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Contents

Effect of Direct-seeding and Transplanting Methods on Rice Cultivar Manawthukha in Meiktila Township

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Abstract

The effect of direct-seeding and transplanting methods on the rice cultivar Manawthukha were tested in this experiment. The Manawthukha rice cultivar used in this series is a high yield modern variety of short-lived, non-photosensitive, drought tolerant and good eating quality. Because of being irrigated or non-irrigated land, rain water availability, and surface elevation the farmers are using various sowing methods on different sowing dates in their rice cultivation. In this work Manawthukha rice cultivar was grown on the same soils that have the same environmental situations. The result of this experiment was found that the direct-seeded plants on thoroughly water soaked puddle soil produce high yields than those of the transplanting plants.

Key words: high yield, photosensitive, drought tolerant, irrigate, non-irrigate

Introduction

Myanmar, The largest country of Southeast Asia *is located between 9° 58' N to 28° 31' N and 92° 9' E to 101° 11' E.* 75% of Myanmar are rural dwellers whose livelihoods depend on farming. The agricultural sectors contribute 34% to the GDP, 23% to the take export earning and employ 63% of the labor force. Among the crops, rice is with 43% by far the most important one and rice-grcwing areas are categorized into rain fed, irrigated and upland, occupying 68%, 19% and 3% of the total sown area respectively. Rice is grown in every part of the country and a great diversity of climate and soil. The main rice growing areas of Myanmar may be divided into three regions with distinct soil; and climate differences. They are upper Myanmar (dry zone, Shan Plateau, and North Myanmar), Lower Myanmar (Pegu and Yangon Division and costal areas), and Delta (Ayeyarwaddy Division).

In 1985-86, Myanmar rice scientists released modern varieties that were sown in area of about 52 percent of total paddy sown area in Myanmar. The most common modern varieties in that period were IR-5, IR-24, IR-28, IR-50, C4-63, Mashuri, etc. In present day to improve the quality

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of Myanmar rice up to the level required by the marketing, high-yielding varieties with shorter life period, longer grain and better eating quality were introduced.

Researchers from Central Agricultural Research Institute together with the IRRI Representative to Myanmar conducted the survey on rice cultivation in central Myanmar, and they concluded that the most important problems were drought or inadequate irrigation water, pests and diseases, expensive and short supply of fertilizer and shortage of labor during peak period of farm operations. They also found that the farmers usually matched these with their own indigenous solutions. They suggested that the choice of the correct varieties to plant helped the farmers overcome water stress and fertilizer shortage.

The aim of this experiment is to study the effect of different seeding on the growth and yield of rice cultivar which commercially grown in Meiktila township. In this experiment rice plants grown by the two methods were used at the same environment and equal circumstances.

Materials and Methods

The significance of rice plants differently seeded by two methods namely direct-seeding and transplanting methods, on growth rate and yield were tested in this experiment. The soils were taken from the paddy field of Myin-gan village located at the west of Meiktila Township. For planting the rice cultivar the large glazed pots were used. Each pot has a diameter of 66 cm at the top and taper toward the bottom to a diameter of 23 cm and has a height of 44 cm. The clay soil in each pot was weight by 90 lbs each respectively.

The rice variety namely Manawthukha were grown by two different methods. Each method on treatment was replicated six times. The rice seedlings for transplanting were made in other pots as the wed bed at the same location. And then the rice seeds were sown for the direct- seeding on next two day. The series of these experiments were done at the Magyi-gone quarter, near the Meiktila University campus.

For direct-seeding the pulverized soils in the pots were irrigated first. And then the soil particles were allowed to settle down in water. The excess water was drained by thawing from pots before seeding the rice grains. The newly sown seeds were used in this experiment by drilling with

fingers after withdrawing the water. Two weeks after seeding, the pots with slightly compacted rice soil were continuously filled with water at 3 cm above the soil surface.

