

Farmers' Assessment on Rice Crop Response to Urea Fertilizer at Harvest of Dry Season, 2017 in Central Myanmar

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Overall Information of Respondents

ACIAR, Mynutrients team (SMCN/2014/044) has undergoing nutrient management in rice research of two locations at Taungoo and Yezin, the representative sites of central Myanmar. The first season rice experiment had started field trial sowing seeds on 6th Feb, 2017 in Taungoo, and 14th Feb, 2017 in Yezin. Just before harvest, farmers from nearby villages were invited and two-page key informant interviews were conducted with 27 farmers at Taungoo and 38 farmers at Yezin. This summary report structured on well prepared questionnaires.

As it was concerned the gender issue, male participant percent was 48 percent of total respondents and 52 percent was female to take part in assessing the rice plant response to urea fertilizer at Taungoo. For Yezin, male participants was 58 percent of total respondents and 32 percent was female. The average age of respondent was 47 years and the oldest and youngest respondents were 74 and 24 years respectively at Taungoo whilst the average age of respondent was 49 years and the oldest and youngest respondents were 80 and 27 years respectively at Yezin. Farm size owned by the respondent farmer was quite different from the smallest 1 acre to the largest 28 acre and the average was 7 acre at Taungoo, however, the smallest size is 2 acre, the largest farm size was 25 and the average farm size was 7.6 acre at Yezin. Most of the farms were lowland and a few were upland.

Cropping Pattern

The cropping patterns practiced by the respondent farmers were six cropping patterns -rice-rice, rice-bean-rice, rice-bean, rice-sesame, rice-sesame-rice and rice-rice-kitchen crops. Rice was the major crop sown in Taungoo area and rice-rice cropping pattern was the main one consisting 67% of the total cropping patterns. Rice-bean-rice is the second most practiced pattern but it was only 13% of the total and 10% was rice-bean. Rice-sesame, rice-sesame-rice and rice-rice-kitchen crops were 3% each of the total cropping patterns (Figure 1. 1. a).

The same as Taungoo, rice-rice was the most popular cropping pattern among farmers at Yezin and it was followed by rice-bean-rice, rice-bean, rice-sesame-rice, corn-bean and rice-bean-sesame. Rice-rice cropping pattern was the main pattern practiced by the farmer and it was 44% of the cropping patterns. Rice-bean-rice, rice-bean, rice-sesame-rice were 32%, 15% and 5% of the total cropping

patterns respectively. Corn-bean and rice-bean-sesame were the least practiced pattern of 2% in each (Figure 1. 1. b).

Rice Varieties used in Monsoon and Summer Seasons

There were lots of rice varieties used in Taungoo and Yezin areas. The sample farmers were growing different varieties in monsoon and summer season. ByautTun was used by most of farmers it was 70% of total sown varieties in monsoon season (Figure 1. 2. a). It possessed 70% of the total sown varieties. Dagon2 -10%, Pyi Taw Yin - 8%, Ma Gyan Taw - 8%, Yeanelo -3% of total sown varieties. And Sin Thukha and Thai 90 varieties were used 1% in each. The results showed that the respondents preferred ByautTun variety to be grown in monsoon season.

Unlike monsoon season, Thai 90 variety was the major variety used in summer season and it was

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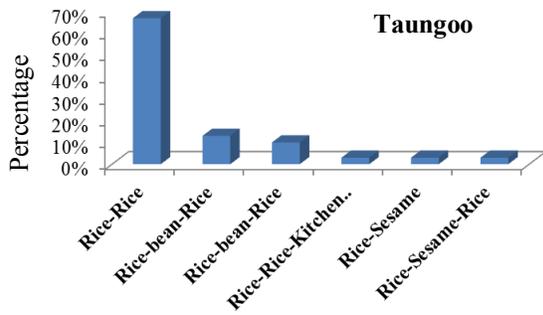


Figure 1. 1 (a) Cropping Pattern practiced by respondents

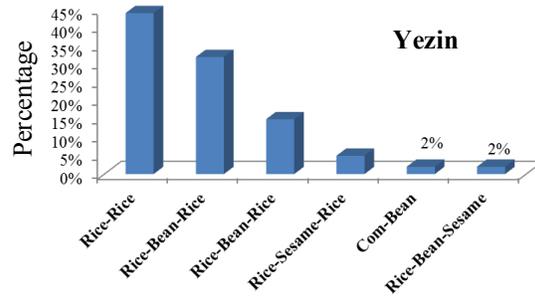


Figure 1. 1 (b) Cropping Pattern practiced by respondents

57% of the total three varieties (Figure 1. 2. b). Dagon2 and Pyi Taw Yin varieties were used 22% in each and these results showed that the farmer in Taungoo area used Thai 90 as the major variety in summer.

