

# **Fertilizer Sector Improvement (FSI+) Project**

**Agreement Number BFS-IO-15-00001**

## **Crop Cut Survey Report**

**2016 Wet Season**

**Funded by**



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## Acronyms and Abbreviations

ANOVA	Analysis of Variance
BP	Broadcast Paddy
BU	Briquette Urea
DOA	Department of Agriculture
FSI	Fertilizer Sector Improvement
GM	Gross Margin
ha	hectare
HYV	High-Yielding Variety
IFDC	International Fertilizer Development Center
kg	kilogram
m	meter
MOP	Muriate of Potash
TP	transplanting paddy
TPC	total production cost
TSP	Triple Superphosphate
UDP	Urea Deep Placement
USAID	United States Agency for International Development

# **Fertilizer Sector Improvement (FSI+) Project**

**Agreement Number BFS-IO-15-00001**

## **Crop Cut Survey Report 2016 Wet Season**

### **Introduction**

The Fertilizer Sector Improvement (FSI) project, implemented by the International Fertilizer Development Center (IFDC), is funded by the United States Agency for International Development (USAID) for five years. During its first season (the wet season of 2014), the project ran nine field trials to test the adaptation of urea deep placement technology (UDP) in Ayeyarwady, Bago, and Yangon regions. Extension of the technology commenced in the summer paddy season of 2014/2015 when 1,465 farmers from 10 townships (from three regions) were trained. In the wet season of 2015, 1,795 farmers selected in 14 townships from three regions received training. In the dry season of 2015/2016, the farmer trainings were provided to an additional 1,795 farmers in 18 townships from the three regions. In the wet season of 2016, 1,933 farmers were trained in 27 townships. Farmers received training not only in UDP but also in seed selection to use good seeds and application of a balanced mix of nutrients. Other extension activities included demonstrations, field days, and cross visits.

To measure the impact of the technology on rice yield, at the end of each season, the project takes crop cuts from a random sample of farms with fields where UDP is applied and compares them to fields without UDP. Two plots (5 m x 2 m) are cut in each field with and without UDP, threshed, weighed, and moisture measured to calculate yield per hectare (ha) at 14% moisture. One hundred and sixteen crop cuts were collected during November to December 2016. This report describes the results for the crop cuts taken at the end of the wet season of 2016 in 27 townships.

## Results

### Sample Size and Random Sampling of Direct Beneficiary Farmers Who Applied UDP

A list of names of direct beneficiary farmers (who attended the farmer trainings and applied UDP in the wet season paddy) was received from the field monitoring by the project partners and extension team and from key informant farmers. The total number of farmers applying UDP in the wet season of 2016 was 1,650 (1,193 male, 457 female).<sup>1</sup> Sampling was a stepwise process. First, 50% of the village tracts where farmers were using UDP within a township were selected at random.<sup>2</sup> Then within those village tracts 50% of the villages where farmers were using UDP were selected at random. Then the farmers applying UDP in those villages were sorted by gender. By using a random integer generator (non-repeating), a 7% random sample was selected by gender. Table 1 shows that in Yangon region, there were 28 male farmers and 13 female farmers in the sample, covering nine project intervention townships. In Bago there were 12 females and 26 males from seven project townships, and in Ayeyarwady there were nine females and 29 males from 11 townships (Appendix).

Each farm in the sample had fields with UDP and fields without UDP for crop cuts. On one occasion in Bago, when the field officers went to take the crop cuts, the male farmer had already harvested his paddy, and on another occasion in Ayeyarwady, one female farmer participated on behalf of her elderly farther. Overall, the adjusted cuts were from **81 male** farmers and **35 female** farmers (Table 1).

At the time of the crop cut, the field officers completed a questionnaire with the farmer. Data on crop cuts (paddy yield) with and without UDP, inputs used, wet paddy cultivated area, percentage of total production sold, farm gate paddy price received, and labor were collected to enable a gross margin analysis.

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<sup>1</sup> According to the information received from field monitoring at the end of August 2016.

<sup>2</sup> In townships with only one village tract where farmers were using UDP, crop cuts from that tract were taken.

**Table 1. Sample Size and Collected Sample Crop Cuts for the Wet Season Paddy, 2016**

Sr. No.	Region	Township	Beneficiary Farmer Who Used UDP in Wet 2016		Sample Farmers (7% of UDP Farmers)		Collected No. of Sample Beneficiary Farmers	
			Female	Male	Female	Male	Female	Male
1	Yangon	1. Kungyangon	53	58	4	4	4	4
		2. Kawhmu	15	42	1	3	1	3
		3. Kyauktan	9	38	1	3	1	3
		4. Thanlyin	13	42	1	3	1	3
		5. Twantay	8	47	1	3	1	3
		6. Taikkyi	20	53	1	4	1	4
		7. Hmawbi	22	22	2	2	2	2
		8. Hlegu	35	84	2	6	2	6
		9. Htantabin	1	6	0	0	0	0
		<b>Total YGN</b>	<b>176</b>	<b>392</b>	<b>13</b>	<b>28</b>	<b>13</b>	<b>28</b>
2	Bago	1. Letpadan	27	42	2	3	2	3
		2. Thayarwady	15	21	1	1	1	0
		3. Bago	21	40	1	3	1	3
		4. Daik-U	15	46	1	3	1	3
		5. Kyauktaha	22	95	2	7	2	7
		6. Pyay	51	90	4	6	4	6
		7. Zigon	13	47	1	3	1	3
				<b>Total Bago</b>	<b>164</b>	<b>381</b>	<b>12</b>	<b>26</b>
3	Ayeyarwady	1. Maubin	8	52	1	4	1	4
		2. Pantanaw	2	39	0	3	0	3
		3. Mawlamyinegyun	28	90	2	6	3	5
		4. Kyaiklat	11	15	1	1	1	1
		5. Myaungmya	5	32	1	2	1	2
		6. Kangyidaunt	15	42	1	3	1	3
		7. Bogale	9	28	1	2	1	2
		8. Zalun	4	30	0	2	0	2
		9. Einme	11	47	1	3	1	3
		10. Kyaunggon	6	19	0	1	0	1
		11. Pyapon	18	26	1	2	1	2
		<b>Total Ayeyarwady</b>	<b>117</b>	<b>420</b>	<b>9</b>	<b>29</b>	<b>10</b>	<b>28</b>
		<b>Grand Total</b>	<b>457</b>	<b>1,193</b>	<b>34</b>	<b>83</b>	<b>35</b>	<b>81</b>

### Farm Size Groups of the Sample Crop Cut Farmers

The majority of both male (79%) and female (80%) farmers in the sample were smallholders (who are working on 5 ha or less of paddy land). In the medium-size group (between 5.1 and 10 ha), there were more male farmers (18%) than female farmers (11%), but in the large farm group (more than 10 ha), there were more female farmers (8.6%) than male farmers (2.5%) (Table 2).

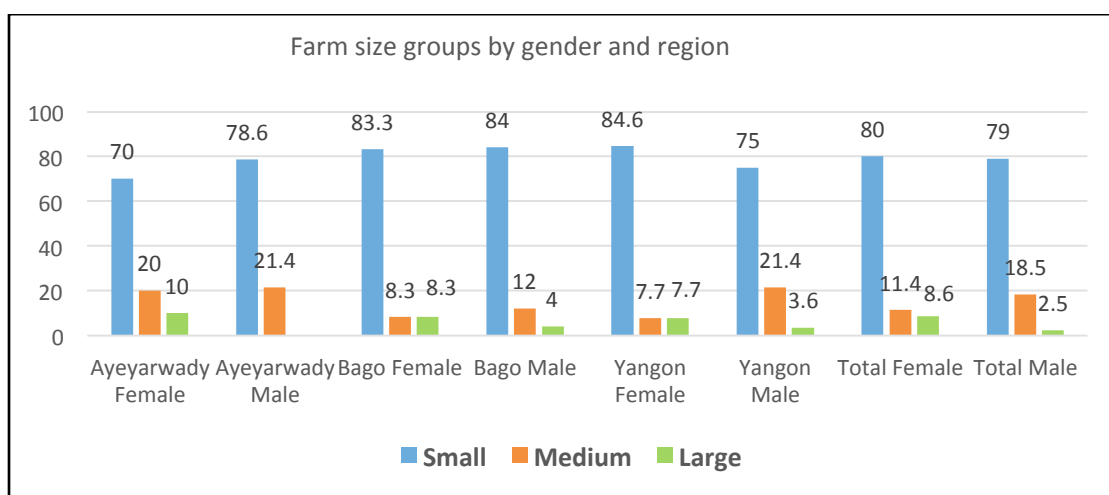
There was a higher percentage of male farmers with small farm size in Ayeyarwady and Bago region, but in Yangon region, there were more female farmers (84.6%) with small sized paddy land than male farmers (75%) (Figure 1).



Nearly the same the percentage of both male and female farmers were medium land holders in Ayeyarwady region. About 10% of female farmers in Ayeyarwady region were large land holders, but there were no male farmers in this group.

About 12% of male and 8% of female farmers were medium land holders in Bago region. There was a higher percentage of female farmers (8%) with a large farm size than male farmers (4%) in Bago region.

More male farmers had a medium farm size in Yangon region, while more female farmers had a large farm size for wet paddy production in 2016.



**Figure 1. Farm Size Groups of Crop Cut Farmers by Gender by Region (%)**

**Table 2. Farm Size Groups of Crop Cut Farmers by Gender by Region**

			Farm Size Group			Total
			Small (<5 ha)	Medium (5.1-10 ha)	Large (>10 ha)	
Yangon	Female	Count	11 (84.6%)	1 (7.7%)	1 (7.7%)	13 (100%)
	Male	Count	21 (75%)	6 (21.4%)	1 (3.6%)	28 (100%)
	Total	Count	32 (78%)	7 (17.1%)	2 (4.9%)	41 (100%)
Ayeyarwady	Female	Count	7 (70%)	2 (20%)	1 (10%)	10 (100%)
	Male	Count	22 (78.6%)	6 (21.4%)	0	28 (100%)
	Total	Count	29 (76.3%)	8 (21.1%)	1 (2.6%)	38 (100%)
Bago	Female	Count	10 (83.3%)	1 (8.3%)	1 (8.3%)	12 (100%)

	Male	Count	21 (84%)	3 (12%)	1 (4%)	25 (100%)
	Total	Count	31 (83.3%)	4 (10.8%)	2 (5.4%)	37 (100%)
<b>Total</b>	Female	Count	28 (80%)	4 (11.4%)	3 (8.6%)	35 (100%)
	Male	Count	64 (79%)	15 (18.5%)	2 (2.5%)	81 (100%)
	Total	Count	92 (79.3%)	19 (16.4%)	5 (4.3%)	116 (100%)

### Average Wet Paddy UDP and Non-UDP Land by Gender and Region

The average size of wet paddy land with UDP cultivated by male farmers was larger than the average size of UDP land cultivated by female farmers in Yangon and Ayeyarwady regions (Table 3). But the average size of UDP land was nearly the same for both male and female farmers in Bago region.

On the other hand, the average size of non-UDP land cultivated by female farmers was larger than male farmers in Yangon and Ayeyarwady regions. For example, the average size of non-UDP land cultivated by female farmers in Ayeyarwady region was 4.49 ha while it was 3.15 ha for non-UDP land cultivated by male farmers. Both male and female farmers in Bago region cultivated the same size of non-UDP land in the wet paddy season of 2016.

The analysis of variance (ANOVA) table shows that there was no significant difference in both UDP and non-UDP land size among the regions. The t-test also shows no significant difference in both UDP and non-UDP land size between male and female farmers.

**Table 3. Average Size of Wet Paddy Land With and Without UDP by Gender and Region**

			UDP (ha)	NUDP (ha)
Yangon	Female	Mean	.1077	4.2038
		N	13	13
		Std. Deviation	.08852	4.94904
	Male	Mean	.1175	4.0750
		N	28	28
		Std. Deviation	.17562	3.18242
Total	Mean	.1144	4.1159	
	N	41	41	
	Std. Deviation	.15228	3.76668	
Ayeyarwady	Female	Mean	.0960	4.4980

	N		10	10
	Std. Deviation		.05060	4.14050
Male	Mean		.1014	3.1568
	N		28	28
	Std. Deviation		.07975	1.99878
Total	Mean		.1000	3.5097
	N		38	38
	Std. Deviation		.07260	2.72831
Bago	Female	Mean	.0783	3.3783
		N	12	12
		Std. Deviation	.00577	3.53042
	Male	Mean	.0760	3.3976
		N	25	25
		Std. Deviation	.01000	2.73547
	Total	Mean	.0768	3.3914
		N	37	37
		Std. Deviation	.00884	2.96598

**ANOVA Table**

		Sum of Squares	df	Mean Square	F	Sig.
UDP (ha) * Bago=1, Aye=2,YGN=3	Between Groups (Combined)	.028	2	.014	1.398	.251
	Within Groups	1.125	113	.010		
	Total	1.153	115			
NUDP(ha) * Bago=1, Aye=2,YGN=3	Between Groups (Combined)	11.969	2	5.984	.583	.560
	Within Groups	1159.625	113	10.262		
	Total	1171.594	115			

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
UDP (ha)	Equal variances assumed	.270	.604	-.238	114	.812	-.00485	.02034	-.04514	.03544
	Equal variances not assumed			-.300	109.235	.765	-.00485	.01619	-.03694	.02724
NUDP(ha)	Equal variances assumed	3.054	.083	.705	114	.482	.45634	.64706	-.82548	1.73816
	Equal variances not assumed			.596	46.527	.554	.45634	.76603	-1.08513	1.99781
Total wet paddy (ha)	Equal variances assumed	2.985	.087	.698	114	.487	.45165	.64697	-.82999	1.73329
	Equal variances not assumed			.590	46.563	.558	.45165	.76556	-1.08885	1.99215

## Sources of Seeds by Gender and Region

Half or more than half of the sampled male and female farmers used their own seeds for growing wet season paddy in 2016. More female farmers used their own seeds in Yangon (62%), Ayeyarwady (70%), and Bago (58%) regions (Table 4).

