

Fertilizer Sector Improvement (FSI) Project

Report of Variety and Fertilizer Management Demonstration Plots on Maize at Southern Shan State in Myanmar

2016 Wet Season

Funded by



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In collaboration with



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Acronyms and Abbreviations

cm	centimeter
DAS	Days After Sowing
FP	Farmer's Practice
FSI	Fertilizer Sector Improvement (project)
ft	foot
FYM	Farmyard Manure
ha	hectare
IFDC	International Fertilizer Development Center
K	Potassium
kg	kilogram
MOP	Muriate of Potash
P	Phosphorus
S	Sulfur
t	ton
TSP	Triple Superphosphate
UDP	Urea Deep Placement

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Introduction

Urea deep placement (UDP) is a proven technology that can increase the yield of transplanted lowland rice by 15-20 percent with less use of urea (up to 40 percent) compared to broadcast application of urea. This has been proven in Bangladesh, sub-Saharan African countries, and more recently in Myanmar. The technology can also be applied on maize and some vegetable crops with similar yield increase.

In Myanmar, maize is widely grown in Shan State hills in the rainy season. It is also grown in some areas on the plains of Yangon, Bago, Ayeyarwaddy, and dry zone regions in the dry season, with residual moisture and some area with irrigation. In Shan State, fertilizer, especially urea, is usually applied as a side dressing on the maize crop. After applying urea, some farmers cover with soil to hill the rows, but others apply by surface broadcasting. Compound fertilizers with different nutrient ratios (15:15:15, 20:12:12, 10:10:5, etc.) are applied as basal. Maize yields range from 2.7 tons per hectare (t/ha) to 8 t/ha. Farmers are using hybrid maize varieties, which are readily available in the market. CP DK 888 hybrid was widely grown over the last few years. Now farmers are looking for better hybrids that can give higher yield. The yield can be improved by using quality, disease-resistant hybrid seeds with better fertilizer management practices.

In the 2016 wet season, maize variety and fertilizer demonstrations were established in southern Shan State by Syngenta and IFDC working under a partnership agreement. Syngenta introduced its maize hybrid, NK 621, and IFDC introduced balanced fertilization with UDP. NK 621 and UDP were compared with farmer's variety and farmer's fertilizer management practice.

Material and Methods

Site Selection

Two townships, Pindaya and Yaksauk, in southern Shan State were selected for maize demonstration plots. The preliminary site selection was in late February 2016 with staff from Syngenta (Thailand), AWBA,¹ and IFDC-Fertilizer Sector Improvement (FSI) project. Some demonstration sites were selected in Pindaya township. The second site selection trip was in early April with the IFDC Principal Scientist from IFDC headquarters, FSI Chief of Party, and FSI Senior Agronomist. Altogether, 16 sites were selected, nine sites from Pindaya township, six sites from Yaksauk township, and one site from Heho, Kalaw township. Selected sites, villages, farmers, and locations are given in Table 1.

Table 1. Sites of Maize Demonstrations

No	Township	Village	Farmer	Latitude	Longitude	Elevation (ft)
1	Pindaya	Lae Pyin	U Htein Lin	N 21° 01.303'	E 96° 42.282'	3,655
2		Thepyay Gone	U Maung Htay	N 21° 02.580'	E 96° 41.887'	3,491
3		Mine In	U Pyu	N 21° 03.800'	E 96° 42.933'	3,338
4		Ye Ti	U Chit Aye	N 21° 06.526'	E 96° 45.399'	3,218
5		Mine Lee	U Chit Kaung	N 21° 06.430'	E 96° 43.662'	3,519
6		Htoe Pon	U Kyaw San	N 21° 00.187'	E 96° 41.883'	3,680
7		Htae Thun	U Than Htay	N 20° 58.749'	E 96° 42.970'	4,117
8		Myoma	U Soe Ngwe	N 20° 57.275'	E 96° 40.251'	3,819
9		Phaung Pyar	U Kyaw Win	N 21° 09.914'	E 96° 45.970'	3,204
10	Yaksauk	Magyi Gone	U Tun Than Oo	N 21° 13.883'	E 96° 49.256'	3,115
11		Myaung Taw	U Sow Lwin	N 21° 11.154'	E 96° 48.495'	3,095
12		Yadanar Bon	U Aung Zaw Oo	N 21° 08.998'	E 96° 55.199'	3,243
13		Pin Phytit	U Thein Zaw	N 21° 06.325'	E 96° 55.476'	3,208
14		Nyaungbin Thar	U Tin Ko	N 21° 18.995'	E 96° 51.600'	3,023
15		Lae Mee	U Tin Ko Ko Oo	N 21° 21.469'	E 96° 54.210'	2,907
16	Kalaw	Heho	U Tin Win	N 20° 43.801'	E 96° 47.361'	3,833

