low quality - aukkone)	mean	0.9	0.3
Total fertilizer – kg	mean	70.6	98.8
-	median	66.7	100.0

Table 4: Chemical fertilizer use in paddy cultivation (kgs per acre)

Source: Authors' calculations based on MAPS, round 2 and 4

The MAPS also captures the extent to which rice farmers relied on hired labor, draught animals, and mechanization during the dry seasons of 2022 and 2023 (Table 5). We see few differences over time and most rice farms relied on similar labor arrangements over the two seasons. During the dry season of 2023, only 19 percent of rice farmers relied exclusively on their own family labor and 81 percent used outside help, indicating the importance of outside labor for paddy farms. Compared to the dry season of 2022, the share of rice farmers solely relying on family labor decreased by 8 percentage points, indicating increased demand for hired labor, possibly explaining agricultural wage increases.

Rice farmers in Myanmar rely heavily on mechanization for their rice farm activities. Draught animals have traditionally been very important in rice cultivation but were used only by 25 percent of rice farmers in the dry season. Nationally, 95 percent of farmers used a tractor (either 4-, 3- or 2- wheel) for plowing plots and 82 percent combine-harvesters to harvest paddy, higher than in 2022. Most rice farmers relied on mechanization service providers for plowing but it is noteworthy that 32 percent used their own tractor for plowing, a slightly higher percentage than a year earlier.

		Dry Season		
Use on largest rice plot	Unit	2022	2023	
Non-family labor				
Hired	%	66.0	68.2	
Exchange	%	3.2	3.4	
Both	%	3.6	9.6	
No	%	27.2	18.7	
Draught animals				
Hired	%	15.1	9.6	
Own	%	13.8	14.4	
Both	%	0.7	0.7	
No	%	70.4	75.3	
Tractor for plowing				
Hired	%	58.5	58.5	
Own	%	27.2	32.2	
Both	%	5.8	3.9	
No	%	8.5	5.4	
Combine-harvester				
Hired	%	83.2	79.4	
Own	%	2.9	2.8	
Both	%	0.1	-	
No	%	13.8	17.8	

Table 5: Labor use and mechanization in paddy rice cultivation

Source: Authors' calculations based on MAPS, round 2 and 4

Finally, we assess overall (commercial) input expenditures on rice as they might give a good indication of the intensity of input use in rice production.⁶ Table 6 shows that input expenditures per acre increased on average by 50 percent during the dry season of 2023 compared to the previous one. Despite the reduction in formal credit from the government and micro-finance institutions, farmers were - on average - somehow able to increase expenditures on their rice plots and compensate for the increased prices of most inputs. Big increases are especially noted for the bigger farmers, who - seemingly attracted by the high paddy prices - doubled their input expenditures compared to last year.

	Dry Season					
Use on largest rice plot	2022	2023	% change			
Mean	306,360	458,657	49.7			
Median	300,000	450,000	50.0			
By size of farm (mean)						
0-<2 acres	306,904	458,646	49.4			
2-<5 acres	310,432	457,489	47.3			
5-<8 acres	237,198	477,015	100.1			

Table 6: Monetary input expenditures (MMK/acre) on paddy rice

Source: Authors' calculations based on MAPS, round 2 and 4

Natural and other shocks

Climatic shocks generally constitute important risks for agricultural production. When asked about the incidence of natural or other shocks, 35 and 21 percent of the rice farmers indicated that they were negatively impacted by at least one of these shocks in the dry season of 2022 and 2023 respectively (Table 7). However, the shocks reported over these two years were different. Drought negatively impacted 14 percent of affected rice farmers in 2023 while only 10 percent were impacted in 2022. There were also more complaints by paddy farmers in 2023 of pests, diseases and weed (52 percent of shock-affected farmers in 2023; 44 percent in 2022) and damage by animals (17 percent of shock-affected farmers in 2023; 11 percent in 2022).

Table 7: Incidence of natural and other shocks

	Dry Season		
	Unit	2022	2023
Crop negatively affected by any shock	% yes	34.6	20.7
If yes, which one?			
Drought	% yes	10.4	13.8
Poor access to irrigation water	% yes	6.8	4.4
Irregular rain	% yes	13.1	6.6
Heavy rains	% yes	15.5	12.1
Floods	% yes	17.3	8.2
Flash floods	% yes	1.7	0.4
Extreme temperature	% yes	4.1	3.9
Pest, diseases, weeds	% yes	43.7	52.4
Damage by animals	% yes	11.5	17.4
Damaged by rats	% yes	4.4	5.9
Storm	% yes	0.9	3.2

Source: Authors' calculations based on MAPS, round 2 and 4

⁶ There are likely a number of issues with the measurement of input expenditures in MAPS. First, we only rely on monetary input expenditures. This is an imperfect way of assessing inputs into rice production as there are a number of non-monetary inputs going into rice production as well, such as family labor, organic fertilizer, and animal traction. Second, monetary input expenditures were approximated by farmers asking for a simple measure of what they spent on their largest rice plot. This might have been complicated to answer for farmers given that a number of inputs are bought in bulk and getting at the exact costs for a plot might therefore have been wrongly evaluated. Coming with a single number at once – combining all costs of fertilizer, agro-chemicals, mechanization, and hired labor – might also have been problematic. It is therefore likely that there is measurement error in this variable and a caveat for further analysis.