In transplanting rice pots the pulverized soils were let to flood the water to get well soaked soil before transplantation. Six pots used for each treatment by these methods were arranged in separate rows and the rows were kept two feet apart. The water level in the pot was maintained at the depth of about two inches above the soil surface. The 25 days old rice seedlings were transplanted. The two groups of rice plant grown by direct seeding and transplanting methods were sown at the same time.

Not only sown rice seeds but also transplanting rice plants were let to grow by twelve (12) hills in the pots with the spacing of 6"x7". There were three seeds or seedlings per hill to be grown respectively. After transplantation all pots of treatments were watered well enough not to be dried during the experimental periods. The rice plants were naturally sown by these methods under the same condition.

The leaf length, plant height and leaf breadth were recorded. Counting the number of tillers was also done weekly till the booting stage. Yield and yield components of rice plant grown by two different methods were subjected to analysis of variance and comparisons of varietals means were made by using student "t" test.

Results

Comparison among the direct-seeding and transplanting method on the shoot growth shows that the measurement of shoot growth by the direct-seeding method was superior to the transplanting method significantly at 1% level (Table-1). The comparison between direct-seeding and transplanting method showed that the measurement of leaf breadth found in direct-seeding was inferior to the transplanting method and significantly different at 1% level (Table-2).

The comparison between the effects of direct-seeding and transplanting method on the growth of leaf length showed significant differences. The leaf lengths of direct-seeding both at 8 weeks and 10 weeks were significantly different at 1% to 5% level. There were significant effects of direct-seeding method on the number of tiller and the total grain yield. After transplantation the counting number of tillers at 3-week and

9-week showed significantly more effects by direct-seeding method than those by transplanting method different at 1% level (Table-3).

In the cultivation by direct-seeding method the tillering of rice plant was significantly increased and the maximum number was found at 9-weeks measuring, and decreased in later stages. In contrast, the number of tiller in transplanting method was found to be in usual manners. The maximum number of tiller was shown at 7-weekand decreased at the later stage. The actual grain yield per pot and 1000 grain weight of those grown by direct-seeding method were significantly higher than those by transplanting method with the level of 5% and 1% (Table-6).

Discussion and Conclusion

An advantage of direct-seeding in dry granulated soil, usual practicing by dry land farmers, is that it is required less water than those of drilling or broadcasting in the puddle soil, but more slowly in the early stage. An advantage of broadcasting or drilling on puddle soil is that the seedlings develop rapidly. Therefore, there is an agreement, obtained from this work, that the newly sown seeds should be managed to sink in the puddle soil sustained with water, not exposed to damage by rat, bird, and unexpected heavy rainfall.

The big clods of soil in dry land can also do an effect to produce strong healthy seedling although they can not get enough water film. The moisture not only supports the rice seeds but the temperature may incubate to sprout the newly seeds within the clods. The direct-seeding method used in this experiment was treated only in the glazed pots. Thus the systematic drilling in the puddle soil with water control could be made easily. The germination time was not so long and no chances to damage so that the direct-seeded rice plants are grown at specific spacing without any disturbing actions.

The direct-seeded plants were perhaps having a good nutrition and successive growth to mature in vegetative stage. The rice plants obtained the nutrients by submerged puddle soil under same condition. But there is another fact that the rice plants grown on the drained soil prior to drilling in direct-seeding method. Thus the rice plants were provided with compact soil but not dry. In the field experiment increased compaction significantly increased the concentration of nitrogen, phosphorus, iron, and manganese in

the plant tissue. The increase was apparently due to greater soil reduction under compaction (Patel, 1977). The finding of recent work agreed with this statement.

On the other hand the puddling hastens the mineralization of soil organic matter. Plants grow in puddle fields are more vigorous and greener in appearance than unpuddled ones. Plants on granulated unpuddled soils begin to show nitrogen deficiency symptoms during the tillering stage, while plants on puddle soils maintain dark green color (Sanchez, 1973). In the present study, the color of direct-seeding plants agreed with this finding.