Failed Demonstration Plots

There were four failures. Two demonstration plots in Pindaya and one in Yaksauk failed after planting, and one plot in Yaksauk was not planted. The plot at Lae Pyin, Pindaya, was supposed to be the first sowing plot due to the availability of irrigation water. But just before sowing, heavy rain and overflow water from the irrigation canal flooded the field and sowing had to be delayed. The plot was sown later, but a second flood occurred nearly one month after planting. That was the time for UDP application, but it was too wet. It was decided to

¹ AWBA is a local agribusiness company that is partnering with Syngenta in Myanmar.

abandon the site. At the demonstration at Thepyay Gone, Pindaya, it was first planned to irrigate after sowing, but that did not happen, and as a result the germination was found to be very poor. The farmer then plowed and planted with his own practice, and the site was abandoned. The demonstration at Yadanar Bon, Yaksauk, was one of the good plots with fertile soil and received good crop care. UDP was applied on time and the plot showed good color and growth with UDP at an early stage. However, the whole field, including the demonstration plots, was harvested by laborers before crop cuts could be measured. The plot was lost at harvesting time. The farmer, from Magyi Gone village, Yaksauk, has one large field of over 40 acres. He had bought a combine planter to use with his large four-wheel tractor for the first time. He was not willing to leave a small part of the land for the demonstration. It was agreed that the project would not continue with him. All failed demonstration plots were colored differently in Table 1.

Farmer's Practice – Varieties and Fertilizers

Due to the availability of many hybrid maize varieties in the market, farmers are using their preferred hybrids. In 2016 the Syngenta hybrid, NK 621, was already introduced to some villages and farmers did prefer it. Farmers at Myaung Taw village, Yaksauk, are using NK 621 for maize planting. Other farmer's varieties used in demonstrations are given in Table 2 (failed demonstrations not included). Farmer's practice (FP) of fertilizer application is also given. All farmers are using compound fertilizer as a basal, except in Htoe Pon, although with different ratios of nutrients. The Htoe Pon farmer used 25 kilograms (kg) triple superphosphate (TSP) per acre as basal fertilizer. Normally, 50 kg of compound fertilizer was applied by all demonstration farmers except the farmer in Nyaung Bin Thar. He used 25 kg only. Most farmers applied basal fertilizer by distributing it evenly in the sowing line. Farmers from Mine In, Pin Phyt, Lai Mee, and Heho are applying basal fertilizer by placement method. They put a certain amount of fertilizer in the row between two seed places and then cover it. The Heho farmer also applies farmyard manure (FYM) in the same way (placement in the row between seeds). Urea is applied at 50 kg/acre one time only at 30-45 days after planting by most farmers. Mine In, Myoma, Phaung Pyar, Pin Phyt, Nyaung Bin Thar, and Lai Mee farmers used less. The Pin Phyt farmer applied urea twice, but the rate was less than 50 kg, and urea was incorporated with soil every time he applied it.