At Yezin, most of the respondent farmers used Manaw Thu Kha variety as the first priority both in monsoon and summer season. It possessed 82% of the total used varieties and Ma Gyan Taw variety was 7%, Sin Thu Kha was 4%. Thai 90 Days, IR and Pale Thwe were grown just 2% in each. The data showed that the respondent prefer to grow

Manaw Thu Kha variety in monsoon season (Figure 1. 2. c).

In summer season at Yezin, Manaw Thu Kha variety was the major variety used and it was half of the total used varieties. Manaw Thu Kha was grown in both seasons at Yezin area and it was followed by ShweThwe Yin variety (39%), Thai 90 (6%) and Pale Thwe (6%) (Figure 1. 2. d).

Percent of Sown Area Covered by Each Variety

At Taungoo, ByautTun rice variety covered 70 % of the total sown area of the respondents ' farm

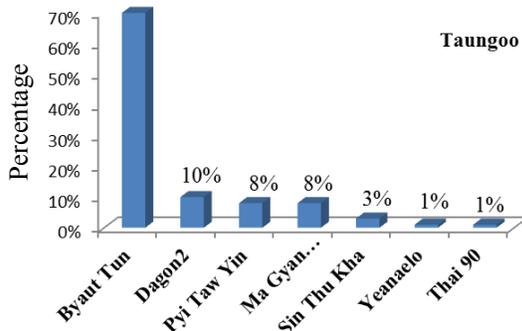


Figure 1. 2 (a) Monsoon Season Rice Varieties Used

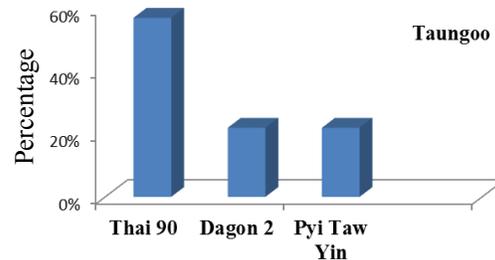


Figure 1. 2 (b) Summer Season Rice Varieties Used

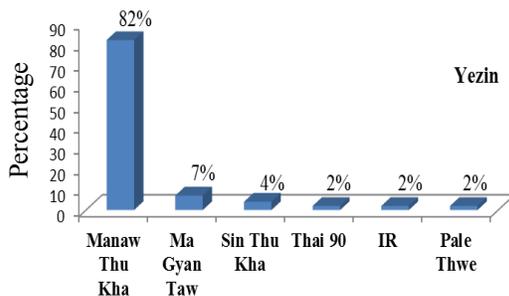


Figure 1.2 (c) Monsoon Season Rice Varieties Used

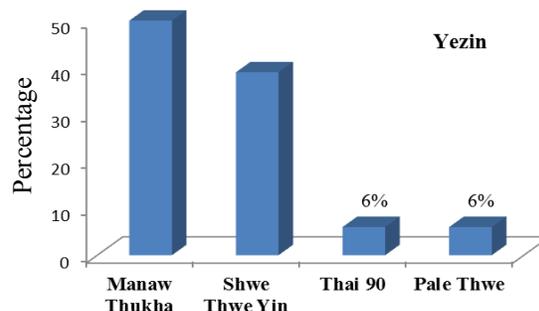


Figure 1. 2 (d) Summer Season Rice Varieties Used

area as shown in figure 1. 3. a. Dagon 2 variety covered 10%, Pyi Taw Yin (8%), Ma Gyan Taw (8%), Sin Thu Kha (3%), showing ByautTun was sown in the most the most popular variety among the respondents in monsoon. In summer season, Dagon 2 is the largest covered variety and it was 41% followed by Thai 90 and Pyi Taw Yin, 36% and 23% respectively. The results revealed that all these three varieties were well distributed in surrounding areas of the Taungoo trial site.