The second important source of seeds was purchasing them from other farmers. A higher percentage of male farmers in Yangon (39%) and Ayeyarwady (21%) bought seeds from other farmers. However, more female farmers bought seeds from other farmers than male farmers in Bago region (33% vs. 16%). It is not known whether the seeds from other farmers are certified seeds or not.

Around 12%, 11%, and 27% of total farmers in Yangon, Ayeyarwady, and Bago regions bought seeds from the Department of Agriculture (DOA). Only one male farmer bought seeds from a company. The seeds from the DOA and the company are the certified seeds.

**Table 4. Sources of Paddy Seeds by Gender and Region**

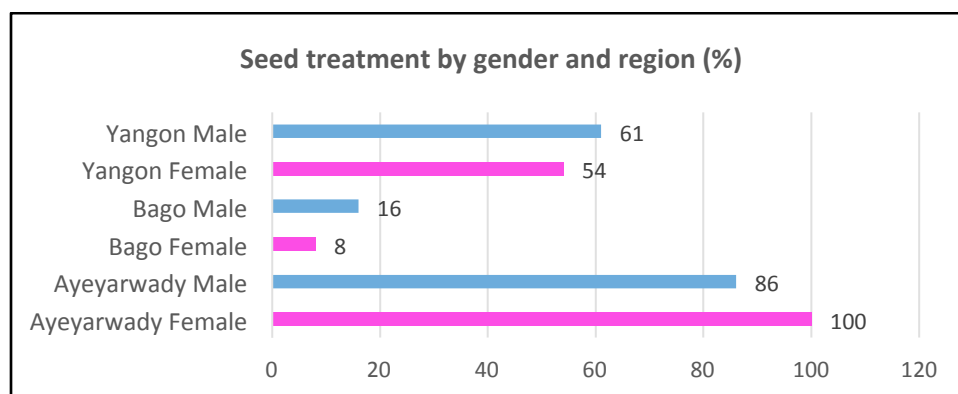
			Seed Sources				Total
			Own Seed	Buy from Farmer	Buy from DOA	Buy from Company	
Yangon	Female	Count	8 (61.5%)	3 (23.1%)	2 (15.4%)	0	13 (100%)
	Male	Count	14 (50%)	11 (39.3%)	3 (10.7%)	0	28 (100%)
	Total	Count	22 (53.7%)	14 (34.1%)	5 (12.2%)	0	41 (100%)
Ayeyarwady	Female	Count	7 (70%)	2 (20%)	1 (10%)	0	10 (100%)
	Male	Count	18 (64.3%)	6 (21.4%)	3 (10.7%)	1 (3.6%)	28 (100%)
	Total	Count	25 (65.8%)	8 (21.1%)	4 (10.5%)	1 (2.6%)	38 (100%)
Bago	Female	Count	7 (58.3%)	4 (33.3%)	1 (8.3%)	0	12 (100%)
	Male	Count	12 (48%)	4 (16%)	9 (36%)	0	25 (100%)
	Total	Count	19 (51.4%)	8 (21.6%)	10 (27%)	0	37 (100%)

## Seed Treatment and Kinds of Seed Treatment

The project recommends all farmers should not only use good seeds but also test germination and apply a selection treatment using saltwater to remove non-viable seed before planting.

Among the regions, a higher percentage of both male (86%) and female (100%) farmers in Ayeyarwady region did treat seed before sowing (Figure 2).

A higher percentage of male farmers in Yangon (61% male vs. 54% female) and Bago (16% male vs. 8% female) regions treated seed in the wet season of 2016.



**Figure 2. Seed Treatment by Gender and Region in Wet Paddy, 2016**

There are two kinds of seed treatment: soak in water or saltwater for 15 minutes to remove unfilled and weed seeds. Most of the farmers used water to remove unfilled seeds. A higher percentage of male farmers in Yangon (77% male vs. 57% female) and Ayeyarwady (83% male vs. 40% female) used water for seed selection. All female farmers and half of the male farmers in Bago region used water for seed selection in the wet season of 2016 (Table 5).

A higher percentage of sample farmers in Bago region (40%) used saltwater for seed selection than the farmers in Yangon (29%) and Ayeyarwady (29%) regions. But it is noted that only four males and one female farmers did any seed selection in Bago region.

**Table 5. Types of Seed Treatment by Gender and Region**

			Soak in Water=1, Saltwater=2		Total
			Water	Saltwater	
Yangon	Female	Count	4 (57.1%)	3 (42.9%)	7 (100%)
	Male	Count	13 (76.5%)	4 (23.5%)	17 (100%)
	Total	Count	17 (70.8%)	7 (29.2%)	24 (100%)
Ayeyarwady	Female	Count	4 (40%)	6 (60%)	10 (100%)

	Male	Count	20 (83.3%)	4 (16.7%)	24 (100%)
	Total	Count	24 (70.6%)	10 (29.4%)	34 (100%)
Bago	Female	Count	1 (100%)	0	1 (100%)
	Male	Count	2 (50%)	2 (50%)	4 (100%)
	Total	Count	3 (60%)	2 (40%)	5 (100%)

### Cultural Practices of the Sample Crop Cut Farmers

A higher percentage of both male (84%) and female (75%) farmers in Bago region practiced transplanting paddy than other regions in the wet season of 2016.

The majority of both male (68%) and female (77%) farmers in Yangon region practiced broadcasting seeds in wet season paddy production. About 64% of male and 30% of female farmers in Ayeyarwady region practiced broadcasting seeds. A higher percentage of female farmers (70%) in Ayeyarwady region practiced transplanting paddy than male farmers (36%).

**Table 6. Cultural Practices of Sampled Farmers in Wet Season, 2016**

			Cultural Practice		Total
			Transplant	Broadcast	
Yangon	Female	Count	3 (23.1%)	10 (76.9%)	13 (100%)
	Male	Count	9 (32.1%)	19 (67.9%)	28 (100%)
	Total	Count	12 (29.3%)	29 (70.7%)	41 (100%)
Ayeyarwady	Female	Count	7 (70%)	3 (30%)	10 (100%)
	Male	Count	10 (35.7%)	18 (64.3%)	28 (100%)
	Total	Count	17 (44.7%)	21 (55.3%)	38 (100%)
Bago	Female	Count	9 (75%)	3 (25%)	12 (100%)
	Male	Count	21 (84%)	4 (16%)	25 (100%)
	Total	Count	30 (81.1%)	7 (18.9%)	37 (100%)

### Seed Rate by Cultural Practice and UDP and Non-UDP Wet Paddy Land

The male farmers in Yangon and Ayeyarwady regions used a higher seed rate when broadcasting seeds than transplanting seedlings. The average seed rate of male farmers was 89 kg/ha for transplanted paddy and 115 kg/ha for broadcasting seeds in Yangon region. The average seed rate of female farmers was more than 100 kg/ha for both practices in Yangon region.

The female farmers in Ayeyarwady region used an average seed rate of 92 kg/ha and 172 kg/ha for transplanted paddy and broadcast seeds, respectively. Thus, female farmers in Ayeyarwady used the highest seed rate for broadcasting seeds among the three regions. The average seed rate of male farmers was more than 100 kg/ha for both practices in Ayeyarwady region.

Female farmers in Bago region used a higher seed rate for both transplant and broadcast paddy than male farmers.

Overall, farmers used a higher seed rate when broadcasting than transplanting in Yangon and Ayeyarwady regions. But farmers in Bago region used the same rate for both practices (107 kg/ha).

**Table 7. Seed Rate by Cultural Practice and UDP/Non-UDP for Wet Season Paddy Land**

				Seed Use (kg/ha)	UDP (ha)	NUDP (ha)
Yangon	Female	Transplant	Mean	103.2500	.2000	2.7667
			N	3	3	3
			Std. Deviation	.00000	.17436	.75162
		Broadcast	Mean	100.6650	.0800	4.6350
			N	10	10	10
			Std. Deviation	33.21328	.00000	5.62466
	Male	Transplant	Mean	88.9056	.1922	5.3167
			N	9	9	9
			Std. Deviation	31.90628	.30781	4.43736
		Broadcast	Mean	115.4742	.0821	3.4868
			N	19	19	19
			Std. Deviation	27.70505	.00631	2.30316
Total	Transplant	Mean	92.4917	.1942	4.6792	
		N	12	12	12	
		Std. Deviation	27.97248	.27285	3.96899	
	Broadcast	Mean	110.3676	.0814	3.8828	
		N	29	29	29	
		Std. Deviation	29.98883	.00516	3.72659	
	Total	Mean	105.1356	.1144	4.1159	
		N	41	41	41	
		Std. Deviation	30.20784	.15228	3.76668	
Ayeyarwady	Female	Transplant	Mean	92.1829	.0800	4.6914
			N	7	7	7

				Seed Use (kg/ha)	UDP (ha)	NUDP (ha)
		Std. Deviation		32.84541	.00000	4.55922
		Broadcast	Mean	172.0767	.1333	4.0467
			N	3	3	3
		Std. Deviation		29.80282	.09238	3.78826
Male	Transplant	Mean		103.1190	.0810	2.1360
		N		10	10	10
		Std. Deviation		31.84935	.00316	.92379
		Broadcast	Mean	114.1739	.1128	3.7239
			N	18	18	18
		Std. Deviation		41.24110	.09857	2.22259
Total	Transplant	Mean		98.6159	.0806	3.1882
		N		17	17	17
		Std. Deviation		31.71635	.00243	3.15524
		Broadcast	Mean	122.4457	.1157	3.7700
			N	21	21	21
		Std. Deviation		44.33498	.09574	2.37643
		Total	Mean	111.7850	.1000	3.5097
			N	38	38	38
		Std. Deviation		40.51744	.07260	2.72831
Bago	Female	Transplant	Mean	103.2478	.0778	3.6767
			N	9	9	9
		Std. Deviation		18.25396	.00667	4.00848
		Broadcast	Mean	120.4533	.0800	2.4833
			N	3	3	3
		Std. Deviation		39.43088	.00000	1.63638
Male	Transplant	Mean		108.6014	.0762	3.2586
		N		21	21	21
		Std. Deviation		26.85846	.01024	2.68438
		Broadcast	Mean	96.7925	.0750	4.1275
			N	4	4	4
		Std. Deviation		44.08385	.01000	3.31323
Total	Transplant	Mean		106.9953	.0767	3.3840
		N		30	30	30
		Std. Deviation		24.40588	.00922	3.07247
		Broadcast	Mean	106.9329	.0771	3.4229
			N	7	7	7
		Std. Deviation		40.61909	.00756	2.67464
		Total	Mean	106.9835	.0768	3.3914
			N	37	37	37
		Std. Deviation		27.47385	.00884	2.96598



Among the broadcasting farmers, the majority of both female and male farmers used a high seed rate of more than 80 kg/ha in all regions.

All broadcasting female farmers in Ayeyarwady region, 67% in Bago, and 60% in Yangon used a high seed rate (over 80 kg/ha). About 84% of male in Yangon, 78% in Ayeyarwady, and half of male farmers in Bago used a seed rate of over 80 kg/ha in the wet paddy season of 2016.

Overall, 43% of total farmers in Bago, 24% in Yangon, and 19% in Ayeyarwady region used a low seed rate (less than 80 kg/ha).

**Table 8. Seed Rate of Broadcast Seed by Gender and Region**

			Use Seed Rate		Total
			Less than 80 kg/ha	Over 80 kg/ha	
Yangon	Female	Count	4 (40%)	6 (60%)	10 (100%)
	Male	Count	3 (15.8%)	16 (84.2%)	19 (100%)
	Total	Count	7 (24.1%)	22 (75.9%)	29 (100%)
Ayeyarwady	Female	Count	0	3 (100%)	3 (100%)
	Male	Count	4 (22.2%)	14 (77.8%)	18 (100%)
	Total	Count	4 (19%)	17 (81%)	21 (100%)
Bago	Female	Count	1 (33.3%)	2 (66.7%)	3 (100%)
	Male	Count	2 (50%)	2 (50%)	4 (100%)
	Total	Count	3 (42.9%)	4 (57.1%)	7 (100%)

### Paddy Variety Planted in Wet Season 2016

The majority of both male (96%) and female (92%) farmers planted high-yielding varieties (HYVs) in Bago region in the wet paddy season of 2016 (Table 9). A higher percentage of male farmers in Ayeyarwady (86%) and Bago (96%) regions used HYVs of paddy in the wet paddy season. About half of the female farmers in Ayeyarwady region used HYVs and the rest used a local variety of paddy, such as Pawsan. Only one male farmer in Bago region used a hybrid variety in the wet paddy season.