Table 2. Farmer's Variety and Farmer's Practice of Fertilizer Management, All Demonstrations

No	Village	Farmer	Farmer's Variety	Farmer's Practice Fertilizer
1	Mine In	U Pyu	CP 888	(15:15:15) 50 kg/acre basal 30 DAS Urea 25 kg/acre
2	Ye Ti	U Chit Aye	Thai 029	(15:15:15) 50 kg/acre basal 45 DAS Urea 50 kg/acre
3	Mine Lee	U Chit Kaung	CP 888	(10:10:5) 50 kg/acre 50-60 DAS Urea 50 kg/acre
4	Htoe Pon	U Kyaw San	Yezin - 11	TSP 25 kg/acre basal and no topdressing
5	Htae Thun	U Than Htay	101	(20:10:5) 50 kg/acre basal 30 DAS Urea 50 kg/acre
6	Myoma	U Soe Ngwe	Yezin - 11	Zarmani (15:10:10:3Mg) 50 kg/acre basal 45 DAS Urea 25 kg/acre
7	Phaung Pyar	U Kyaw Win	NK 621	(15:15:15) 50 kg/acre basal 30-40 DAS Urea 33.3 kg/acre (surface broadcast)
8	Myaung Taw	U Sow Lwin	Yezin - 11	(15:15:15) 50 kg/acre basal 30 DAS Urea 50 kg/acre
9	Pin Phytit	U Thein Zaw	CP 301	(15:5:5) 25 kg + (25:12:13) 25 kg/acre basal 35 DAS Urea 16.6 kg/acre* 50 DAS Urea 16.6 kg/acre
10	Nyaung Bin Thar	U Tin Ko Ko	SP 101	(15:15:15) 25 kg/acre basal 45 DAS Urea 25 kg (surface placement)
11	Lae Mee	U Tin Ko Ko Oo	TP - 1	(10:10:5 + 5S) 50 kg/acre basal distributed in the sowing line 35 DAS Urea 37.5 kg/acre surface placement
12	Heho	U Tin Win	A 888	(10:10:5) 50 kg + FYM 2 cart-load basal, 30-45 DAS Urea 50 kg/acre*

* Urea is covered with soil at application time.

Experimental Design and Treatments

A simple design with four treatments (two varieties x two fertilizer practices) was used for almost all demonstrations. At Myaung Taw, Yaksauk, where the farmer's variety is NK 621, there were only two treatments, NK 621 with UDP and NK 621 with farmer's fertilizer practice. At Heho, Kalaw, an additional two treatments were included, which were farmer's basal + UDP and phosphorus (P), potassium (K), sulfur (S) + UDP, and UDP was applied as basal at planting time. The common four treatments were as follows:

1. NK 621 with UDP.
2. NK 621 with farmer's fertilizer practice.
3. Farmer's variety with farmer's fertilizer practice.
4. Farmer's variety with UDP.

Normally, four treatments were sown in a row. But according to the shape of available land, the first two treatments were planted in front and the other two treatments were planted at the back at Mine In, Htoe Pon, Htae Thun, and Pin Phyt.

There were six treatments in Heho demonstration plots, which were:

1. NK 621 with UDP.
2. NK 621 with farmer's fertilizer practice.
3. Farmer's variety with farmer's fertilizer practice.
4. Farmer's variety with UDP.
5. NK 621 with farmer's basal + UDP at planting time.
6. NK 621 with P, K, S + UDP at planting time.

A plot size of 15 m x 20 m was used in all demonstrations. Row spacing is 75 centimeters (cm), and plant spacing is 25 cm.

Basal Fertilizer and Urea

Basal fertilizer used in farmer's practice for each demonstration is given in Table 2. For the UDP treatment, blanket fertilizer of 50 kg TSP/acre (55.6 kg P₂O₅/ha), 25 kg muriate of potash (MOP)/acre (37.1 kg K₂O/ha), and 10 kg gypsum/acre (4.6 kg S/ha) were applied as basal.