At Yezin, Manaw Thu Kha was the largest grown rice variety of the respondents in monsoon season as shown in figure 1. 3. c. It possessed 85% of the total sown rice area. Ma Gyan Taw area was 3% followed by Sin Thu kha (3%) of the total sown varieties in each. Ma Gyan Taw and Yeanelo varieties received the same percent of 6% in . Thai 90, and Pale Thwe were grown just 3% and 6% in each. Thisresylt showed that the respondent prefer to grow Manaw Thu Kha variety in monsoon season. In summer season, Manaw Thu Kha variety was also the major variety sown in this area and it was nearly half of the total sown varieties. Manaw Thu Kha was growing in both seasons at Yezin. ShweThwe Yin varieties was the second largest

sown varieties and it was planted 38 % of the total sown area followed by Pale Thwe and Thai 90, 14% and 3% respectively (Figure 1. 3. d.).

Benefit Cost Ratio (BCR)

At Taungoo, the production cost and gross benefit of each rice variety was investigated during the farmer field day. According to the results of BCR of the monsoon rice varieties Sin Thu Kha gave the highest BCR of 1. 8. ByautTun and Ma Gyan Taw had the second highest BCR of 1. 7. Pyi Taw Yin and Yeanelo varieties gave the same BCR of 1. 6. BCR of Dagon 2 and Thai 90 were 1. 5 and 1. 1 respectively. Overall, Sin Thu Kha was the highest benefit giving variety among the other varieties and followed by ByautTun and Ma Gyan Taw. The lowest BCR was observed in Thai 90 just getting a return of input cost (Table 1. 1. a).

The BCR of the summer rice varieties was shown in the table 1. 1. b. The results pointed out that Dagon 2 gave the highest BCR of 1. 6 which was followed by Pyi Taw Yin and Thai 90 with the same BCR of 1. 5.