**Table 9. Paddy Variety Planted by Gender and Region in Wet Season, 2016**

	Paddy Variety Used	Total

			HYV	Hybrid	Local	
Yangon	Female	Count	10 (76.9%)		3 (23.1%)	13 (100%)
	Male	Count	21 (75%)		7 (25%)	28 (100%)
	Total	Count	31 (75.6%)		10 (24.4%)	41 (100%)
Ayeyarwady	Female	Count	5 (50%)		5 (50%)	10 (100%)
	Male	Count	24 (85.7%)		4 (14.3%)	28 (100%)
	Total	Count	29 (76.3%)		9 (23.7%)	38 (100%)
Bago	Female	Count	11 (91.7%)	0	1 (8.3%)	12 (100%)
	Male	Count	24 (96%)	1 (4%)	0	25 (100%)
	Total	Count	35 (94.6%)	1 (2.7%)	1 (2.7%)	37 (100%)

### Cropping Pattern of the Sample Farmers by Gender by Region (After Wet Paddy in 2016)

There are seven different cropping patterns (after wet paddy in 2016) practiced by the sampled crop cut farmers. About 23% of female and 11% of male farmers will grow “dry (season) paddy” after wet (season) paddy in Yangon region. About 46% of male and 8% of female farmers will grow “gram” after wet season paddy in Yangon region. Only one female farmer will grow “gram followed by dry paddy.” Some of the farmers will not grow another crop on all of their land. Therefore, they leave some of the land as fallow land. Two male and female farmers will grow dry paddy and leave some land as fallow at the same time. One female and three male farmers will grow grams in some part of their land and leave some of land as fallow in Yangon region. About 39% of female and 25% of male farmers will not grow any crops after the wet paddy season (leaving it all as fallow land in the dry season) in Yangon region.

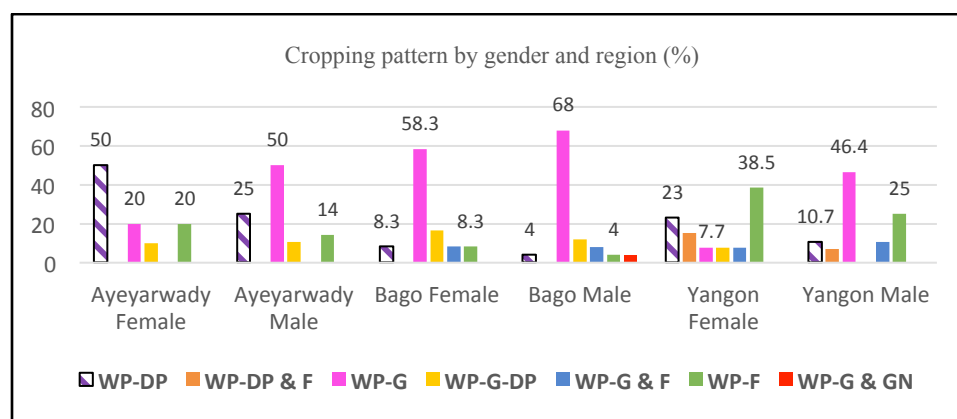
About 20% of female and 14% of male farmers in Ayeyarwady region cannot grow a crop after the wet paddy season in 2016 (fallow land). On the other hand, half of the female farmers grow “dry paddy” and half of the male farmers grow “gram” after wet paddy in Ayeyarwady region. About 10% of both male and female farmers practice “gram followed by dry paddy” in Ayeyarwady (wet paddy – gram – dry paddy).

The majority of both male (68%) and female (58%) sample farmers in Bago region will grow “gram” after wet paddy in 2016. About 17% of female and 12% of male farmers practice gram

followed by dry paddy in Bago region (wet paddy – gram – dry paddy) in the dry season of 2016-2017.

**Table 10. Cropping Pattern of Sampled Farmers by Gender and Region, Wet Season 2016**

			Dry Paddy=1						Total	
			Dry Paddy	Gram	Gram+ Groundnut	Fallow	Gram Followed by DP	DP+Fallow		Gram+ Fallow
Yangon	Female	Count	3 (23.1%)	1 (7.7%)		5 (38.5%)	1 (7.7%)	2 (15.4%)	1 (7.7%)	13 (100%)
	Male	Count	3 (10.7%)	13 (46.4%)		7 (25%)	0	2 (7.1%)	3 (10.7%)	28 (100%)
	Total	Count	6 (14.6%)	14 (34.1%)		12 (29.3%)	1 (2.1%)	4 (9.8%)	4 (9.8%)	41 (100%)
Ayeyarwady	Female	Count	5 (50%)	2 (20%)		2 (20%)	1 (10%)			10 (100%)
	Male	Count	7 (25%)	14 (50%)		4 (14.3%)	3 (10.7%)			28 (100%)
	Total	Count	12 (31.6%)	16 (42.1%)		6 (15.8%)	4 (10.5%)			38 (100%)
Bago	Female	Count	1 (8.3%)	7 (58.3%)	0	1 (8.3%)	2 (16.7%)		1 (8.3%)	12 (100%)
	Male	Count	1 (4%)	17 (68%)	1 (4%)	1 (4%)	3 (12%)		2 (8%)	25 (100%)
	Total	Count	2 (5.4%)	24 (64.9%)	1 (2.7%)	2 (5.4%)	5 (13.5%)		3 (8.1%)	37 (100%)



(WP= wet paddy, DP=dry paddy, G= gram, F=fallow, GN=groundnut)

**Figure 3. Cropping Pattern of Sample Farmers by Gender and Region (%)**

### Use of Basal Fertilizer by Gender by Region

Overall, about 44% of farmers in Yangon region, 32% in Ayeyarwady, and 19% in Bago applied the basal fertilizer.<sup>3</sup>

<sup>3</sup> This is for all farmers in the sample, with or without UDP.

A higher percentage of both male and female farmers in Yangon region used basal fertilizer than the farmers in Bago and Ayeyarwady regions.

Except in Yangon region, more male farmers used basal fertilizer in wet paddy than female farmers in Bago and Ayeyarwady regions.

**Table 11. Use of Basal Fertilizer by Gender and Region**

		Basal Fertilizer		Total
		Use Basal	Not Use	
Yangon	Female Count	6 (46.2%)	7 (53.8%)	13
	Male Count	12 (42.9%)	16 (57.1%)	28
	Total Count	18 (43.9%)	23 (56.1%)	41
Ayeyarwady	Female Count	3 (30%)	7 (70%)	10
	Male Count	9 (32.1%)	19 (67.9%)	28
	Total Count	12 (31.6%)	26 (68.4%)	38
Bago	Female Count	2 (16.7%)	10 (83.3%)	12
	Male Count	5 (20%)	20 (80%)	25
	Total Count	7 (18.9%)	30 (81.1%)	37

All female farmers and 83% of male farmers in Yangon region used triple superphosphate (TSP) as a basal fertilizer in wet paddy. One male farmer used compound fertilizer and one used muriate of potash (MOP) as a basal in Yangon region.

All female and male farmers (who apply basal) in Ayeyarwady region used TSP for basal fertilizer application in the wet paddy season.

Half of female farmers used TSP and the rest used compound fertilizer as a basal in Bago region. About 60% of male farmers used TSP and 40% used compound fertilizer as a basal in Bago region.

**Table 12. Types of Basal Fertilizer Used by Gender and Region**

		Kinds of Basal			Total
		TSP	Compound	MOP	
Yangon	Female Count	6 (100%)	0	0	6 (100%)
	Male Count	10 (83.3%)	1 (8.3%)	1 (8.3%)	12
	Total Count	16 (88.9%)	1 (5.6%)	1 (5.6%)	18

Ayeyarwady	Female	Count	3 (100%)			3
	Male	Count	9 (100%)			9
	Total	Count	12 (100%)			12
Bago	Female	Count	1 (50%)	1 (50%)		2
	Male	Count	3 (60%)	2 (40%)		5
	Total	Count	4 (57.1%)	3 (42.9%)		7

### Other Fertilizer Used with UDP by Gender and Region

The majority of both male and female farmers in Ayeyarwady and Bago regions, when applying UDP, only applied briquette urea<sup>4</sup> (BU), and a higher percentage of female farmers (in Ayeyarwady 70% female vs. 68% male; in Bago 83% female vs. 80% male) applied BU only in the UDP plot. For those who applied other fertilizers with UDP, about 32% of male and 30% of female farmers applied TSP in the UDP plot in Ayeyarwady region. In Bago region, 8% of female farmers applied BU and TSP, and 8% applied BU and compound fertilizer, but for male farmers in Bago region, more used BU and TSP (12%) than BU and compound (8% of male farmers).

**Table 13. Types of Other Fertilizers Used with UDP by Gender and Region**

		Kinds of Fertilizer Application				Total	
		Only BU	BU+TSP	BU+NPK	BU+MOP		
Yangon	Female	Count	7 (53.8%)	6 (46.2%)	0	0	13 (100%)
	Male	Count	16 (57.1%)	10 (35.7%)	1 (3.6%)	1 (3.6%)	28 (100%)
	Total	Count	23 (56.1%)	16 (39%)	1 (2.4 %)	1 (2.4%)	41 (100%)
Ayeyarwady	Female	Count	7 (70%)	3 (30%)			10 (100%)
	Male	Count	19 (67.9%)	9 (32.1%)			28 (100%)
	Total	Count	26 (68.4%)	12 (31.6%)			38 (100%)
Bago	Female	Count	10 (83.3%)	1 (8.3%)	1 (8.3%)		12 (100%)
	Male	Count	20 (80%)	3 (12%)	2 (8%)		25 (100%)
	Total	Count	30 (81.1%)	4 (10.8%)	3 (8.1%)		37 (100%)

About 54% of female farmers in Yangon region applied BU only and the rest of female farmers used BU and TSP. About 57% of male farmers applied BU only, 36% applied BU and TSP, and 3.6% of male farmers used BU and MOP.

<sup>4</sup> That is they do not apply any other fertilizer.

## Kinds of Fertilizer Application in Non-UDP by Gender and Region

Most farmers in Yangon and Ayeyarwady applied nitrogen by broadcasting urea (Table 14). All female farmers in Yangon and 90% of female farmers in Ayeyarwady region used prilled<sup>5</sup> urea in their non-UDP wet paddy plot in 2016. About 96% and 89% of male farmers in Yangon and Ayeyarwady region also used prilled urea in wet paddy. A lesser percentage of both male (76%) and female farmers (67%) used prilled urea in Bago region.

**Table 14. Use of Prilled Urea in Non-UDP Fields by Gender and Region**

			Used Prilled Urea in Wet Paddy		Total
			Used	Not Used	
Yangon	Female	Count	13 (100%)	0	13 (100%)
	Male	Count	27 (96.4%)	1 (3.6%)	28 (100%)
	Total	Count	40 (97.6%)	1 (2.4%)	41 (100%)
Ayeyarwady	Female	Count	9 (90%)	1 (10%)	10 (100%)
	Male	Count	25 (89.3%)	3 (10.7%)	28 (100%)
	Total	Count	34 (89.5%)	4 (10.5%)	38 (100%)
Bago	Female	Count	8 (66.7%)	4 (33.3%)	12 (100%)
	Male	Count	19 (76%)	6 (24%)	25 (100%)
	Total	Count	27 (73%)	10 (27%)	37 (100%)

More farmers in Bago region (68%) applied compound fertilizer than in either Ayeyarwady (26%) or Yangon (17%) (Table 15). A higher percentage of both male (72%) and female (58%) farmers in Bago region used compound fertilizer in wet paddy non-UDP fields in 2016 than in the other regions. A lesser percentage of female farmers in Yangon (15%) and Ayeyarwady (10%) regions applied compound fertilizer than male farmers in the wet paddy season.

**Table 15. Use of Compound Fertilizer in Non-UDP Fields by Gender by Region**

			Used NPK		Total
			Used	Not Used	
Yangon	Female	Count	2 (15.4%)	11 (84.6%)	13 (100%)
	Male	Count	5 (17.9%)	23 (82.1%)	28 (100%)
	Total	Count	7 (17.1%)	34 (82.9%)	41 (100%)

<sup>5</sup> “Use prilled urea” is the expression used to indicate farmers broadcast urea (prilled or granular).

Ayeyarwady	Female	Count	1 (10%)	9 (90%)	10 (100%)
	Male	Count	9 (32.1%)	19 (67.9%)	28 (100%)
	Total	Count	10 (26.3%)	28 (73.7%)	38 (100%)
Bago	Female	Count	7 (58.3%)	5 (41.7%)	12 (100%)
	Male	Count	18 (72%)	7 (28%)	25 (100%)
	Total	Count	25 (67.6%)	12 (32.4%)	37 (100%)

Farmers also used special fertilizer for their paddy crop, such as urea and herbicide fertilizer, (Table 16 refers to other fertilizers) in the wet paddy season of 2016. There was a higher percentage of female farmers in Yangon (30.8%) and Bago (50%) regions who applied other fertilizers in wet paddy production. Only 7% of male farmers and no female farmers applied other fertilizers in Ayeyarwady region.

Overall, 35% of farmers in Bago, 22% in Yangon, and 5% in Ayeyarwady regions applied other fertilizers in non-UDP paddy fields in the wet season of 2016.

**Table 16. Use of Other Fertilizers in Non-UDP Fields by Gender and Region**

			Other Fertilizer Used Or Not		Total
			Used	Not Used	
Yangon	Female	Count	4 (30.8%)	9 (69.2%)	13 (100%)
	Male	Count	5 (17.9%)	23 (82.1%)	28 (100%)
	Total	Count	9 (22%)	32 (78%)	41 (100%)
Ayeyarwady	Female	Count	0	10 (100%)	10 (100%)
	Male	Count	2 (7.1%)	26 (92.9%)	28 (100%)
	Total	Count	2 (5.3%)	36 (94.7%)	38 (100%)
Bago	Female	Count	6 (50%)	6 (50%)	12 (100%)
	Male	Count	7 (28%)	18 (72%)	25 (100%)
	Total	Count	13 (35.1%)	24 (64.9%)	37 (100%)

A higher percentage of male farmers in all regions applied TSP or MOP in wet paddy in 2016. Overall, 73% of farmers in Yangon region, 53% in Ayeyarwady, and 11% in Bago applied TSP or MOP in non-UDP paddy fields in 2016.