One 2.7-gram urea briquette was applied 25-30 days after planting on each maize plant. The rate was therefore 144 kg urea/ha (58 kg urea/acre) or 66 kg N/ha. Urea application of FP for each farmer is given in Table 2. No urea was applied on FP fertilizer treatment at Htoe Pon.

Results and Discussion

Pindaya Township Demonstration Plots

The maize component and yield data from the Pindaya demonstration plots are given in Table 3 and Table 6.

Mine In – This plot is situated along the riverside, and one flash flood occurred before planting. The topsoil on one corner of the plot was eroded, and pebbles had to be removed

before planting. CP 888 was used as the farmer's variety. Syngenta hybrid, NK 621, gave more yield than the farmer's variety in all fertilizer management practices. On average across all fertilizer practices, NK 621 yielded 27.6 percent higher than CP 888. The UDP plot gave more yield than FP with NK 621 (16.87 t/ha and 14.0 t/ha, respectively) but with CP 888, FP gave more yield than UDP (13.81 t/ha and 10.38 t/ha, respectively), although the UDP plot was at the corner where the flood occurred. The yield of CP 888 with FP was significantly low compared to other treatments.

Ear size (length and diameter) was found larger with UDP than with FP for NK 621. But with CP 888, it was not different. At the early growth stage, a difference in plant color was clearly observed on NK 621. It was greener with UDP than FP. At harvest time, plants with UDP were still green while plants with FP were dry with straw color.

Ye Ti – Thai 029 hybrid maize was used as the farmer's variety. NK 621 gave higher yield than Thai 029 across all fertilizer treatments. Even with farmer's fertilizer practice, NK 621 yielded higher (8.32 t/ha) than Thai 029. The UDP treatment gave higher yield with NK 621 but not with Thai 029, possibly because the UDP plot was located at the lowest (wetter) part of the plot. Leaf blight disease was observed more on Thai 029. NK 621 was less infected by the disease.

Growth of both hybrids was good but Thai 029 looked a little taller than NK 621. Lodging (about 45 percent) of the plot was observed on Thai 029. This lodging was due to heavy rain and strong wind at late vegetative stage. NK 621 has a strong stem and was resistant to lodging.

Mine Lee – This demonstration was the poorest among all demonstrations due to very light soil with poor soil fertility. Most of the plants were stunted. Vigorous plants, but still without normal growth, were observed at high spots, especially around old termite mounds. Response from urea, either UDP or prilled urea, was not clear at the early growth stage. However, different response was observed at a later stage between UDP and prilled urea. UDP plants were greener and more vigorous than prilled urea. Yield with UDP gave higher yield than yield with FP with both hybrids. Plants of CP 888 with UDP were extremely stunted but still gave higher yield than FP. NK 621 seemed to be more responsive to N than CP 888 and yielded better on the poor soil. As an average, NK 621 yielded 54.9 percent higher than CP

888. UDP was clearly a more efficient method of application on poor soil. NK 621 + UDP yielded 6.22 t/ha, which was 38.9 percent higher than the yield with FP (4.48 t/ha). With CP 888, the yield superiority of UDP over FP was 23.9 percent.

Htoe Pon – This is the only demonstration where no urea was applied as farmer’s practice. It is understandable that the UDP treatment showed higher yield than FP treatment. The UDP treatment over FP was 98.3 percent higher with NK 621 and 37.1 percent higher with Yezin 11. As an average across both varieties, yield from UDP was 65.6 percent higher than FP. That was due to no urea application on FP. At harvest time, the differences in cob size and uniformity were so evident that the farmer realized the important of urea on maize and will be using urea in the coming maize seasons.

Htae Thun – UDP gave higher yield (8.89 t/ha) than FP with NK 621 (6.96 t/ha), but not with farmer’s variety, 101. With farmer’s variety, FP gave higher yield (10.35 t/ha) than UDP (8.67 t/ha). This is probably due to sloping land, with the UDP plot located on the lowest portion. In most demonstrations, it was noticed that plants on the lower area showed less growth.