The pH of a submerge soil exerts marked influence on the growth of rice (Arnon and Johnson, 1942, Moore, 1972, Ponnamperuma et al., 1966). Chemical changes created by soil submergence provide both benefits and disadvantages for rice nutrition. T.Tadano and S.Yoshida, thus suggested that soil and management practices should be directed at attaining a pH of 6.6 at planting time and at maintaining that value at least until panicle initiation because of the availability of high grade of phosphorus, releasing of nitrogen by microorganisms an adequate amount from soil. The rice plants grown by direct-seeding method were developed under submerged condition as necessary. Thus the changing of pH value in the pots of direct-seedling plants seem to be providing a rather amount of nutritious, and consequently showing significant differences between the yield components of the direct-seeding plants compared with transplanting method.

Finally, the effect of direct-seeding method on the growth and yield of Manawthukha rice cultivar was more significantly different and superior than that of transplanting method in this experiment. It was found that rice plant grown by direct seeding method was preferable benefits in vegetative growth and yield other than that used by transplanting method. Moreover, using the direct seeding method can reduce the cost of rice production and labour intensive for the farmers.

Table-1 Comparison on shoot growth collected from 3,6,and 9 weeks old (after transplanting) of Manawthukha rice cultivar grown by direct-seeding and transplanting methods in Meiktila township
(Experiment A = Direct-seeding, Experiment B = Transplanting)

		3-weeks		6-weeks		9-weeks	
Comparison	Plant number	Shoot-growth mean ± sd	t-value	Shoot-growth mean ± sd	t-value	Shoot-growth mean ± sd	t-value
Experiment-A	72	45.18 ± 2.72	1.4^{ns}	71.37 ± 6.55	0.83^{ns}	85.88 ± 11.96	4.3**
Experiment-B	72	44.12 ± 2.72		72.23 ± 5.78		79.09 ± 5.99	

Sd = Standard Deviation, ns = Non significant
*, ** = Significantly different at 5% and 1% level respectively

Table-2. Comparison on leaf-breadth collected from 3,6 and 9 weeks old (after transplanting) of Manawthukha rice cultivar grown by direct-seeding and transplanting methods in Meiktila township
(Experiment A = Direct-seeding, Experiment B = Transplanting)

		3-weeks		6-weeks		9-weeks	
Comparison	Plant number	Leaf-breadth mean ± sd	t-value	Leaf-breadth mean ± sd	t-value	Leaf-breadth mean ± sd	t-value
Experiment-A	72	0.53 ± 0.07	1.0^{ns}	1.15 ± 0.23	1.3^{ns}	1.4 ± 0.13	5.0**
Experiment-B	72	0.52 ± 0.07		1.11 ± 0.08		1.5 ± 0.08	

Sd = Standard Deviation, ns = Non significant
** = Significantly different at 1% level.

Comparison on leaf-length collected from 6, 8, and 10 weeks old (after transplanting) of Manawthukha rice cultivar grown by direct-seeding and transplanting method in Meiktila township.

		6 weeks		8 weeks		10 weeks	
		Leaf length		Leaf length		Leaf length	
Comparison	plant number	mean ± sd	t value	mean ± sd	t value	mean ± sd	t value
Experiment A	72	50.28 ± 4.19	ns 1.03	50.28 ± 4.19	** 2.63	50.28 ± 4.19	** 5.65
Experiment B	72	52.61 ± 3.61		53.46 ± 2.27		51.58 ± 2.04	

sd = standard Deviation
ns = non significant, ** significant at 1% level.
Experiment A = direct seeding method
Experiment B = transplanting method

Table-3. Comparison on number of tiller collected from 3,6 and 9 weeks old (after transplanting) of Manawthukha rice cultivar grown by direct-seeding and transplanting methods in Meiktila township

(Experiment A = Direct-seeding, Experiment B = Transplanting)

		3-weeks		6-weeks		9-weeks	
Comparison	Plant number	Tiller mean ± sd	t-value	Tiller mean ± sd	t-value	Tiller mean ± sd	t-value
Experiment-A	72	4.03 ± 0.79	6.61**	6.69 ± 1.39	1.6^{ns}	8.13 ± 1.9	5.9**
Experiment-B	72	3.30 ± 0.54		6.29 ± 1.57		6.36 ± 1.68	