At Yezin, BCR value-2. 7 of Pale Thwe was

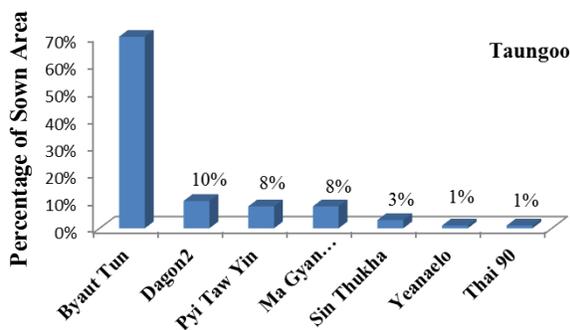


Figure 1. 3 (a) Sown Area Covered by each Rice Variety in Monsoon Season

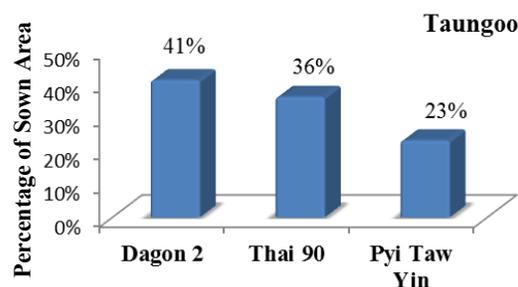


Figure 1. 3 (b) Sown Area covered by each Rice Variety in Summer Season

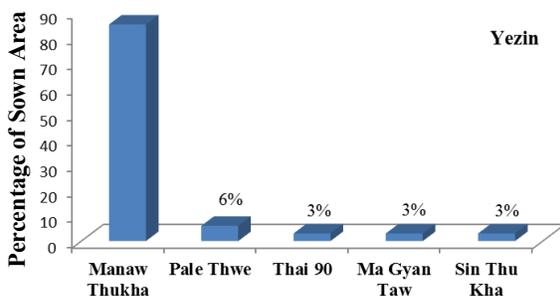


Figure 1.3 (c) Sown Area Covered by each Rice Variety in Monsoon Season

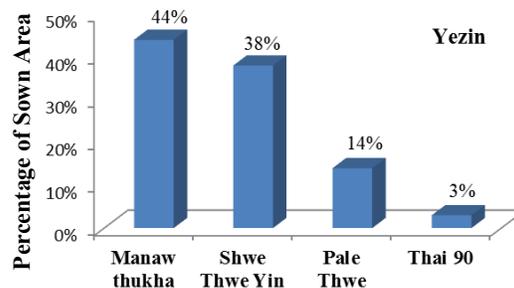


Figure 1. 3 (d) Sown Area covered by each Rice Variety in Summer season

Table 1. 1(a) Benefit Cost Ratio (BCR) of the Monsoon Rice at Taungoo

No.	Variety	Average Cost (MMK)	Gross Benefit (MMK)	BCR
1	Sin Thukha	250,000	450,000	1.8
2	ByautTun	234,857	388,857	1.7
3	Ma Gyan Taw	225,000	380,000	1.7
4	Pyi Taw Yin	236,667	367,500	1.6
5	Yeanaelo	230,000	373,500	1.6
6	Dagon2	236,667	360,000	1.5
7	Thai 90	300,000	315,000	1.1

Table 1. 1 (b) Benefit Cost Ratio (BCR) of the Summer Rice at Taungoo

No.	Variety	Average Cost (MMK)	Gross Benefit (MMK)	BCR
1	Dagon 2	270,000	417,400	1.6
2	Pyi Taw Yin	251,400	372,600	1.5
3	Thai 90	221,539	340,154	1.5

the highest and the second highest BCR of 2.0 was observed in Sin Thu Kha. The BCR of Manaw Thu Kha variety gave the value of BCR 1.7. Ma Gyan Taw, Sin Thu Kha and Thai 90 varieties achieved the BCR of 1.6, 1.5 and 1.4 respectively. BCR of IR was only 1.0 that meant no profit for this variety.

The BCR of the summer paddy varieties was shown in the table 1.2.d. According to the results, Manaw Thu Kha obtained the highest BCR of 2.0

and Pale Thwe gave the lowest BCR of 1.3. In summer, the BCR of Pale Thwe was very low value compared with monsoon BCR value.

Fertilizer and Application Method

Table 1.2 (a) illustrated the percentage of the types fertilizer used by informants (the participant farmers) at Taungoo. There were six kinds of fertilizers which utilized by these farmers. These were

Table 1. 1 (c) Benefit Cost Ratio (BCR) of the Monsoon Paddy at Yezin

No.	Variety	Average Cost (MMK)	Gross Profit (MMK)	BCR
1	Pale Thwe	450,000	1,200,000	2.7
2	Sin Thu Kha	280,000	550,000	2.0
3	Manaw Thu Kha	301,389	516,375	1.7
4	Ma Gyan Taw	300,000	481,667	1.6
5	Sin Thu Kha	275,000	412,000	1.5
6	Thai 90	250,000	352,000	1.4
7	IR	250,000	240,000	1.0

Table 1. 1 (d) Benefit Cost Ratio (BCR) of the Summer Paddy

No.	Variety	Average Cost (MMK)	Gross Benefit (MMK)	BCR
1	ManawThukha	257,778	524,556	2.0
2	Thai 90	250,000	450,000	1.8
3	ShweThwe Yin	250,000	433,571	1.7
4	Pale Thwe	450,000	605,000	1.3

urea, FYM, Top One, Compound, Potash and Bio Fertilizer. The 93% of the farmers used urea fertilizer, 59% of the farmers applied FYM and 52% applied Top One fertilizer, 48% of the farmer used compound fertilizer. 4% of the farmer used potash and Bio fertilizer. Top one fertilizer was urea fertilizer mixed with herbicides.

All farmers applied fertilizer by broadcasting. Most of the farmers applied urea fertilizer in two time splits at active tillering and booting stage by surface application.

Overall, the average amount of 63 kg urea per acre was applied by the respondents. The average amount of 73 kg Top one fertilizer per acre and 49 kg Compound fertilizer per acre were applied by the respondent farmers. Bio fertilizer was used by only one farmer and it was 40 kg per acre 25 kg potash per acre was applied by one farmer. The average amount of 4. 5 carts FYM per acre was applied in this area.