Myoma – In this demonstration, the yield with UDP was slightly lower than the yield with FP for both hybrids. NK 621 gave higher yield than Yezin 11. Average yield of NK 621 was 11.81 t/ha and Yezin 11 yielded 9.04 t/ha. It was observed at the vegetative stage and harvesting time that plant performance and growth were equally good for both hybrids.

Phaung Pyar – There were only two plots with two treatments of fertilizer management at Phaung Pyar. NK 621 hybrid had been introduced to the village and farmers preferred it. The farmer uses 50 kg/acre of compound fertilizer (15:15:15) as basal, and 33.3 kg urea/acre was applied 30 days after sowing by surface broadcasting. Therefore, the UDP rate was higher than the urea broadcasting rate and gave 49.2 percent higher yield (10.93 t/ha) than FP (7.33 t/ha).

Yaksauk Township Demonstration Plots

Maize component data and yield data from Yaksauk demonstrations are given in

Table 4 and Table 7.

Myaung Taw – UDP gave higher yield (9.92 t/ha) than FP (8.05 t/ha) with Yezin 11 hybrid. But FP treatment gave higher yield (10.31 t/ha) than UDP (9.44 t/ha) with NK 621. The field is sloping to one side, and the NK 621 + UDP plot was at the lowest side of the field where flooding occurred. There was water logging during the vegetative stage. This is the reason for the low yield of NK 621 with UDP. However, the average yield of NK 621 (9.87 t/ha) was better than that of Yezin 11 (8.98 t/ha). It would be even better if both hybrids were grown under equal conditions.

Pin Phyt – NK 621 gave higher yield than CP 301 with both fertilizer management practices. The average yield of NK 621 was 10.94 t/ha while CP 301 had 8.11 t/ha. NK 621 gave similar yields with UDP and FP. The yield of NK 621 with FP (10.97 g/ha) was slightly higher than that with UDP (10.91 /ha). But CP 301 gave 16.4 percent higher yield with UDP than FP. This demonstration farmer follows intensive practices of maize planting. The crop was absolutely free from weeds. Urea was applied as two splits, and it was incorporated with soil at every application.

Nyaung Bin Thar – This demonstration plot was the second poorest among all in terms of plant growth and performance. The lowest yield was observed on both hybrids. NK 621 averaged 4.29 t/ha, and SP 101 gave 3.41 t/ha only. NK 621 had higher yield with UDP than with FP while SP 101 gave higher yield with FP than UDP. Soil heterogeneity on the plot was greater than on other demonstrations. When sowing, with all four treatments in a row, some space had to be skipped where the condition in the row was unfavorable. The soil at one end of the plot with SP 101 + UDP was less fertile with lighter soil than other areas, and it contributed to the low yield of UDP.

Lai Mee – It was found that NK 621 gave more yield than TP 1 maize hybrid. UDP yield was also better than FP yield. The demonstration farmer has up to 200 acres for maize cultivation. Land preparation is mechanized with a four-wheel, high horsepower tractor. But inter-cultivation and weeding were poor due to less labor and no mechanization. It was difficult to apply UDP at 25 days after planting since the soil surface became hard after rains. Side dressing of urea was not incorporated with soil. UDP yielded 42.09 percent higher than FP since less urea (25 kg/acre) was applied by surface broadcast.

Heho, Kalaw Township, Demonstration Plot

Component data and yield from Heho demonstration are given in Table 5 and Table 8.

UDP gave higher yield with NK 621 but not with A 888 hybrid. A 888 hybrid gave higher yield with FP than with UDP. This may be explained by land leveling. Unlike rice land in plain area, most maize lands in Shan State are on hilly terrain. It was observed that the plots on lower areas gave lower yield than on higher areas.