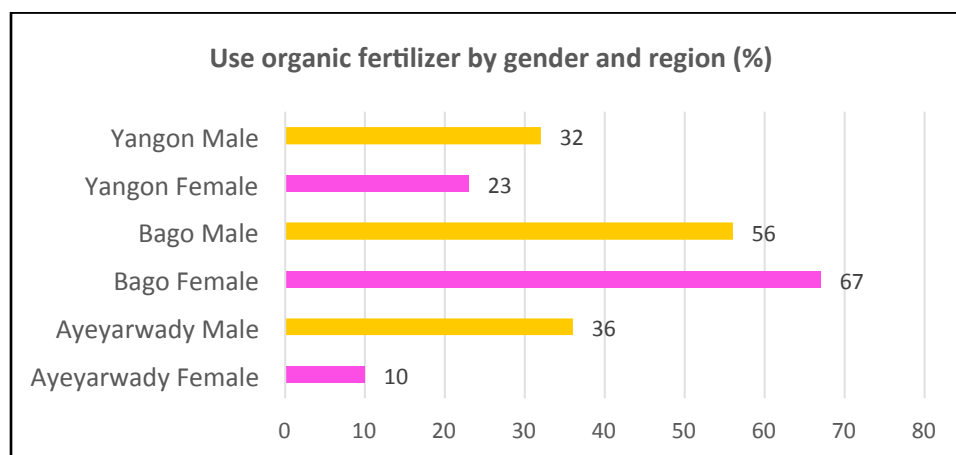
**Table 17. Use of TSP or MOP Fertilizer in Non-UDP Fields by Gender and Region**

			Used TSP or MOP		Total
			Used	Not Used	
Yangon	Female	Count	8 (61.5%)	5 (38.5%)	13
	Male	Count	22 (78.6%)	6 (21.4%)	28
	Total	Count	30 (73.2%)	11 (26.8%)	41
Ayeyarwady	Female	Count	5 (50%)	5 (50%)	10
	Male	Count	15 (53.6%)	13 (46.4%)	28
	Total	Count	20 (52.6%)	18 (47.4%)	38
Bago	Female	Count	1 (8.3%)	11 (91.7%)	12
	Male	Count	3 (12%)	22 (88%)	25
	Total	Count	4 (10.8%)	33 (89.2%)	37

### Use of Organic Fertilizer and Kinds of Organic Fertilizer by Gender and Region

Among the regions, a higher percentage of both male (56%) and female (67%) farmers in Bago region applied organic fertilizer than the farmers in Yangon and Ayeyarwady regions.

A higher percentage of male farmers in Yangon (32% male vs. 23% female) and Ayeyarwady (36% male vs. 10% female) used organic fertilizer in wet season paddy production.

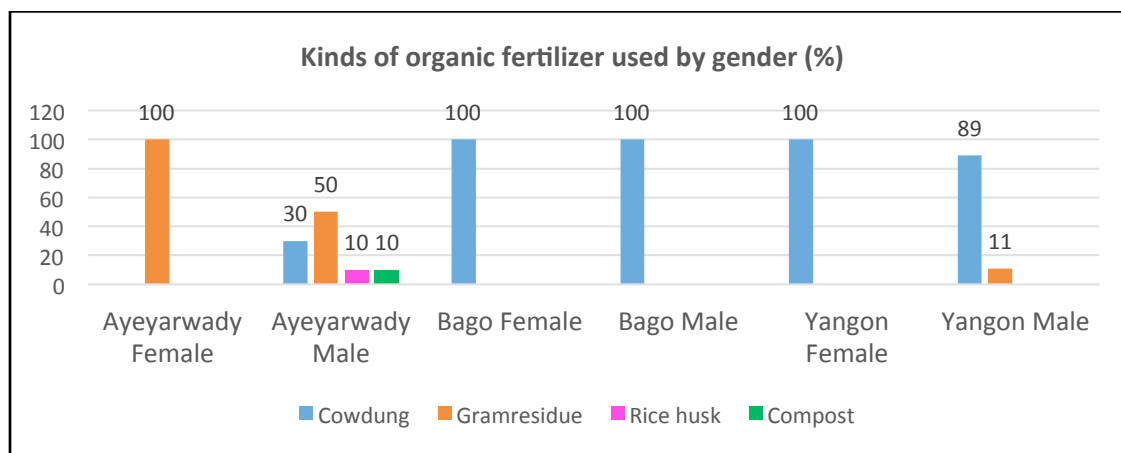


**Figure 4. Use of Organic Fertilizer by Gender and Region (%)**



All female farmers and 50% of male farmers (who applied organic fertilizer) used gram residue for the wet paddy production in Ayeyarwady region. Around 30% of male farmers used cow dung, 10% used rice husk, and 10% used compost in Ayeyarwady region.

All male and female farmers in Bago region and all female farmers in Yangon region used cow dung. About 11% of male farmers in Yangon region also used gram residue.



**Figure 5. Kinds of Organic Fertilizer Used by Gender and Region (%)**

### Rates of Fertilizer in Wet Season Paddy by Gender and Region

The average rate of prilled urea for a unit of land was higher for male farmers in Yangon (males used an average 155 kg/ha and females used 87 kg/ha) and Ayeyarwady (males used an average 99 kg/ha and females used 85 kg/ha) regions. The female farmers used a higher rate of prilled urea (132 kg/ha) than male farmers (101 kg/ha) in Bago region. Overall, the sample farmers in Yangon region used a higher rate of prilled urea (133 kg/ha) than farmers in Bago (110 kg/ha) and Ayeyarwady (95 kg/ha) regions.

For compound fertilizer, male farmers in Yangon and Bago regions used higher rates. Overall, farmers in Bago region used higher rates of compound fertilizer (98 kg/ha) than farmers in Ayeyarwady (95 kg/ha) and Yangon (84 kg/ha) regions.

The ANOVA table shows that the rate of prilled urea was significantly different among the regions. The t-tests presents that rates of seeds, prilled urea, and compound fertilizer were not significantly different between male and female farmers.

**Table 18. Rate of Prilled Urea and Compound Fertilizer (kg/ha) by Gender and Region**

			Prilled Urea (kg/ha)	Compound (kg/ha)
Yangon	Female	Mean	87.368 (N=13)	46.31250 (N=2)
		Std. Deviation	48.9957	21.831922
	Male	Mean	154.787 (N=27)	98.800 (N=5)
		Std. Deviation	76.8697	33.821868
	Total	Mean	132.876 (N=40)	83.80357 (N=7)
		Std. Deviation	75.5026	38.703861
Ayeyarwady	Female	Mean	85.078 (N=9)	98.800 (N=1)
		Std. Deviation	29.8990	.
	Male	Mean	99.047 (N=25)	94.16875 (N=8)
		Std. Deviation	48.2112	46.649429
	Total	Mean	95.349 (N=34)	94.68333 (N=9)
		Std. Deviation	44.1164	43.663844
Bago	Female	Mean	132.299 (N=8)	89.44929 (N=7)
		Std. Deviation	77.1863	43.452916
	Male	Mean	101.400 (N=19)	100.78972 (N=18)
		Std. Deviation	35.8479	33.480973
	Total	Mean	110.555 (N=27)	97.61440 (N=25)
		Std. Deviation	51.9653	35.959290

**ANOVA Table**

			Sum of Squares	df	Mean Square	F	Sig.
prilled urea(kg/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	26390.948	2	13195.474	3.625	.030
	Within Groups		356761.750	98	3640.426		
	Total		383152.698	100			
compound (kg/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	1043.161	2	521.580	.359	.701
	Within Groups		55273.875	38	1454.576		
	Total		56317.036	40			

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
seed use (kg/ha)	Equal variances assumed	.027	.870	-.050	114	.961	-.33203	6.70700	-13.61855	12.95449
	Equal variances not assumed			-.049	62.544	.961	-.33203	6.80411	-13.93090	13.26685
prilled urea(kg/ha)	Equal variances assumed	.006	.940	-1.662	99	.100	-22.2109	13.3617	-48.7234	4.3015
	Equal variances not assumed			-1.754	61.896	.084	-22.2109	12.6638	-47.5263	3.1044
compound (kg/ha)	Equal variances assumed	.665	.420	-1.255	39	.217	-17.003161	13.548843	-44.408283	10.401960
	Equal variances not assumed			-1.176	13.842	.259	-17.003161	14.455881	-48.041106	14.034783

### Use of Pesticide and Herbicide by Gender and Region

A higher percentage of female farmers in Yangon (69%) and Ayeyarwady (40%) regions used pesticides in wet season paddy in 2016.

About 32% of male farmers and 17% of female farmers in Bago region used pesticides.

Overall, 61% of farmers in Yangon, 27% in Bago, and 21% in Ayeyarwady regions used pesticides in wet season paddy.

**Table 19. Use of Pesticides by Farmers by Gender and Region**

		Use of Pesticide		Total	
		Use	Not Use		
Yangon	Female	Count	9 (69.2%)	4 (30.8%)	13
	Male	Count	16 (57.1%)	12 (42.9%)	28
	Total	Count	25 (61%)	16 (39%)	41
Ayeyarwady	Female	Count	4 (40%)	6 (60%)	10
	Male	Count	4 (14.3%)	24 (85.7%)	28
	Total	Count	8 (21.1%)	30 (78.9%)	38
Bago	Female	Count	2 (16.7%)	10 (83.3%)	12
	Male	Count	8 (32%)	17 (68%)	25
	Total	Count	10 (27%)	27 (73%)	37

Both male and female farmers in Ayeyarwady region did not use herbicide in wet season paddy in 2016. Only one female farmer in Yangon region used herbicide.

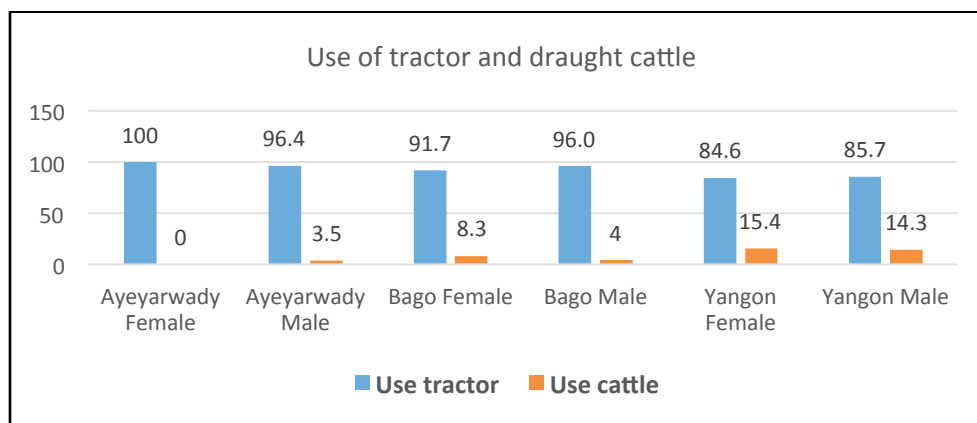
About 32% of male and 17% of female farmers in Bago region used herbicide in wet season paddy.

**Table 20. Use of Herbicide by Farmers by Gender and Region**

		Use of Herbicide		Total	
		Use	Not Use		
Yangon	Female	Count	1 (7.7%)	12 (92.3%)	13
	Male	Count	0	28 (100%)	28
	Total	Count	1 (2.4%)	40 (97.6%)	41
Ayeyarwady	Female	Count		10 (100%)	10
	Male	Count		28 (100%)	28
	Total	Count		38 (100%)	38
Bago	Female	Count	2 (16.7%)	10 (83.3%)	12
	Male	Count	8 (32%)	17 (68%)	25
	Total	Count	10 (27%)	27 (73%)	37

### Use of Tractor, Draught Cattle, and Harvester by Gender and Region

All female farmers and 96.4% of male farmers in Ayeyarwady region used a tractor for land preparation in the wet paddy season of 2016. More than 90% of both male and female farmers in Bago region also used a tractor. About 85% of female and 86% of male farmers in Yangon region used a tractor. A higher percentage of both male (14.3%) and female (15.4%) farmers used draught animals in land preparation in Yangon region than in the other two regions in the wet season of 2016.



**Figure 6. Use of Tractor and/or Draught Animals in Land Preparation for Wet Season 2016**

It was noted that the majority of both male and female farmers who used a tractor own the tractor in Ayeyarwady and Yangon regions. A higher percentage of both male and female farmers who used a tractor in Bago region hired the tractor service for land preparation.

**Table 21. Use of Tractor and/or Draught Animals in Land Preparation in Wet Paddy, 2016**

		Use of Tractor or Cattle			Total
		Own Tractor/Use	Hire Tractor/Use	Use Cattle	
Yangon	Female	9 (69.2%)	2 (15.4%)	2 (15.4%)	13
	Male	14 (50%)	10 (35.7%)	4 (14.3%)	28
	Total	23 (56.1%)	12 (29.3%)	6 (14.6%)	41
Ayeyarwady	Female	7 (70%)	3 (30%)	0	10
	Male	14 (50%)	13 (46.4%)	1 (3.6%)	28
	Total	21 (55.3%)	16 (42.1%)	1 (2.6%)	38
Bago	Female	4 (33.3%)	7 (58.3%)	1 (8.3%)	12
	Male	11 (44%)	13 (52%)	1 (4%)	25
	Total	15 (40.5%)	20 (54.1%)	2 (5.4%)	37

A higher percentage of both male and female farmers in Yangon and Bago regions used/hired harvester services for wet paddy harvesting in 2016. More male farmers hired harvester services than female farmers in all regions.

Overall, 51% of farmers in Yangon and Bago and 16% of farmers in Ayeyarwady region hired harvester services in wet paddy in 2016.