Cyclone Mocha

As the cyclone Mocha hit parts of Myanmar hard in the middle of May, we asked farmers in the MAPS how they had been affected by this cyclone (Table 8). About 10 percent of rice farmers in the dry season and 13 percent of all farmers indicated that they had been affected by the cyclone. The largest effects were seen in the Coastal areas – especially Rakhine – (however, note that we have a low number of respondents in those areas) and in the Dry Zone. 36 and 16 percent of crop farmers respectively indicated in these zones their agricultural production was affected by the cyclone. If they indicated impacts, we also asked to assess the losses caused by the cyclone. 20 percent of the affected farmers - representing 3 percent of all farmers - indicated that they lost their whole harvest.⁷ 15, 21 and 41 percent indicated that they lost three-quarters, half, and one-quarter of their harvests, respectively. When they had been affected by the cyclone Mocha, 49 percent of the farmers reported that the next monsoon season would not proceed as normal.

	Unit	National	Hills	Dry	Delta	Coastal
	Rice farmers					
Agricultural production affected by cyclone Mocha	% yes	10.3	5.1	18.3	6.0	46.4
If affected, losses caused by cyclone Mocha						
All	% yes	12.6	-	13.1	17.0	-
Three-quarters	% yes	11.6	-	8.0	11.8	31.2
Half	% yes	23.8	93.3	20.1	10.9	58.4
One-quarter	% yes	51.3	6.7	57.2	60.3	10.4
None	% yes	0.8	-	1.6	-	-
If affected by cyclone Mocha, believe that the monsoon season might proceed as normal	% yes	46.1	80.8	49.8	36.4	48.5
			All fa	armers		
Agricultural production affected by cyclone Mocha	% yes	13.4	6.9	16.4	8.7	36.5
If affected, losses caused by cyclone Mocha						
All	% yes	20.0	11.8	21.6	11.0	29.6
Three-quarters	% yes	15.3	13.3	15.0	11.3	20.8
Half	% yes	21.5	29.3	19.8	16.9	25.4
One-quarter	% yes	40.8	45.7	41.5	56.3	22.3
None	% yes	2.3	-	2.1	4.6	1.9
If affected by cyclone Mocha, believe that the monsoon season might proceed as normal	% yes	50.8	48.1	55.3	51.4	42.2

Table 8: Effect of cyclone Mocha on farmers

Source: Authors' calculations based on MAPS, round 4

Rice productivity

Paddy rice yields at the national level averaged 1,676 kgs per acre (the median was 1,672 kgs per acre) or 4.1 tons per hectare for the dry season of 2022 (Table 9), which was significantly higher than during the monsoon when yields averaged 3.1 tons (MAPSA 2023c). We note an increase of 1.2 percent on average compared to last year. Big declines are noted for the Coastal areas where the average yield declined by 29 percent (likely due to effects of Mocha). We also see a decline of 5 percent in the Dry Zone while an increase was noted in the Delta, where the majority of paddy is grown in the dry season (the Bago, Ayeyarwady, Mon and Yangon regions combined made up 85 percent of total paddy production in the summer of 2021, as estimated by MoALI). As we only have data on the largest plot and have no good assessment of changes in paddy area cultivated, we shy away from making assessments of rice production at the national level.

⁷ The World Bank (2023) evaluated the damage of cyclone Mocha at about 3.4 percent of Myanmar's GDP in 2021.

2022				20	2023		
	N	Mean	Median	N	Mean	Median	% change
Hills	60	1350	1254	54	1303	1254	-3.5
Dry	225	1702	1672	200	1609	1672	-5.4
Delta	385	1680	1672	387	1763	1776	+4.9
Coastal	8	2065	2090	17	1469	957	-28.9
Total	678	1657	1672	658	1677	1672	+1.2

Table 9: Paddy rice yields on the largest plot (kgs/acre), dry season 2022 and 2023

Source: Authors' calculations based on MAPS, round 2

Finally, we assess how gross profits have changed over the last two dry seasons, combining data from average yields, paddy prices, and commercial expenditures per acre over these periods. We see a significant improvement for gross revenues per acre in the most recent dry season (2023): they increased by 71 percent compared to 2022 and by 139 percent compared to 2021 (Figure 1). As commercial expenditures increased by 50 percent over the last year, nominal gross profits - reflecting rewards for family farm labor and the use of land - for paddy rice farmers increased by 84 percent from 2022 to 2023. While profits tripled in nominal terms compared to two years ago, price inflation has been high in the country (MAPSA 2023a) and real profit increased much less. Real profits, with nominal prices corrected by the change in the cost of an average food basket (evaluated in the middle of 2021, 2022, and 2023), increased by 41 percent during the dry season of 2023 compared to the dry season of 2022 and 2021 (Figure 1).

Figure 1: Gross nominal revenue and real - in terms of the cost of an average food basket - profits per acre in paddy rice production, dry seasons of 2021, 2022, and 2023



Source: Authors' calculations based on MAPS, dry season 2023 (round 4) and dry season 2022 (round 2)

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ACKNOWLEGEMENTS

This work was undertaken as part of the Feed the Future Myanmar Agricultural Policy Support Activity (MAPSA) led by the International Food Policy Research Institute (IFPRI) in partnership with Michigan State University (MSU). This study was made possible by the support of the American people through the United States Agency of International Development (USAID), under the terms of Award No. AID-482-IO-21-000x. This publication has not gone through IFPRI's standard peer-review procedure. The opinions expressed here belong to the authors, and do not necessarily reflect the views of USAID, IFPRI, MSU, or the CGIAR.

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The Myanmar Strategy Support Program (Myanmar SSP) is led by the International Food Policy Research Institute (IFPRI) in partnership with Michigan State University (MSU). Funding support for Myanmar SSP is provided by the CGIAR Research Program on Policies, Institutions, and Markets; the Livelihoods and Food Security Fund (LIFT); and the United States Agency for International Development (USAID). This publication has been prepared as an output of Myanmar SSP. It has not been independently peer reviewed. Any opinions expressed here belong to the author(s) and do not necessarily reflect those of IFPRI, MSU, LIFT, USAID, or CGIAR.

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