Sd = Standard Deviation, ns = Non significant

** = Significantly different at 1% level.

Table-5. Comparison of panicle growth length and total number of panicle per pot of Manawthukha rice cultivar grown by direct-seeding and transplanting methods in Meiktila township

(Experiment A = Direct-seeding, Experiment B = Transplanting)

Comparison	Pot No	Panicle length		Total number of panicle per pot	
		mean ± sd	t-value	mean ± sd	t-value
Experiment-A	6	23.21 ± 1.02	1.96*	55.16 ± 9.24	1.34^{ns}
Experiment-B	6	21.17 ± 2.33		48.5 ± 7.89	

Sd = Standard Deviation, ns = Non significant
* = Significantly different at 5% level.
** = Significantly different at 1% level.

Table-6. Comparison of 1,000 grains weight and actual yield grains per pot of Manawthukha rice cultivar grown by direct-seeding and transplanting methods in Meiktila township

(Experiment A = Direct-seeding, Experiment B = Transplanting)

Comparison	Pot No.	1000 grains weight		Actual yield grains per pot	
		mean ± sd	t-value	mean ± sd	t-value
Experiment-A	6	16.17 ± 1.33	2.93**	43.83 ± 12.43	2.07*
Experiment-B	6	29.67 ± 11.22		29.67 ± 11.22	

Sd = Standard Deviation,
* = Significantly different at 5% level.
** = Significantly different at 1% level.

Chemical analysis of soil used in this work

pH	Available			Exchangeable/ 100 gm		Water soluble		ppm	
	N%	P_2O_5lb/ac	K_2O%	Ca	Mg		Mn	Cu	Zn
7.98	0.0031	26.13	0.0176	10.88	3.54	0.0011	2.11	0.75	0.12