**Table 22. Use of a Harvester in Wet Paddy by Gender and Region**

		Use Harvester or Not		Total
		Use Harvester	Not Used	
Yangon	Female	6 (46.2%)	7 (53.8%)	13
	Male	15 (53.6%)	13 (46.4%)	28
	Total	21 (51.2%)	20 (48.8%)	41
Ayeyarwady	Female	1 (10%)	9 (90%)	10

	Male	Count	5 (17.9%)	23 (82.1%)	28
	Total	Count	6 (15.8%)	32 (84.2%)	38
Bago	Female	Count	5 (41.7%)	7 (58.3%)	12
	Male	Count	14 (56%)	11 (44%)	25
	Total	Count	19 (51.4%)	18 (48.6%)	37

### Hire Permanent Labor and Contract Service Labor for Wet Season Paddy in 2016

A higher percentage of female farmers hired permanent labor and paid them a monthly salary. Some farmers not only paid them a salary but also provided paddy for family consumption. A higher percentage of female farmers in Ayeyarwady (40%) and Yangon (23%) hired permanent labor for wet paddy production than male farmers (Table 23). In Bago, it was reversed, with 32% male farmers hiring and 25% female farmers. Overall, 30% of farmers in Bago, 29% in Ayeyarwady, and 22% in Yangon region hired permanent labor in the wet paddy season in 2016.

**Table 23. Hire of Permanent Labor for Wet Season Paddy by Gender and Region**

			Permanent Labor		Total
			Hire	Not Hire	
Yangon	Female	Count	3 (23.1%)	10 (76.9%)	13
	Male	Count	6 (21.4%)	22 (78.6%)	28
	Total	Count	9 (22%)	32 (78%)	41
Ayeyarwady	Female	Count	4 (40%)	6 (60%)	10
	Male	Count	7 (25%)	21 (75%)	28
	Total	Count	11 (28.9%)	27 (71.1%)	38
Bago	Female	Count	3 (25%)	9 (75%)	12
	Male	Count	8 (32%)	17 (68%)	25
	Total	Count	11 (29.7%)	26 (70.3%)	37

Contract service labor groups were hired especially for transplanting paddy and harvesting of paddy. Around five to 10 people work together in a group and receive money for their labor contributions.

More than half of female and male farmers in Yangon region hired contract service labor in the wet paddy season of 2016. More female farmers hired the contract service labor than male

farmers in Ayeyarwady and Bago regions. All female farmers and 89% of male farmers in Ayeyarwady region hired the contract service labor. About 92% of female and 88% of male farmers hired this kind of labor service in Bago region.

**Table 24. Hire of Contract Service Labor for Wet Season Paddy by Gender and Region**

Region	Gender	Hire Contract Service Labor or Not		Total
		Hire Labor	Not Hired Labor	
Yangon	Female Count	7 (53.8%)	6 (46.2%)	13 (100%)
	Male Count	18 (64.3%)	10 (35.7%)	28 (100%)
	Total	25 (61%)	16 (39%)	41 (100%)
Ayeyarwady	Female Count	10 (100%)	0	10 (100%)
	Male Count	25 (89.3%)	3 (10.7%)	28 (100%)
	Total	35 (92.1%)	3 (7.9%)	38 (100%)
Bago	Female Count	11 (91.7%)	1 (8.3%)	12 (100%)
	Male Count	22 (88%)	3 (12%)	25 (100%)
	Total	33 (89.2%)	4 (10.8%)	37 (100%)

### Mean Costs for Seeds, Seedbed, and Land Preparation

The average “seed cost” for male farmers was higher than the average seed cost for female farmers in all regions. For example, the seed cost of male and female farmers in Bago region was \$32/ha and \$24/ha, respectively. Overall, the seed cost of farmers was \$33/ha, \$31/ha, and \$30/ha in Ayeyarwady, Yangon, and Bago region, respectively.

The average “seedbed preparation cost” for male farmers was higher than the average cost for female farmers in all regions. Overall, the seedbed preparation cost of farmers was \$40/ha, \$37/ha, and \$36/ha in Yangon, Ayeyarwady, and Bago region, respectively.

The average “land preparation cost” for male farmers was higher than the average cost for female farmers in Yangon (males spent \$37/ha and females spent \$26/ha) and Ayeyarwady (males spent \$41/ha and females spent \$33/ha) regions. The female farmers in Bago region spent more (\$47/ha) for land preparation than male farmers (\$40/ha).

The average “land preparation cost” of all farmers in Bago, Ayeyarwady, and Yangon regions was \$42/ha, \$39/ha, and \$34/ha, respectively, in the wet paddy season of 2016.

The ANOVA table presents that average cost for seeds, seedbed, and land preparation was not significantly different between the regions in the wet paddy season of 2016. The t-tests show that there was no significant difference in costs of seeds, seedbed, and land preparation between male and female farmers.

**Table 25. Mean Costs of Seeds, Seedbed, and Land Preparation by Gender and Region**

			Seed Cost (\$/h)	Seedbed Cost (\$/h)	Land Preparation (\$/h)
Yangon	Female	Mean	29.3440	30.6800	25.7783
		N	5	2	12
		Std. Deviation	10.27955	22.10416	18.94285
	Male	Mean	31.2943	43.2013	37.2936
		N	14	8	25
		Std. Deviation	18.55529	25.28496	20.91532
	Total	Mean	30.7811	40.6970	33.5589
		N	19	10	37
		Std. Deviation	16.52031	24.07107	20.76395
Ayeyarwady	Female	Mean	30.2233	26.9517	32.9020
		N	3	6	10
		Std. Deviation	7.80702	24.13913	16.02926
	Male	Mean	33.3760	43.6090	40.9667
		N	10	10	27
		Std. Deviation	15.27013	29.20992	21.45166
	Total	Mean	32.6485	37.3625	38.7870
		N	13	16	37
		Std. Deviation	13.67305	27.84835	20.24267
Bago	Female	Mean	23.7360	32.3938	46.9558
		N	5	8	12
		Std. Deviation	3.16630	21.15550	24.87220
	Male	Mean	32.1331	36.9110	40.2652
		N	13	20	25
		Std. Deviation	10.91476	17.57809	22.48694
	Total	Mean	29.8006	35.6204	42.4351
		N	18	28	37
		Std. Deviation	10.07125	18.37902	23.15632



**ANOVA Table**

			Sum of Squares	df	Mean Square	F	Sig.
seed cost(\$/h) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)		61.760	2	30.880	.163	.850
	Within Groups		8880.313	47	188.943		
	Total		8942.073	49			
seed bed cost(\$/h) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)		191.759	2	95.879	.188	.829
	Within Groups		25967.997	51	509.176		
	Total		26159.756	53			
Land preparation(\$/h) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)		1472.958	2	736.479	1.604	.206
	Within Groups		49576.408	108	459.041		
	Total		51049.366	110			

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
seed cost(\$/h)	Equal variances assumed	2.888	.096	-1.095	48	.279	-4.76162	4.34659	-13.50103	3.97778
	Equal variances not assumed			-1.471	41.271	.149	-4.76162	3.23739	-11.29835	1.77511
seed bed cost(\$/h)	Equal variances assumed	.180	.673	-1.507	52	.138	-9.85914	6.54305	-22.98873	3.27044
	Equal variances not assumed			-1.544	29.868	.133	-9.85914	6.38449	-22.90043	3.18214
Land preparation(\$/h)	Equal variances assumed	.158	.692	-.946	109	.346	-4.19842	4.43796	-12.99431	4.59746
	Equal variances not assumed			-.937	61.883	.352	-4.19842	4.47921	-13.15258	4.75573

## Mean Costs for Briquette Urea, Total Fertilizer Cost in UDP and Non-UDP Fields

The “cost of Briquette Urea (BU)” was significantly different between the regions at 1% level. It depended on the different transportation costs between the regions. The average BU cost in Yangon was \$44/ha; in Ayeyarwady, it was \$49/ha; and in Bago, it was \$49/ha. The BU cost was nearly the same for male and female farmers in all regions.

The “total fertilizer cost for UDP fields (BU cost only or BU cost plus TSP/MOP or BU cost plus compound fertilizer cost)” was significantly different between the regions at 10% level. The average total fertilizer cost for UDP fields in Yangon was \$53/ha; in Ayeyarwady, it was \$57/ha; and in Bago, it was \$51/ha. The total fertilizer cost in UDP fields was nearly the same for male and female farmers in all regions.

The “total fertilizer cost for non-UDP fields” was significantly different between the regions at 5% level. The average total fertilizer cost for non-UDP fields in Yangon was \$70/ha; in Ayeyarwady, it was \$49/ha; and in Bago, it was \$65/ha.

Male farmers spent more on total fertilizer within non-UDP fields in Yangon (males spent \$77/ha and females spent \$54/ha) and Ayeyarwady (males spent \$77/ha and females spent \$54/ha) regions. The total fertilizer cost in UDP fields was nearly the same for male and female farmers in Bago region. However, the t-tests show that there was no significant difference in costs of BU or total fertilizer in UDP and Non-UDP fields for male and female farmers.

**Table 26. Mean Costs of Briquette Urea, Total Fertilizer Cost in UDP and Non-UDP Fields by Gender and Region**

			BU Cost (\$/ha)	Total Fertilizer Cost UDP (\$/ha)	Total Fertilizer Cost NUDP (\$/ha)
Yangon	Female	Mean	44.1515	53.0585	53.7485
		N	13	13	13
		Std. Deviation	.00376	11.43683	31.82617
	Male	Mean	44.1511	53.5289	76.9832
		N	28	28	28
		Std. Deviation	.00315	12.74885	36.40317
	Total	Mean	44.1512	53.3798	69.6161
		N	41	41	41
		Std. Deviation	.00331	12.20653	36.30697
Ayeyarwady	Female	Mean	48.9950	57.8220	39.5000
		N	10	10	10
		Std. Deviation	.80638	15.91689	22.11410
	Male	Mean	48.7036	57.0071	52.1596
		N	28	28	28
		Std. Deviation	1.06553	13.38607	30.28245
	Total	Mean	48.7803	57.2216	48.8282
		N	38	38	38
		Std. Deviation	1.00179	13.87499	28.63656
Bago	Female	Mean	46.7000	50.8808	65.7358
		N	12	12	12
		Std. Deviation	.00000	10.59509	30.03888
	Male	Mean	46.7016	51.1976	64.9708
		N	25	25	25
		Std. Deviation	.00374	10.10291	31.12507
	Total	Mean	46.7011	51.0949	65.2189
		N	37	37	37
		Std. Deviation	.00315	10.11775	30.35937

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
BU cost (\$/ha) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)	425.226	2	212.613	646.998	.000
	Within Groups	37.133	113	.329		
	Total	462.360	115			
Total fert cost UDP(\$/ha) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)	721.481	2	360.741	2.431	.093
	Within Groups	16768.315	113	148.392		
	Total	17489.796	115			
Total fert cost NUDDP (\$/ha) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)	9313.232	2	4656.616	4.526	.013
	Within Groups	116250.690	113	1028.767		
	Total	125563.922	115			

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
BU cost (\$/ha)	Equal variances assumed	.038	.846	-.253	114	.801	-.10283	.40726	-.90961	.70394
	Equal variances not assumed			-.251	63.951	.802	-.10283	.40908	-.92008	.71442
Total fert cost UDP(\$/ha)	Equal variances assumed	.053	.819	-.135	114	.893	-.33887	2.50529	-5.30183	4.62408
	Equal variances not assumed			-.134	63.504	.894	-.33887	2.52435	-5.38259	4.70485
Total fert cost NUDDP (\$/ha)	Equal variances assumed	.408	.524	-1.644	114	.103	-10.90726	6.63506	-24.05127	2.23675
	Equal variances not assumed			-1.732	73.094	.088	-10.90726	6.29849	-23.45987	1.64535

## Mean Costs for Pesticide and Herbicide, Casual Labor, Contract, and Permanent Labor

Among the regions, the farmers in Bago region spent more on pesticide and herbicide (\$29/ha) than the farmers in Ayeyarwady (\$21/ha) and Yangon (\$13/ha) regions. The male farmers spent more on pesticide and herbicide than females in Ayeyarwady (males spent \$34/ha and females spent \$7/ha) and Bago (males spent \$30/ha and females spent \$26/ha) regions. The F-test shows that costs for pesticide and herbicide were significantly different among the regions at 1% level.

There were three kinds of labor use in paddy production: (1) daily casual labor, (2) contract service labor for transplanting and harvesting paddy, and (3) permanent or seasonal labor. It was noted that seven farmers (out of total 116 farmers) used “family labor only” in wet season paddy in 2016.

Across the regions, the farmers in Yangon region spent more (\$69/ha) on daily casual labor than the farmers in Ayeyarwady (\$33/ha) and Bago (\$42/ha). The F-test shows that the cost of daily

casual labor was significantly different between the regions at 1% level. Male farmers in all regions spent more for daily casual labor than female farmers.

Female farmers in Yangon and Ayeyarwady regions spent more on contract service labor than male farmers, but in Bago region male farmers spent more (\$135/ha) on contract labor than female farmers (\$130/ha) in wet paddy in 2016. The F-test shows that the cost of contract service labor was significantly different between the regions at 1% level.

The female farmers in Yangon and Ayeyarwady regions spent more for permanent labor than male farmers. Overall, the cost of permanent labor was \$44/ha in both Yangon and Ayeyarwady regions and \$39/ha in Bago region. The F-test shows that cost of permanent labor was not significantly different between the regions.

The t-tests present that there was no significant difference in the costs of pesticide/herbicide, casual labor, contract service labor, and permanent labor between male and female farmers.