The farmer applied two cart-loads of FYM per acre as a basal by placement along the sowing row between seeds. NK 621, which had an average yield of 8.19 t/ha, was 33.6 percent better than A 888 hybrid, which yielded 6.13 t/ha on average. UDP produced 17.8 percent higher yield than FP as an average for all varieties. With NK 621 hybrid, UDP was 44.7 percent higher than FP.

The results of the additional two treatments on which UDP was applied at planting time seemed to show not enough nitrogen nutrient for the whole period of the growing season. It gave less yield than other treatments on which UDP was applied 30 days after planting. UDP with farmer's basal fertilizer application gave 5.22 t/ha, and UDP with balance P, K, and S gave 5.92 t/ha. This would indicate a basal fertilizer of compound fertilizer (10:10:5) with FYM may not be enough for P and K. With the application of P, K, and S, the yield was 13.4 percent higher than FP.

Conclusion

As an average value across both fertilizer management practices, it was found that NK 621 hybrid performed better than all hybrid varieties used by farmers at all locations except Htae Thun. At Htae Thun, the farmer's variety, 101, yielded 9.51 t/ha, which was much higher than the yield (7.93 t/ha) of NK 621. The yield superiority of NK 621 over farmer's variety was highest with 54.9 percent at Mine Lee, where the lowest yield with poorest soil was observed, showing that NK 621 could still perform relatively well on poor soil. It was observed that plant and cob uniformity of NK 621 was better than that of hybrids used by

farmers. It was especially noticeable that cobs of other hybrids were not as uniform as those of the NK 621 hybrid, perhaps related to seed quality.

It was noted that the NK 621 hybrid was more responsive to UDP than FP. NK 621 with UDP gave higher yield than FP at nine of the 12 locations. FP gave higher yield than UDP at Myoma, Myaung Taw, and Pin Phytit. That was due to unfavorable conditions on the UDP plot, such as flooding at Myaung Taw and poor soil fertility at Myoma and Pin Phytit. With farmer's variety, UDP and FP results varied across locations. UDP gave higher yields at half of the locations, and FP gave higher yields at the other half. However, lower yields of UDP with farmer's hybrid can be explained at Mine In, Htae Thun, Nyaung Bin Thar, and Heho, where the UDP plots were located on lower areas with abnormal conditions, such as waterlogging. UDP could give better yields at those locations if UDP plots had no such adverse conditions.

In these demonstrations, farmers used less nitrogen than with the UDP treatment. The UDP rate was 144 kg urea/ha (58.3 kg urea/acre), whereas the highest FP rate was 123.6 kg urea/ha (50 kg urea/acre). Only five farmers used this amount, and other farmers used half or little more than half of that amount. One farmer was not using urea fertilizer as his practice at all. Moreover, most farmers did not incorporate or cover with soil after urea application. One farmer at Phaung Pyar practiced surface broadcasting. The yield with FP could be different/higher with a higher urea rate and if covered with soil after application. Land leveling might also be considered important since maize yields varied according to land topography.