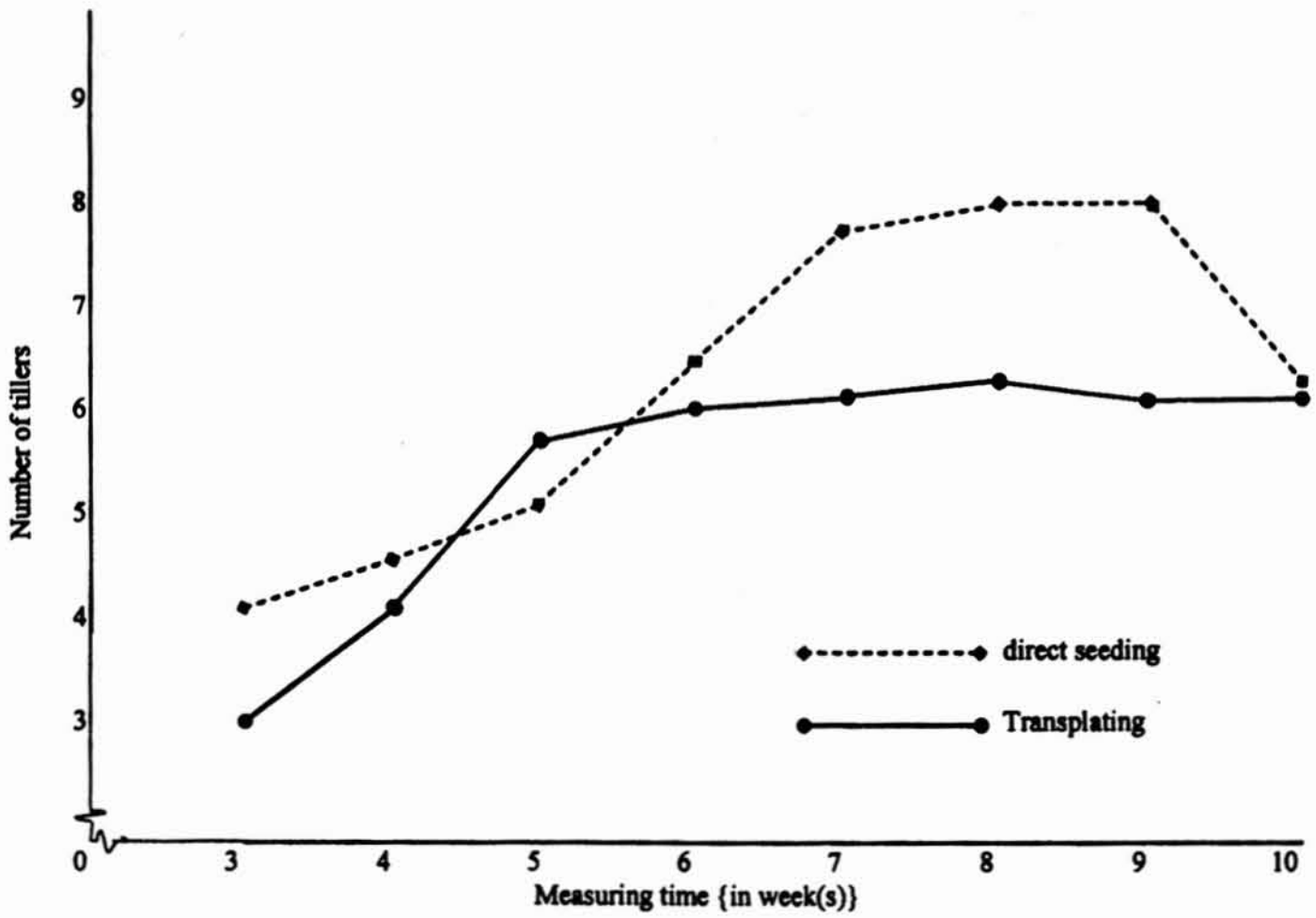

Figure 1. Frequency of total number of tiller of rice cultivar Manawthukha grown by two different methods in Meiktila Township