Unlike Taungoo, farmers from Yezin used urea, compound fertilizer and FYM. Table 1. 2 (b) illustrates the farmers applied urea and compound as fertilizer. Only 34 percent of the farmers applied FYM into their farms. 97% of the total sample farmer used urea fertilizer and 87% of the total respondents applied compound fertilizer. The same as the Taungoo farmers, farmers at Yezin applied fertilizers by broadcasting. Most of the farmers applied urea fertilizer in two time splits at active tillering and booting stages. The average amount of 65 kg urea per acre and 47 kg compound fertilizer per acre

were applied by Yezin farmers. The average amount of 3 carts of FYM per acre was applied in Yezin area.

Farmers' Preference Assessment

According to the respondents' assessment on the performance of the plant physical conditions of each plot at both sites-Taungoo and Yezin, the score was weighted and the results of Taungoo were shown in the table 1. 3. a. Without given any hint of treatments, farmers preferred and predicted that T8 (Nitrogen briquette 77. 6 kg Nha⁻¹) plot would be the highest yield and satisfied on the physical performance. As a second preference plot, T7 (180 kg Nha⁻¹) which is the highest nitrogen rate was chosen by the respondents. The third and fourth most preference plots were T6 (130kg Nha⁻¹) and T4 (77. 6 kg Nha⁻¹) plots. The fifth and sixth were T3 (30 kg Nha⁻¹) and T5 (100 kg Nha⁻¹) plots respectively. T2 (0 kg Nha⁻¹) and T1 (Nil control) plots were seventh and eighth in preference assessment. There was a very interesting assessment of the farmers that most of the famers could predict the higher nitrogen rate plots gave higher yield and preferred to the physical performance with an exception of only T5 (100 kg Nha⁻¹).

At Yezin, farmer preferred and predicted that T2 (0 kg Nha⁻¹) plot would be the highest yield and satisfied on the physical performance due to uniform ripening of the rice plants. As a second preference plot, T1 (Nil control) which is no fertilizer

Table 1. 2 (a) Fertilizer Utilization by informants at Taungoo

Fertilizer	Frequency	Percent	Amount (per acre)			Unit
			Average	Maximum	Minimum	
Urea	25	93	63	250	25	kg
Top One	14	52	73	120	40	kg
Compound	13	48	49	132	22	kg
Bio	1	4	40	-	-	kg
Potash	1	4	25	-	-	kg
FYM	16	59	4. 5	20	1	cart

Table 1. 2 (b) Fertilizer Utilization by informants at Yezin

Fertilizer	Frequency	Percent	Average	Amount (per acre)		Unit
				Maximum	Minimum	
Urea	37	97	65	150	0. 24	Kg
Compound	33	87	47	150	0. 24	Kg
FYM	13	34	3	10	0. 5	Cart

treated at all was chosen by the respondents. The third and fourth most preference plots were T6 (130 kg Nha⁻¹) and T8 (Urea Deep Placement Briquette 77.6 kg Nha⁻¹). The fifth and sixth were T4 (77.6 kg Nha⁻¹) plots and T3 (30 kg N/ha) plots respectively. T5 (100 kg Nha⁻¹) and T7 (180 kg Nha⁻¹) plots were seventh and eighth preference assessment. In this Yezin site, T1 and T2 plots were the right time to harvest and all the plant were very similar color and ripen evenly. This is one of the reasons of choosing those two plots. Some plots were lodging at that time of farmer field day due to the heavy rain and strong wind. Most of the farmers dislike that condition of lodging. It was also observed that the higher nitrogen rate applied plots were still green at that time even though the variety was over life span of 125 days.

Correlation between Farmers' Priority of Their Preference and Actual Yield

With more than 20 years farming experience, farmers at Taungoo could assess significantly and successfully (Table 1. 4. a). Farmers gave first and second priority to the plots bearing highest yield T8 & T7 respectively) and second last and last priority to the plots producing lowest yield (T2 & T1). Farmers' priority and actual yield at Taungoo was in linear relation with $R=0.834$, $P=0.002$ (Figure 1. 4. a).