Table 3. Maize Component Data from Pindaya Demonstration Plots

No	Variety and Fertilizer	Plant Height (cm)	Ear Height (cm)	No of ears per plant	Ear Length (cm)	Ear Diameter (cm)	Number of rows per ear	Number of seeds per row
1	Mine In							
	NK 621 + UDP	232	119	1.0	19.8	4.8	13.6	40.3
	NK 621 + FP	224	113	1.0	18.5	4.5	13.4	35.6
	CP 888 + FP	228	119	1.6	16.6	3.9	10.4	38.7
	CP 888 + UDP	193	93	1.5	16.5	3.9	10.4	36.0
2	Ye Ti							
	NK 621 + UDP	227	114	1.2	19.7	4.6	13.6	42.9
	NK 621 + FP	225	112	1.0	18.5	4.5	13.4	40.4
	029 + FP	228	125	1.0	18.5	4.5	13.0	40.2
	029 + UDP	232	125	1.2	19.0	4.5	13.0	42.1
3	Mine Lee							
	NK 621 + UDP	150	68	1	15.7	4.5	13.1	36.1
	NK 621 + FP	152	69	1	15.4	4.2	12.8	27.4
	CP 888 + FP	123	59	1	12.1	3.6	10.4	32.0
	CP 888 + UDP	118	51	1	13.5	3.6	10.0	31.8
4	Htoe Pon							
	NK 621 + UDP	206	107	14	18.6	4.7	14	40.4
	NK 621 + FP	168	69	14	12.6	4.3	14	28.4
	Yezin 11 + FP	169	62	12	14.8	3.8	12	30.9
	Yezin 11 + UDP	193	87	12	18.7	4.1	12	41.1
5	Htae Thun							
	NK 621 + UDP	251	137	1.0	19.9	5.0	13.8	40.1
	NK 621 + FP	257	137	1.0	19.3	4.8	13.6	35.6
	101 + FP	254	143	1.7	18.6	4.4	11.6	38.6
	101 + UDP	250	126	1.7	18.9	4.5	12.0	38.9
6	Myoma							
	NK 621 + UDP	211	106	1.5	20.3	5.1	13.6	42.3
	NK 621 + FP	215	140	1.3	18.6	4.9	13.0	39.8
	Yezin 11 + FP	220	303	1.2	20.5	4.7	13.0	39.9
	Yezin 11 + UDP	233	112	1.2	19.2	4.5	12.8	41.4

Table 4. Maize Component Data from Yaksauk Demonstration Plots

No	Variety and Fertilizer	Plant Height (cm)	Ear Height (cm)	No of ears per plant	Ear Length (cm)	Ear Diameter (cm)	Number of rows per ear	Number of seeds per row
7	Phaung Pyar							
	NK 621 + UDP	266	145	1.0	20.6	5.1	13.8	39.5
	NK 621 + FP	253	135	1.0	18.1	4.8	13.8	31.1
8	Myaung Taw							
	NK 621 + UDP	225	114	1.0	19.9	4.8	14.0	40.5
	NK 621 + FP	230	118	1.0	20.4	4.9	13.4	40.2
	Yezin 11 + FP	221	104	1.0	22.0	4.5	11.8	44.2
	Yezin 11 + UDP	233	111	1.1	22.0	4.6	12.6	41.1
9	Pin Phyt							
	NK 621 + UDP	230	126	1.0	18.5	4.8	14.0	36.5
	NK 621 + FP	216	119	1.0	18.4	4.7	13.2	36.9
	CP 301 + FP	183	97	1.0	18.3	4.8	12.8	40.0
	CP 301 + UDP	185	104	1.0	18.0	4.5	13.4	38.4
10	Nyaung Bin Thar							
	NK 621 + UDP	186	95	1.0	17.0	4.5	13.6	31.3
	NK 621 + FP	192	95	1.0	16.7	4.4	12.6	30.5
	SP 101 + FP	203	99	1.0	16.9	4.4	14.4	31.2
	SP 101 + UDP	199	99	1.0	15.8	4.3	15.0	31.1
11	Lai Mee							
	NK 621 + UDP	213	117	1.0	17.4	4.6	13.6	36.6
	NK 621 + FP	200	110	1.0	17.6	4.4	13.2	31.6
	TP 1 + FP	213	115	1.0	17.8	4.4	13.6	32.4
	TP 1 + UDP	182	100	1.0	18.7	4.3	13.0	33.0

Table 5. Maize Component Data from Heho, Kalaw Demonstration Plot

No	Variety and Fertilizer	Plant Height (cm)	Ear Height (cm)	No of ears per plant	Ear Length (cm)	Ear Diameter (cm)	Number of rows per ear	Number of seeds per row
12	Heho							
	NK 621 + UDP	199	109	1.0	18.7	5.1	14.2	38.9
	NK 621 + FP	186	98	1.0	18.8	4.7	13.2	35.6
	A 888 + FP	178	115	1.0	17.1	4.3	11.4	38.7
	A 888 + UDP	177	104	1.0	17.0	4.2	11.4	38.2
	FP+FYM + UDP	174	96	1.0	17.1	4.4	12.6	30.6
	PKS + UDP	188	103	1.0	17.0	4.6	13.4	31.8