**Table 27. Mean Costs of Pesticide and Herbicide, Casual Labor, Contract Labor, and Permanent Labor by Gender and Region**

			Pest/Weeds (\$/ha)	Casual Labor (\$/h)	Contract Labor (\$/ha)	Permanent Labor (\$/ha)
Yangon	Female	Mean	15.3533	56.9250	84.7686	44.4900
		N	9	8	7	3
		Std. Deviation	10.31271	25.76547	33.63734	12.89833
	Male	Mean	11.6319	75.5281	65.0211	43.5950
		N	16	16	18	6
		Std. Deviation	5.36448	37.04677	20.74785	20.32647
	Total	Mean	12.9716	69.3271	70.5504	43.8933
		N	25	24	25	9
		Std. Deviation	7.53396	34.31295	25.87814	17.32109
Ayeyarwady	Female	Mean	7.2850	26.1725	113.7340	50.5400
		N	4	8	10	4
		Std. Deviation	4.25651	9.93758	44.28182	9.97964
	Male	Mean	34.4925	35.9722	96.0404	40.2129
		N	4	23	25	7
		Std. Deviation	26.78950	23.12390	40.96038	23.98222
	Total	Mean	20.8888	33.4432	101.0957	43.9682
		N	8	31	35	11

			Std. Deviation	22.95300	20.83668	42.06093	20.05276
Bago	Female	Mean	26.3650	40.1736	130.0800	27.0733	
		N	4	11	11	3	
		Std. Deviation	15.69112	21.01382	56.19355	12.09666	
	Male	Mean	29.8582	43.0328	134.9245	43.6837	
		N	11	25	22	8	
		Std. Deviation	23.80735	16.60068	52.25889	25.08385	
Total	Mean	28.9267	42.1592	133.3097	39.1536		
	N	15	36	33	11		
	Std. Deviation	21.45148	17.80227	52.76720	23.01963		

**ANOVA Table**

			Sum of Squares	df	Mean Square	F	Sig.
pest/disease(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	2411.475	2	1205.737	4.721	.014
	Within Groups		11492.458	45	255.388		
	Total		13903.933	47			
Causal labor (\$/h) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	18467.111	2	9233.555	15.871	.000
	Within Groups		51196.953	88	581.784		
	Total		69664.064	90			
Contract Labor(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	56606.789	2	28303.395	15.408	.000
	Within Groups		165322.503	90	1836.917		
	Total		221929.292	92			
Permanent Labor(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	162.236	2	81.118	.194	.825
	Within Groups		11720.328	28	418.583		
	Total		11882.564	30			

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
pest/disease(\$/ha)	Equal variances assumed	3.484	.068	-.963	46	.341	-5.00315	5.19482	-15.45977	5.45347
	Equal variances not assumed			-1.096	44.971	.279	-5.00315	4.56603	-14.19976	4.19346
Causal labor (\$/h)	Equal variances assumed	1.624	.206	-1.198	89	.234	-7.63070	6.36919	-20.28614	5.02474
	Equal variances not assumed			-1.329	62.798	.189	-7.63070	5.73970	-19.10129	3.83989
Contract Labor(\$/ha)	Equal variances assumed	.001	.981	1.110	91	.270	12.30305	11.08854	-9.72297	34.32908
	Equal variances not assumed			1.110	51.342	.272	12.30305	11.08068	-9.93874	34.54485
Permanent Labor(\$/ha)	Equal variances assumed	3.007	.094	-.105	29	.917	-.81643	7.77579	-16.71971	15.08686
	Equal variances not assumed			-.122	25.886	.904	-.81643	6.69964	-14.59069	12.95783

## Mean Costs of Total Labor, Harvesting Machine, Total Production Cost in UDP and Non-UDP

The cost of “total labor” was higher for male farmers in Yangon (\$115/ha) and Bago (\$176/ha) regions than for female farmers. The total labor cost for female farmers in Ayeyarwady region was higher than the cost for male farmers (\$155 vs. \$125/ha).

Overall, the cost for total labor in Bago, Ayeyarwady, and Yangon region was \$171/ha, \$133/ha, and \$112/ha, respectively. The F-test shows that the total labor cost was significantly different between the regions at 1% level.

Male farmers spent more for “harvesting by machine” than female farmers in Yangon and Bago regions. Overall, the cost for harvesting by machine in Bago, Yangon, and Ayeyarwady was \$80/ha, \$76/ha, and \$69/ha, respectively. The F-test shows that the cost for harvesting by machine was not significantly different between the regions.

Male farmers had a higher cost as “total production in UDP fields” than female farmers in Yangon and Bago regions. Overall, the total production cost in UDP fields in Yangon, Bago, and Ayeyarwady was \$259/ha, \$363/ha, and \$274/ha, respectively.

Male farmers had a higher “total production cost in non-UDP fields” in all regions. The average total production cost in Yangon, Bago, and Ayeyarwady regions was \$276/ha, \$377/ha, and \$266/ha, respectively. The F-test results present that the total production cost both in UDP and non-UDP fields was significantly different between the regions at 1% level.

The t-tests present that there was no significant difference in the costs of total labor, harvesting machine, and total production in UDP and non-UDP fields between male and female farmers.

**Table 28. Mean Costs for Total Labor, Harvest Machine, Total Paddy Production Costs in UDP and Non-UDP Fields by Gender and Region**

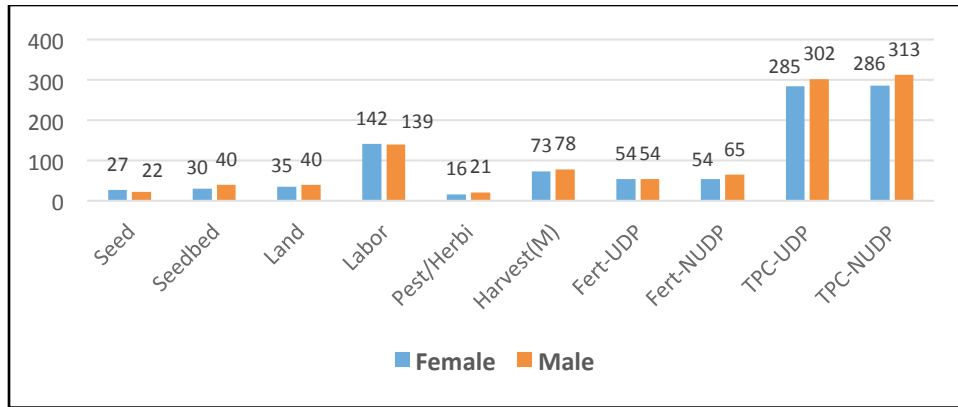
			Total Labor (\$/ha)	Harvest Machine (\$/ha)	Total Production Cost in UDP (\$/ha)	Total Production Cost in NUDP (\$/ha)
Yangon	Female	Mean	107.4782	72.4838	239.0362	239.7254
		N	11	8	13	13
		Std. Deviation	59.44108	33.20423	65.54209	76.77509
	Male	Mean	114.8004	78.2032	268.8293	292.2829
		N	23	19	28	28
		Std. Deviation	60.63992	20.70837	110.87855	131.29649
	Total	Mean	112.4315	76.5085	259.3827	275.6183
		N	34	27	41	41
		Std. Deviation	59.44944	24.51127	98.91525	118.39589
Ayeyarwady	Female	Mean	154.8900	86.8400	282.4430	264.1240

	N		10	1	10	10
	Std. Deviation		52.56948	.	59.37111	55.77378
Male	Mean		125.3518	66.7143	270.9600	266.1146
	N		28	7	28	28
	Std. Deviation		49.94290	31.78222	78.74317	91.24480
Total	Mean		133.1250	69.2300	273.9818	265.5908
	N		38	8	38	38
	Std. Deviation		51.63459	30.27274	73.54151	82.66134
Bago	Female	Mean	162.8333	72.3667	338.0867	352.9350
	N		12	6	12	12
	Std. Deviation		78.04796	21.78878	76.92373	93.93395
	Male	Mean	175.7452	83.8043	375.0556	388.8200
	N		25	14	25	25
	Std. Deviation		69.57613	8.78189	80.72109	91.94222
Total	Mean		171.5576	80.3730	363.0657	377.1816
	N		37	20	37	37
	Std. Deviation		71.59651	14.37427	80.37286	92.85315

**ANOVA Table**

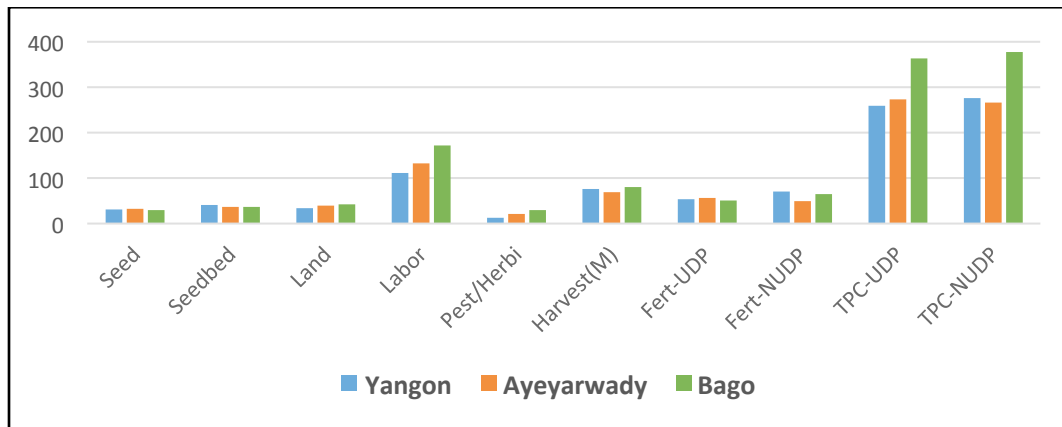
			Sum of Squares	df	Mean Square	F	Sig.
Total Labor (\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	64475.678	2	32237.839	8.547	.000
	Within Groups		399814.820	106	3771.838		
	Total		464290.498	108			
Harvest machine(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	715.893	2	357.946	.717	.493
	Within Groups		25961.707	52	499.264		
	Total		26677.600	54			
Total UDP(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	239637.750	2	119818.875	16.431	.000
	Within Groups		824030.835	113	7292.308		
	Total		1063668.585	115			
Total NUDP(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	287180.294	2	143590.147	14.437	.000
	Within Groups		1123902.073	113	9946.036		
	Total		1411082.367	115			

Male farmers spent more on seedbed and land preparation, pesticides and herbicides, harvesting machines, and fertilizers in non-UDP fields than female farmers. Female farmers spent more on seeds and labor than male farmers. The total production cost for male farmers was higher in both UDP and non-UDP wet season paddy fields.



**Figure 7. Various Costs and Total Production Cost of Wet Season Paddy (\$/ha) by Gender**

Among the regions, the farmers in Bago region spent more on labor and harvesting machines in non-UDP fields than in the other two regions. The farmers in Yangon region spent more on the cost of fertilizers in non-UDP fields. The total production cost (TPC) (for both UDP and non-UDP fields) for the farmers in Bago region was significantly higher than the TPC of farmers in Yangon and Ayeyarwady regions.



**Figure 8. Various Costs and Total Production Cost of Wet Season Paddy (\$/ha) by Region**

### Average Farm Gate Price and Paddy Yield in UDP and Non-UDP Fields

Overall, the farm gate paddy price received by farmers in wet season 2016 averaged \$0.125/kg in Yangon region and \$0.127/kg in both Ayeyarwady and Bago regions. Female farmers received a slightly higher average farm gate paddy price than males in all regions.



For male farmers in all regions, yields were higher with UDP than non-UDP. For example, male farmers in Ayeyarwady region harvested 4.8 tons/ha and female farmers harvested 3.6 tons/ha in their UDP plots. For non-UDP, male and female farmers harvested 4.0 and 3.0 tons/ha, respectively.

The F-tests present there was no significant difference in the farm gate price of paddy and UDP and non-UDP yields between the regions.

Overall, male farmers obtained higher yields in both UDP and non-UDP fields. The average yield from UDP for male and female farmers was 4.6 and 4.0 tons/ha. The average yield from non-UDP plots for male and female farmers was 3.83 and 3.3 tons/ha. The t-tests show that UDP yield was significantly different from non-UDP yield for both male and female farmers.