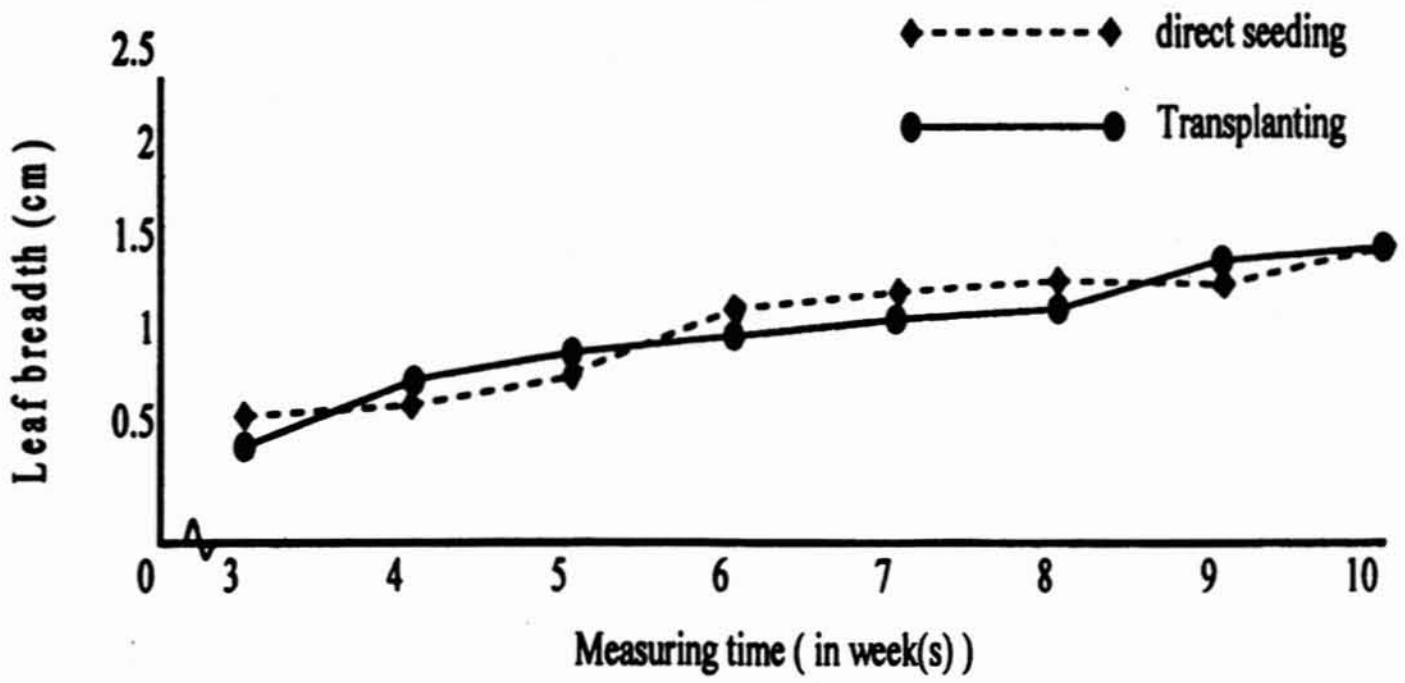

Figure 2. Frequency of Leaf breadth growth rate of cultivar Manawthukha grown by two different methods in Meiktila Township

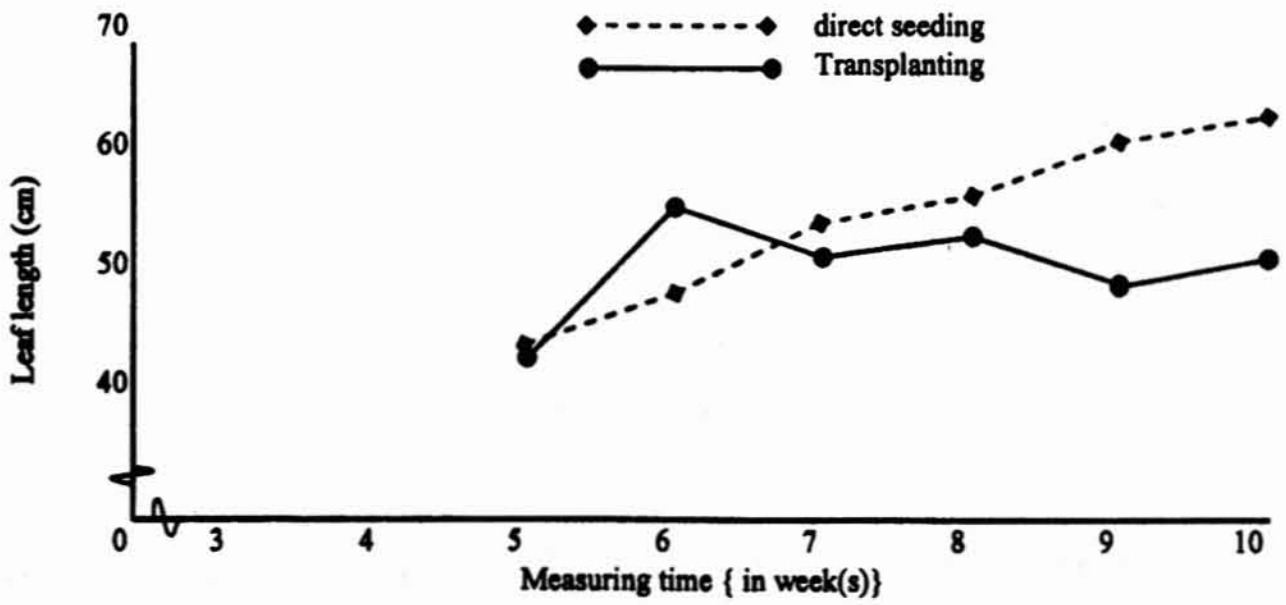

Figure 3. Frequency of Leaf length growth rate of rice cultivar Manawthukha grown by two different methods in Meiktila Township

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