Table 6. Maize Yield Data from Pindaya Demonstration Plots

No	Location variety/fertilizer	Yield (t/ha)	Variety average	Fertilizer average	NK over FV (%)	UDP over FP (%)
1	Mine In					
	NK 621 + UDP	16.87	15.43	13.62	27.6	-2.0
	NK 621 + FP	14.00				
	CP 888 + FP	13.81	12.09	13.90		
	CP 888 + UDP	10.38				
2	Ye Ti					
	NK 621 + UDP	9.34	8.83	8.45	14.5	4.3
	NK 621 + FP	8.32				
	029 + FP	7.87	7.71	8.10		
	029 + UDP	7.56				
3	Mine Lee					
	NK 621 + UDP	6.22	5.35	5.02	54.9	32.8
	NK 621 + FP	4.48				
	CP 888 + FP	3.09	3.46	3.78		
	CP 888 + UDP	3.82				
4	Htoe Pon					
	NK 621 + UDP	10.06	7.57	9.01	9.8	65.6
	NK 621 + FP	5.07				
	Yezin 11 + FP	5.81	6.89	5.44		
	Yezin 11 + UDP	7.97				
5	Htae Thun					
	NK 621 + UDP	8.89	7.93	8.78	-16.6	1.5
	NK 621 + FP	6.96				
	101 + FP	10.35	9.51	8.65		
	101 + UDP	8.67				
6	Myoma					
	NK 621 + UDP	11.74	11.81	10.33	30.6	-1.7
	NK 621 + FP	11.88				
	Yezin 11 + FP	9.15	9.04	10.51		
	Yezin 11 + UDP	8.93				

Table 7. Maize Yield Data from Yaksauk Demonstration Plots

No	Location variety/fertilizer	Yield (t/ha)	Variety average	Fertilizer average	NK over FV (%)	UDP over FP (%)
7	Phaung Pyar					
	NK 621 + UDP	10.93				49.2
	NK 621 + FP	7.33				
8	Myaung Taw					
	NK 621 + UDP	9.44	9.87	9.68	9.9	5.4
	NK 621 + FP	10.31				
	Yezin 11 + FP	8.05	8.98	9.18		
	Yezin 11 + UDP	9.92				
9	Pin Phyt					
	NK 621 + UDP	10.91	10.94	9.82	34.8	6.4
	NK 621 + FP	10.97				
	CP 301 + FP	7.50	8.11	9.23		
	CP 301 + UDP	8.73				
10	Nyaung Bin Thar					
	NK 621 + UDP	4.56	4.29	3.81	25.7	-2.1
	NK 621 + FP	4.02				
	SP 101 + FP	3.77	3.41	3.89		
	SP 101 + UDP	3.06				
11	Lai Mee					
	NK 621 + UDP	7.45	6.34	7.22	6.3	42.1
	NK 621 + FP	5.23				
	TP 1 + FP	4.94	5.96	5.08		
	TP 1 + UDP	6.99				

Table 8. Maize Yield Data from Heho, Kalaw Demonstration Plot

No	Location variety/fertilizer	Yield (t/ha)	Variety average	Fertilizer average	NK over FV (%)	UDP over FP (%)
12	Heho					
	NK 621 + UDP	9.69	8.19	7.75	33.6	17.8
	NK 621 + FP	6.70				
	A 888 + FP	6.46	6.13	6.58		
	A 888 + UDP	5.81				
	FP+FYM + UDP	5.22	5.57	13.4		
	PKS + UDP	5.92				