**Table 29. Average Farm Gate Price and Paddy Yield for UDP and Non-UDP**

			Farm Gate Price (\$/kg)	UDP Yield (kg/ha)	Non-UDP Yield (kg/h)
Yangon	Female	Mean	0.1277	4,193.8462	3,321.6413
		N	13	13	13
		Std. Deviation	.00927	1,225.29247	1,180.85692
	Male	Mean	0.1243	4,279.3929	3,536.8503
		N	28	28	28
		Std. Deviation	.00836	1,101.59535	946.98898
	Total	Mean	0.1254	4,252.2683	3,468.6133
		N	41	41	41
		Std. Deviation	.00869	1,127.45182	1,016.82769
Ayeyarwady	Female	Mean	0.1280	3,633.6000	3,052.8738
		N	10	10	10
		Std. Deviation	.01135	739.73226	999.03156
	Male	Mean	0.1279	4,846.3571	4,017.0056
		N	28	28	28
		Std. Deviation	.00738	1,024.53152	1,011.82302
	Total	Mean	0.1279	4,527.2105	3,763.2867
		N	38	38	38
		Std. Deviation	.00843	1,091.77651	1,083.96307
Bago	Female	Mean	0.1308	4,300.3091	3,492.1880
		N	12	12	12
		Std. Deviation	.01240	934.49035	903.21484

Male	Mean	0.1260	4,700.1558	3,972.2163
	N	25	25	25
	Std. Deviation	.01190	829.33970	728.99734
Total	Mean	0.1276	4,570.4758	3,816.5314
	N	37	37	37
	Std. Deviation	.01211	872.56967	809.60530
Total	Female	Mean	0.1289	4,070.2774
	N	35	35	35
	Std. Deviation	.01078	1,018.75465	1,025.39907
Male	Mean	0.1260	4,605.2456	3,837.2021
	N	81	81	81
	Std. Deviation	.00931	1,015.12992	925.31645
Total	Mean	0.1269	4,443.8328	3,676.1181
	N	116	116	116
	Std. Deviation	.00982	1,041.40701	983.39188

**ANOVA Table**

		Sum of Squares	df	Mean Square	F	Sig.
Farmgate (\$/kg) * Bago=1,Aye=2,YGN=3	Between Groups (Combined)	.000	2	.000	.778	.462
	Within Groups	.011	113	.000		
	Total	.011	115			
UDP yield(kg/ha) * Bago=1,Aye=2,YGN=3	Between Groups (Combined)	2362168.141	2	1181084.070	1.091	.339
	Within Groups	1.224E8	113	1082819.610		
	Total	1.247E8	115			
Non-UDP yield(kg/h) * Bago=1,Aye=2,YGN=3	Between Groups (Combined)	2783614.281	2	1391807.141	1.450	.239
	Within Groups	1.084E8	113	959541.937		
	Total	1.112E8	115			

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
UDP yield(kg/ha)	Equal variances assumed	.278	.599	-2.603	114	.010	-534.96821	205.55920	-942.17941	-127.75702
	Equal variances not assumed			-2.599	64.395	.012	-534.96821	205.85251	-946.15733	-123.77910
Non-UDP yield(kg/h)	Equal variances assumed	.830	.364	-2.760	114	.007	-533.87837	193.43255	-917.06676	-150.68998
	Equal variances not assumed			-2.649	59.030	.010	-533.87837	201.52354	-937.12170	-130.63504

## Yield Increase with UDP and Percentage of Total Production Sold

Among the sample farmers, five male farmers and one female farmer received a negative yield increase with UDP due to flood. This reduced the percentage yield increase with UDP to 28% for female and 21% for male farmers.

Among the regions, female farmers in Yangon region obtained a higher percentage increase in yield (33%). The lower percentage increase in yield (19%) was found in male farmers in Bago region.

It is noted that increased paddy yield with UDP was higher with female farmers in all regions. The yield difference between UDP and non-UDP was higher for female farmers in Yangon (females' yield increment was 872 kg/ha and males' yield increment was 742 kg/ha) and Bago (females' yield increment was 808 kg/ha and males' yield increment was 728 kg/ha) regions. The yield increase by UDP was higher for male farmers (829 kg/ha) in Ayeyarwady region.

On average, wet season paddy yields for female and male farmers increased by **767 kg/ha** and **768 kg/ha**, respectively. The t-test shows that there was no significant difference in yield increase with UDP or the difference between UDP and non-UDP between male and female farmers.

The F-test also presents that there was no significant difference in yield increase with UDP or the difference between UDP and non-UDP between the regions.

The female farmers in Yangon and Bago regions sold more paddy after harvesting. For example, female farmers in Bago sold 95% of total production of wet season paddy in 2016 while male farmers in Bago sold 80% of total production of wet season paddy in 2016. Overall, the t-test shows that there was no significant difference in percentage of paddy sold between male and female farmers.

**Table 30. Yield Increment with UDP and Percentage of Total Paddy Sold by Gender and Region**

			Yield Increment with UDP (kg/ha)	Yield Increase with UDP (%)	% of TP to Sell
Yangon	Female	Mean	872.3223	33.5400	89.62
		N	13	13	13
		Std. Deviation	569.73638	37.79143	15.607
	Male	Mean	742.5657	22.4386	88.71
		N	28	28	28

		Std. Deviation	600.10135	20.61981	15.611
Total		Mean	783.7080	25.9585	89.00
		N	41	41	41
		Std. Deviation	586.68467	27.25446	15.419
Ayeyarwady	Female	Mean	580.4990	25.6950	81.70
		N	10	10	10
		Std. Deviation	418.79348	25.36254	14.530
	Male	Mean	829.4157	22.6607	84.00
		N	28	28	28
		Std. Deviation	706.83375	18.18634	13.966
Total	Mean	763.9113	23.4592	83.39	
	N	38	38	38	
	Std. Deviation	647.75313	19.99137	13.955	
Bago	Female	Mean	808.1492	25.5658	95.45
		N	12	12	11
		Std. Deviation	541.55631	21.60609	9.070
	Male	Mean	727.9712	19.2720	79.60
		N	25	25	25
		Std. Deviation	529.91712	15.42934	25.080
	Total	Mean	753.9749	21.3132	84.44
		N	37	37	36
		Std. Deviation	527.51331	17.61454	22.576
Total	Female	Mean	766.9420	28.5646	89.18
		N	35	35	34
		Std. Deviation	520.52443	28.99024	14.186
	Male	Mean	768.0835	21.5380	84.27
		N	81	81	81
		Std. Deviation	613.55660	18.13482	18.722
	Total	Mean	767.7391	23.6581	85.72
		N	116	116	115
		Std. Deviation	584.79518	22.08504	17.587

**ANOVA Table**

		Sum of Squares	df	Mean Square	F	Sig.
Yield gap (kg/h) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)	18021.878	2	9010.939	.026	.974
	Within Groups	3.931E7	113	347878.751		
	Total	3.933E7	115			
Yield increase % * Bago=1, Aye=2, YGN=3	Between Groups (Combined)	421.915	2	210.957	.428	.653
	Within Groups	55669.235	113	492.648		
	Total	56091.149	115			
Sell % of TP (5) * Bago=1, Aye=2, YGN=3	Between Groups (Combined)	705.128	2	352.564	1.143	.323
	Within Groups	34553.968	112	308.518		
	Total	35259.096	114			

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Yield gap (kg/h)	Equal variances assumed	.557	.457	-.010	114	.992	-1.14146	118.80988	-236.50292	234.22000
	Equal variances not assumed			-.010	75.512	.992	-1.14146	111.30524	-222.84824	220.56533
Yield increase %	Equal variances assumed	3.146	.079	1.583	114	.116	7.02655	4.43838	-1.76586	15.81895
	Equal variances not assumed			1.326	45.912	.191	7.02655	5.29835	-3.63904	17.69213
Sell % of TP (5)	Equal variances assumed	3.466	.065	1.370	113	.173	4.905	3.580	-2.188	11.998
	Equal variances not assumed			1.532	81.028	.129	4.905	3.201	-1.464	11.274

## UDP and Non-UDP Yields, Yield Increase with UDP, and Percentage Increase in Yield by Cultural Practice

- For broadcast seeded rice: UDP yielded higher than non-UDP in all regions.
- For transplanted rice: UDP yielded higher than non-UDP in all regions.
- For UDP applications: Broadcast seeded rice yielded higher than transplanted rice in Yangon and Ayeyarwady, and in Bago the difference was marginal.
- For non-UDP applications: Transplanted rice yielded higher than broadcast seeded rice in Yangon and Bago, but in Ayeyarwady broadcast seeded rice yielded higher than transplanted rice.

The yield increments from UDP was higher in broadcast seeded rice than transplanted rice in Yangon (836 kg/ha) and Bago (920 kg/ha) regions, but in Ayeyarwady the yield increment from UDP was higher in transplanted rice (826 kg/ha) than broadcast seeded rice (713 kg/ha).

In terms of percentage of yield increase from UDP, the broadcasting method provided a higher percentage of increased yield in Yangon (29% vs. 19%) and Bago (25% vs. 20%) regions. The transplanting method provided a higher percentage of increased yield in Ayeyarwady region (28.6% vs. 19.2%).

The ANOVA table shows that there was no significant difference in UDP yield, non-UDP yield, increased yield quantity, and percentage by UDP among the regions. The t-tests also present that no significant difference in UDP yield, non-UDP yield, increased yield quantity, and percentage between different methods.

**Table 31. UDP and Non-UDP Yields, Yield Increments (kg/ha), and Percentage Yield Increment by Cultural Practice and Region**

			UDP Yield (kg/ha)	Non-UDP Yield (kg/h)	Yield Increase by UDP (kg/ha)	Yield Increase (%)
Yangon	Transplant	Mean	4,245.1667	3,589.3745	655.8092	18.6158
		N	12	12	12	12
		Std. Deviation	1,085.77621	933.77829	436.89130	12.57750
	Broadcast	Mean	4,255.2069	3418.6431	836.6317	28.9969
		N	29	29	29	29
		Std. Deviation	1,163.07841	1,060.97611	637.82045	31.08594
	Total	Mean	4,252.2683	3468.6133	783.7080	25.9585
		N	41	41	41	41
		Std. Deviation	1,127.45182	1,016.82769	586.68467	27.25446
Ayeyarwady	Transplant	Mean	4,213.7647	3387.5386	826.0318	28.6847
		N	17	17	17	17
		Std. Deviation	1,052.81810	1,057.92695	544.96290	21.43874
	Broadcast	Mean	4,780.9524	4067.4637	713.6233	19.2290
		N	21	21	21	21
		Std. Deviation	1,080.41638	1,030.13566	729.86816	18.15673
	Total	Mean	4,527.2105	3763.2867	763.9113	23.4592
		N	38	38	38	38
		Std. Deviation	1,091.77651	1,083.96307	647.75313	19.99137
Bago	Transplant	Mean	4573.5868	3858.5899	715.0597	20.4820
		N	30	30	30	30
		Std. Deviation	764.45356	788.81751	502.04409	18.27803
	Broadcast	Mean	4557.1429	3636.2807	920.7543	24.8757
		N	7	7	7	7
		Std. Deviation	1320.40264	937.31249	641.37759	15.12015
	Total	Mean	4570.4758	3816.5314	753.9749	21.3132
		N	37	37	37	37
		Std. Deviation	872.56967	809.60530	527.51331	17.61454

**ANOVA Table**

			Sum of Squares	df	Mean Square	F	Sig.
UDP yield(kg/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	2362168.141	2	1181084.070	1.091	.339
	Within Groups		1.224E8	113	1082819.610		
	Total		1.247E8	115			
Non-UDP yield(kg/h) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	2783614.281	2	1391807.141	1.450	.239
	Within Groups		1.084E8	113	959541.937		
	Total		1.112E8	115			
Yield gap (kg/h) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	18021.878	2	9010.939	.026	.974
	Within Groups		3.931E7	113	347878.751		
	Total		3.933E7	115			
Yield increase % * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	421.915	2	210.957	.428	.653
	Within Groups		55669.235	113	492.648		
	Total		56091.149	115			

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
UDP yield(kg/ha)	Equal variances assumed	2.949	.089	-4.27	114	.670	-82.87051	194.10451	-467.39006	301.64903
	Equal variances not assumed			-4.25	106.952	.671	-82.87051	194.85819	-469.15615	303.41513
Non-UDP yield(kg/ha)	Equal variances assumed	.441	.508	-0.089	114	.929	-16.30212	183.43138	-379.67827	347.07402
	Equal variances not assumed			-0.089	110.130	.930	-16.30212	183.92048	-380.78458	348.18033
Yield gap (kg/ha)	Equal variances assumed	4.034	.047	-6.12	114	.542	-66.65996	108.90639	-282.40268	149.08277
	Equal variances not assumed			-6.09	103.681	.544	-66.65996	109.44207	-283.69555	150.37564
Yield increase %	Equal variances assumed	1.267	.263	-5.90	114	.556	-2.42617	4.11338	-10.57474	5.72240
	Equal variances not assumed			-5.87	101.988	.559	-2.42617	4.13562	-10.62917	5.77683

### Five Data Points and Gross Margin for Sample Crop Cut Farmers by Gender

For farmers using UDP, the gross margin (GM) for male farmers was higher than female farmers in wet season paddy. The male farmers received \$277/ha while female farmers received \$228/ha when using UDP technology in wet season paddy (Table 32).

Even so, the increase in GM when applying UDP was 109% for female farmers and 57% for male farmers because the percentage of yield increase from UDP was higher for females (28%) than males (21%).

The GM of male farmers (\$175/ha) was higher than female farmers (\$109/ha) in non-UDP plots.

**Table 32. Five Data Points and Gross Margin for Crop Cut Sample Farmers by Gender**

	Variety	UP	TP	QS	VS	IC	GM (\$/ha)	% GM Increase
<b>UDP</b>	Male (81)	8.10	38,120.36	31,041.56	3,922.66	2,575.53	276.61	57.5
	Female (35)	3.34	13,192.74	11,686.28	1,522.79	956.76	228.24	109.0
	Combined (116)	11.44	51,313.10	42,727.85	5,445.44	3,532.29	262.88	70.9
<b>NUDP</b>	Male (81)	287.40	1,132,527.14	925,930.08	116,196.35	91,645.93	175.63	
	Female (35)	140.18	448,543.25	358,816.15	45,816.90	41,966.75	109.19	
	Combined (116)	427.58	1,581,070.38	1,284,746.23	162,013.25	133,612.69	153.82	
<b>Whole</b>	Male (81)	295.50	1,170,647.50	956,971.64	120,119.01	94,221.46	178.40	
	Female (35)	143.52	461,735.99	370,502.44	47,339.69	42,923.51	111.99	
	Combined (116)	439.02	1,632,383.49	1,327,474.08	167,458.70	137,144.98	156.66	

UP = Units of planted crop (hectares)

TP = Total Production (mt)

QS = Quantity of sales (mt)

VS = Value of sales (\$)

IC = Purchased recurrent input costs

$$GM = \frac{[(VS/QS)*TP]-IC}{UP}$$

UP



## Five Data Points and GM for Sample Crop Cut Farmers by Cultural Practice

In wet season paddy production, the GM with UDP was higher in broadcast seeded paddy seeds (BP) than transplanting paddy (TP) (\$339/ha vs. \$195/ha). The GM of non-UDP was also higher in broadcast seeded paddy (\$224/ha vs. \$82/ha).