Different from Taungoo, farmers of Yezin gave the first and second priority of their preference to T2 and T1 due to the uniform ripening at harvest. Uniformity of crop (rice) ripeness is also absolutely important for crop yield and as mentioned in 1. 6, rice plants were still green and good growth was observed in the higher nitrogen rate applied plots at

Table 1. 3 (a) Score of respondents' assessment on the plant performance at Taungoo

Treatment	Weighted Score	Preference
T8 (77.6 kg Nha ⁻¹ , UDP*)	1.3	1
T7	3.4	2
T6	3.5	3
T4	3.6	4
T3	5.3	5
T5	5.6	6
T2	6.0	7
T1	6.9	8

Table 1. 3 (b) Score of respondents' assessment on the plant performance at Yezin

Treatment	Weighted Score	Priority
T2	3.60	1st
T1	3.96	2nd
T6	4.01	3rd
T8 (77.6 kg Nha ⁻¹ , UDP*)	4.47	4th
T4	4.86	5th
T3	4.92	6th
T5	4.93	7th
T7	5.23	8th

*Urea Deep Placement

harvest (Table 1. 4. b). Furthermore, there was no correlation between farmers' priority and actual rice yield at Yezin (Figure 1. 4. b)

Conclusion

In addition to above mentioned information, almost all farmers could not afford to test the inherent soil characteristics, they use fertilizers and other agro-chemicals on their own many years farming experience or follow hearsay information and in consequences, it caused themselves a real burden

economically and environmentally.

Compared to Yezin, treatments effect showed significantly and there was clear cut assessment by farmers based on crop performance just before harvest at Taungoo. On the other hand, due to ambiguous crop performance lead farmers at Yezin to make reverse trend of their assessment and also made a vague impression on treatment effect. However, well experience of farmers and their perception on crop response to urea fertilizer treatments was highly appreciated.

Table 1. 4 (a) Farmers' priority list and related actual yield at Taungoo

Priority of preference	Actual yield	Treatment
1	5. 23	T8
2	5. 24	T7
3	4. 37	T6
4	4. 72	T4
5	4. 15	T3
6	4. 34	T5
7	3. 54	T2
8	3. 74	T1

Table 1. 4 (b) Farmers' priority list and related actual yield at Yezin

Priority of preference	Actual yield	Treatment
1	6. 78	T2
2	6. 89	T1
3	8. 15	T6
4	7. 65	T8
5	7. 62	T4
6	7. 10	T3
7	8. 13	T5
8	7. 49	T7

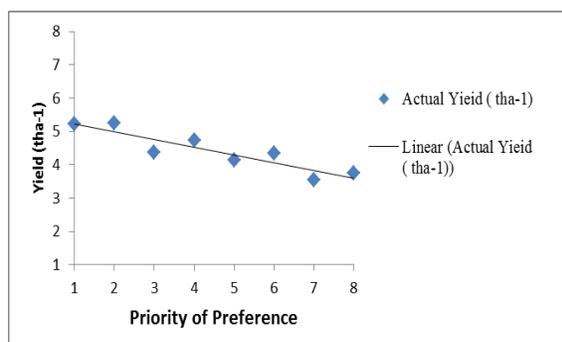


Figure 1. 4 (a). Correlation between farmers' priority of preference and actual yield at Taungoo

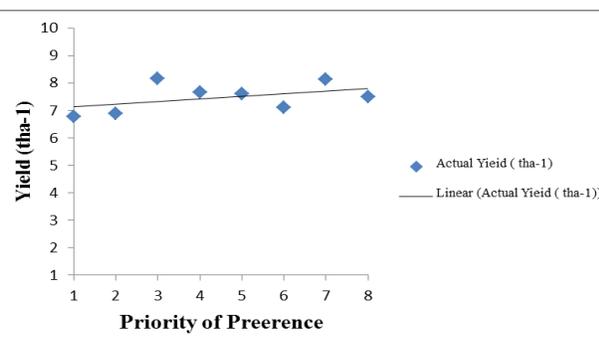


Figure 1. 4 (b). Correlation between farmers' priority of preference and actual yield at Yezin.