This is mainly due to the higher cost of total production in the transplanting method (especially higher labor cost and land preparation cost) than the broadcasting method (TPC with transplanting was \$361/ha vs. \$231/ha). The percentage of GM increased by 136% with UDP in transplanting paddy and by 51% in broadcasting seeds (Table 33).

**Table 33. Five Data Points and Gross Margin for Crop Cut Sample Farmers by Cultural Practice**

	Practice	UP	TP	QS	VS	IC	GM (\$/ha)	% GM Increase
UDP	TP (59)	6.06	26,772.87	21,546.17	2,786.43	2,278.27	195.28	136.4
	BP (57)	5.38	24,540.23	21,181.67	2,659.02	1,254.02	339.48	51.4
	Combined (116)	11.44	51,313.10	42,727.85	5,445.44	3,532.29	262.88	70.9
NUDP	TP (59)	211.87	766,806.85	606,963.65	78,002.04	81,042.66	82.6	
	BP (57)	215.71	814,263.53	677,782.58	84,011.21	52,570.03	224.18	
	Combined (116)	427.58	1,581,070.38	1,284,746.23	162,013.25	133,612.69	153.81	
Whole	TP (59)	217.93	793,579.73	628,509.83	80,788.47	83,320.92	85.74	
	BP (57)	221.09	838,803.76	698,964.25	86,670.23	53,824.05	226.99	
	Combined (116)	439.02	1,632,383.49	1,327,474.08	167,458.70	137,144.98	156.66	

## Five Data Points and GM for Crop Cut Sample Farmers by Variety

The GM of HYVs was higher for both UDP (\$280/ha) and non-UDP (\$173/ha) than GM of local and hybrid varieties (Table 34). The GM of local varieties was higher than GM of hybrid varieties for both UDP and non-UDP in the wet paddy season of 2016. The GM of hybrid varieties was negative in non-UDP (-\$21/ha) because the total production cost for hybrid varieties (\$374/ha) was statistically higher than the costs of other varieties, and the yield of hybrids was the second lowest for both UDP and non-UDP.

The GM increase from UDP was the highest in local varieties (126%), followed by HYV (61.9%). The negative GM for hybrid varieties in non-UDP gave a negative GM increase, or GM decrease (-604%).

**Table 34. Five Data Points and Gross Margin for Crop Cut Sample Farmers by Variety**

	Variety	UP	TP	QS	VS	IC	GM (\$/ha)	% GM Increase
<b>UDP</b>	HYV (95)	9.64	44,592.22	36,795.24	4,690.86	2,983.00	280.2	61.9
	Hybrid (1)	0.08	357.03	357.03	40.18	31.52	107.06	-604.8
	Local (20)	1.72	6,363.85	5,575.57	714.40	517.78	172.97	126.4
	Combined (116)	11.44	51,313.11	42,727.85	5,445.44	3,532.30	262.87	70.9
<b>NUDP</b>	HYV (95)	344.56	1,331,979.74	1,078,593.46	135,539.24	107,756.39	173.04	
	Hybrid (1)	1.94	6,097.41	6,097.41	686.28	727.50	-21.21	
	Local (20)	81.07	242,993.23	200,055.35	25,787.73	25,128.79	76.4	
	Combined (116)	427.58	1,581,070.38	1,284,746.23	162,013.25	133,612.69	153.82	
<b>Whole</b>	HYV (95)	354.21	1,376,571.96	1,115,388.71	140,230.09	110,739.39	175.96	
	Hybrid (1)	2.02	6,454.44	6,454.44	726.46	759.02	-16.08	
	Local (20)	82.79	249,357.08	205,630.92	26,502.13	25,646.57	78.40	
	Combined (116)	439.02	1,632,383.49	1,327,474.07	167,458.69	137,144.98	156.66	

**Table 35. Average Yield from UDP and Non-UDP, Yield Increase from UDP, and Total Production Cost Under UDP and Non-UDP Technology by Variety**

		UDP Yield (kg/ha)	Non-UDP Yield (kg/h)	Yield Increase by UDP (kg/h)	Yield Increase by UDP (%)	TPC in UDP (\$/ha)	TPC in NUDP (\$/ha)
HYV	Mean	4,603.5222	3,835.5808	767.9543	21.7003	297.2267	307.7819
	N	95	95	95	95	95	95
Hybrid	Mean	4,409.0000	3,137.6279	1,271.6400	40.5300	389.2200	374.3600
	N	1	1	1	1	1	1
Local	Mean	3,687.0500	2,945.5948	741.5215	32.1140	292.6835	286.7440
	N	20	20	20	20	20	20
Total	Mean	4,443.8328	3,676.1181	767.7391	23.6581	297.2365	304.7286
	N	116	116	116	116	116	116

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
UDP yield(kg/ha) * HYV=1,Hybrid=2,Local=3	Between Groups	(Combined)	1.388E7	2	6939091.494	7.074	.001
	Within Groups		1.108E8	113	980907.974		
	Total		1.247E8	115			
Non-UDP yield(kg/h) * HYV=1,Hybrid=2,Local=3	Between Groups	(Combined)	1.338E7	2	6689476.664	7.727	.001
	Within Groups		9.783E7	113	865777.874		
	Total		1.112E8	115			
Yield gap (kg/h) * HYV=1, Hybrid=2,Local=3	Between Groups	(Combined)	267667.768	2	133833.884	.387	.680
	Within Groups		3.906E7	113	345669.496		
	Total		3.933E7	115			
Yield increase % * HYV=1,Hybrid=2,Local=3	Between Groups	(Combined)	2078.833	2	1039.417	2.175	.118
	Within Groups		54012.316	113	477.985		
	Total		56091.149	115			
Total UDP(\$/ha) * HYV=1, Hybrid=2,Local=3	Between Groups	(Combined)	8875.570	2	4437.785	.475	.623
	Within Groups		1054793.016	113	9334.451		
	Total		1063668.585	115			
Total NUUDP(\$/ha) * HYV=1,Hybrid=2,Local=3	Between Groups	(Combined)	12203.096	2	6101.548	.493	.612
	Within Groups		1398879.271	113	12379.463		
	Total		1411082.367	115			

## Five Data Points and GM for Crop Cut Sample Farmers by Region

Overall, the farmers in Bago region received higher yield with UDP (4.57 tons/ha) and without UDP (3.8 tons/ha) than in Yangon and Ayeyarwady, but it was not statistically significant. The total production cost of farmers in Bago region for both UDP (\$363/ha) and non-UDP (\$377/ha) was significantly higher than the total production costs in other regions (Table 37).

As a result, the farmers in Bago received lower GM (\$222/ha in UDP, \$112/ha in non-UDP) than Yangon and Ayeyarwady for both UDP and non-UDP plots (Table 36).

The GM of the farmers in Ayeyarwady region was higher (\$329.6/ha in UDP, \$205/ha in non-UDP) for both UDP and non-UDP, followed by the GM of farmers in Yangon region (\$233/ha in UDP and \$144/ha in non-UDP) in the wet paddy season of 2016.

**Table 36. Five Data Points and Gross Margin for Crop Cut Sample Farmers by Region**

	Variety	UP	TP	QS	VS	IC	GM (\$/ha)	% GM Increase
<b>UDP</b>	YGN (41)	4.74	20,402.86	16,883.84	2,119.90	1,457.48	233.12	61.6
	AYE (38)	3.83	17,809.79	14,679.79	1,891.62	1,031.66	329.60	60.7
	BAGO (37)	2.87	13,100.45	11,164.21	1,433.92	1,043.15	222.46	98.4
	Combined (116)	11.44	51,313.10	42,727.85	5,445.44	3,532.29	262.88	70.9
<b>NUDP</b>	YGN (41)	168.74	598,295.18	505,281.56	63,475.00	50,818.84	144.25	
	AYE (38)	133.37	497,827.17	409,311.14	51,981.77	35,870.54	205.08	
	BAGO (37)	125.47	484,948.04	370,153.53	46,556.48	46,923.30	112.15	
	Combined (116)	427.58	1,581,070.38	1,284,746.23	162,013.26	133,612.69	153.82	
<b>Whole</b>	YGN (41)	173.48	618,698.05	522,165.41	65,594.90	52,276.32	146.67	
	AYE (38)	137.20	515,636.95	423,990.9	53,873.39	36,902.20	208.56	
	BAGO (37)	128.34	498,048.49	381,317.74	47,990.40	47,966.45	114.65	
	Combined (116)	439.02	1,632,383.49	1,327,474.08	167,458.70	137,144.98	156.66	

**Table 37. Average Yield from UDP and Non-UDP, Yield Increase from UDP (kg/ha and %), and Total Production Cost of UDP and Non-UDP by Region**

		UDP Yield (kg/ha)	Non-UDP Yield (kg/ha)	Yield Increase by UDP (kg/h)	Yield Increase by UDP (%)	TPC in UDP (\$/ha)	TPC in NUDP (\$/ha)
Yangon	Mean	4,252.2683	3,468.6133	783.7080	25.9585	259.3827	275.6183
	N	41	41	41	41	41	41
Ayeyarwady	Mean	4,527.2105	3,763.2867	763.9113	23.4592	273.9818	265.5908
	N	38	38	38	38	38	38
Bago	Mean	4,570.4758	3,816.5314	753.9749	21.3132	363.0657	377.1816
	N	37	37	37	37	37	37
Total	Mean	4,443.8328	3,676.1181	767.7391	23.6581	297.2365	304.7286
	N	116	116	116	116	116	116

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
UDP yield(kg/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	2362168.141	2	1181084.070	1.091	.339
	Within Groups		1.224E8	113	1082819.610		
	Total		1.247E8	115			
Non-UDP yield(kg/h) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	2783614.281	2	1391807.141	1.450	.239
	Within Groups		1.084E8	113	959541.937		
	Total		1.112E8	115			
Yield gap (kg/h) * Bago=1, Aye=2,YGN=3	Between Groups	(Combined)	18021.878	2	9010.939	.026	.974
	Within Groups		3.931E7	113	347878.751		
	Total		3.933E7	115			
Yield increase % * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	421.915	2	210.957	.428	.653
	Within Groups		55669.235	113	492.648		
	Total		56091.149	115			
Total UDP(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	239637.750	2	119818.875	16.431	.000
	Within Groups		824030.835	113	7292.308		
	Total		1063668.585	115			
Total NUDP(\$/ha) * Bago=1,Aye=2,YGN=3	Between Groups	(Combined)	287180.294	2	143590.147	14.437	.000
	Within Groups		1123902.073	113	9946.036		
	Total		1411082.367	115			

## Appendix 1. Sample of Farmers by Township in Each Region

Region	Township		Gender of Farmers		Total
			Female	Male	
Yangon	Hmawbi	Count	2	2	4
		%	50.0%	50.0%	100.0%
	Hlegu	Count	2	6	8
		%	25.0%	75.0%	100.0%
	Taikkyi	Count	1	4	5
		%	20.0%	80.0%	100.0%
	Kungyangon	Count	4	4	8
		%	50.0%	50.0%	100.0%
	Thanlyin	Count	1	3	4
		%	25.0%	75.0%	100.0%
	Kyauktan	Count	1	3	4
		%	25.0%	75.0%	100.0%
	Kawhmu	Count	1	3	4
		%	25.0%	75.0%	100.0%
Twantay	Count	1	3	4	
	%	25.0%	75.0%	100.0%	
Total	Count	13	28	41	
	%	31.7%	68.3%	100.0%	
Ayeyarwady	Myaungmya	Count	1	2	3
		%	33.3%	66.7%	100.0%
	Zalun	Count	0	2	2
		%	.0%	100.0%	100.0%
	KGDaunt	Count	1	3	4
		%	25.0%	75.0%	100.0%
	Pantanaw	Count	0	3	3
		%	.0%	100.0%	100.0%
	Einme	Count	1	3	4
		%	25.0%	75.0%	100.0%
Kyaunggon	Count	0	1	1	
	%	.0%	100.0%	100.0%	
Mawgyun	Count	3	5	8	
	%	37.5%	62.5%	100.0%	
Maubin	Count	1	4	5	
	%	20.0%	80.0%	100.0%	

Region	Township		Gender of Farmers		Total	
			Female	Male		
	Kyaitlat	Count	1	1	2	
		%	50.0%	50.0%	100.0%	
	Bogale	Count	1	2	3	
		%	33.3%	66.7%	100.0%	
	Pyapon	Count	1	2	3	
		%	33.3%	66.7%	100.0%	
	Total	Count	10	28	38	
		%	26.3%	73.7%	100.0%	
	Bago	Bago	Count	1	3	4
			%	25.0%	75.0%	100.0%
Pyay		Count	4	6	10	
		%	40.0%	60.0%	100.0%	
Daik-U		Count	1	3	4	
		%	25.0%	75.0%	100.0%	
Zigon		Count	1	3	4	
		%	25.0%	75.0%	100.0%	
Kyauktaha		Count	2	7	9	
		%	22.2%	77.8%	100.0%	
Letpadan	Count	2	3	5		
	%	40.0%	60.0%	100.0%		
Thayarwady	Count	1	0	1		
	%	100.0%	.0%	100.0%		
Total	Count	12	25	37		
	%	32.4%	67.6%	100.0%		