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COMPARATIVE STUDIES ON DIRECT SEEDING VS TRANSPLANTING TECHNIQUES OF PADDY

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Abstract

A study on different seeding techniques of paddy was carried out in loamy and sandy loam soils during 1982 and 83. The seeding techniques used were; manual transplanting of paddy seedling, broadcasing of the pre-germinated seeds, and drilling of dry seeds in "watter" conditions. Amongst the common kharif weeds of paddy, *Cyperus iria* Linn. was in abundance in all the treatments. The grain weight produced by pre-germinated seed was 14 time more than that of the paddy seedlings transplantation, while the ungerminated seeds caused 6% reduction in weight through drilling. The maximum paddy yield (5.1 t/ha) was also associated with puddled broacasting of pre-germinated seeds registering an increase of 35% over traditional method of paddy transplanting. Yield was highly correlated (r = 0.99) with grain weight in a linear fashion.

Introduction

In Pakistan, almost all paddy seedlings are manually transplanted. The short period of transplanting results in higher demand for contractual labour, the labour tries to cover more and more area in the available time to earn more money. The manual transplanting charges per unit area result into low plant population at the farmers fields, and ultimately reduce production (Goldman & Shad, 1979). Moreover transplanting technique requires extra time and cost for raising, shifting and transporting of the nursery seedlings in the main field. Direct seeding eliminates the cost and weariness of these operations as seed is directly sown in the main field, and substantially reduce the cost of production. This can be done extensively with profitable results under the adequate and well controlled irrigation supply. It is also evident that direct seeding results in similar (Modgal & Sebastian, 1971) or greater (Anon, 1967; Prasad & Singh, 1975) grain yields than transplating. Majid & Saeed (1973) observed good harvest through direct seeding of those paddy varieties which did well under transplating. Direct seeding is also useful in multiple cropping system as rice mature 7-10 days earlier than transplanted one (Mabbayad & Oborda, 1970). Chatterijee & Khan (1978) recorded 6% more wheat grain yield in an area which was previously under the direct seeded rice, compared with transplanted area.

In Pakistan, it is generally believed that rice crop can only be grown through transplanting, and it is usually followed by the winter wheat crop which normally results into

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poor production due to its late sowing. Therefore, this study was conducted to evaluate the production potential of paddy through direct sowing compared to transplanting.

Materials and Methods

A field expriment was conducted at the National Agricultural Research Centre Islamabad where soil was loamy, pH 8.0; organic matter 0.58%; N 0.3%; EC, 3.0 mm hos/cm P 1.98 ppm and K 99 ppm and repeated at a farmers field in Gujranwala, Punjab, where soil was sandy loam; pH 8.2; organic matter 0.67; N 0.07%; EC 5.2 mm hos/cm; P 3.3 ppm and K 90 ppm.

Three different treatments were (To) manual transplanting of paddy seedlings, (T1) broadcasting of the pre-germinated seeds on the puddled soil, and (T2) drilling of the ungerminated seed in "Watter" conditions. The recommended rice cultivar IR-6 was used as a test crop. The T1 and T2 treatments were sown in the month of June on both the sites at a seed rate of 70 Kg ha^{-1}. For control plots, nursery was sown in the nursery bed on the same date which was transplanted to the actual field after 3 weeks. Super phosphate (50 Kg p ha^{-1}), ammonium sulphate (80 Kg N ha^{-1}) and Zinc sulphate (12 Kg ha^{-1}) were used. Two weedings were done manually at 30 and 60 days after sowing.

The expriment was laid out in randomized complete block design (RCBD) with four replications, having a plot size of 27 m x 9 m. Rainfall during the cropping season totalled 657.4 mm at NARC and 249.5 mm at farmer's rield, in addition to 6 and 12 irrigations, respectively. Observations on grain yield, 1000 grain weight, plant height, plant density and head m^{-2} were recorded. Grain yield was determined on hectare basis at 22% moisture level. The data was statistically analysed and the difference between treatment means was tested at 5% level of significance (Sreel & Torrie, 1967).

Results and Discussion

The common Kharif weeds of paddy namely *Cyperus rotundus* Linn; *Cyperus iria* Linn; *Sphenoclea zeylanica* Gaertn. and *Paspalum distichum* Linn. were observed in the experimental area. The weed density was ($P < 0.05$) higher in plots which were sown by ungerminated seeds in "Watter" condition (Table 1). Weed infestation was higher at the early growth stages of the crop which decreased with the passage of time. *C. iria* was predominant while *S. zeylanica* had the least position in direct seeded technique (Fig. 1). Weeds are considered as the major problem in the direct seeding system of paddy (Haque *et al,* 1978).

A significant difference ($P < 0.05$) in plant density of paddy was noted amongst the seeding techniques in 1982. Maximum plant density (29.63 m^2) was recorded by pre-germinated seeds under the puddling conditions (Table 1) while during 1983 none of the

Table 1. Effect of the seeding techniques on the yield and yield components of paddy.

Treatments	Weed Population			Plant Density	Rice		
	30 days	60 days	90 days		Plant Height (cm)	1000 grain Weight (g)	Grain Yield (t/ha)
NARC, 1982							
Broadcasting of pre-germinated seed (T2)	8.75 b*	5.25*	3.0 b*	29.63 a*	82.25* a	25.13 a*	5.10 a*
Seeding drilling (T1)	18.25 a	7.25	6.75 a	26.25 a	81.32 a	22.65 b	3.63 b
Transplanting (T0)	–	6.0	4.0 b	22.62 b	74.67 b	21.50 b	3.28 b
S.E. ($P < 0.05$)	6.68	NS	1.38	3.65	5.29	1.62	1.09
Gujranwala, 1983							
Broadcasting of pre-germinated seeds (T2)	362.75 a*	94.25 bc*	96.50 ab*	35.75	70.70 a*	20.03* a	3.25 a*
Seed drilling (T_1)	423.75 a	153.50 a	123.75 a	41.25	54.75 bc	16.63 c	1.88 b
Transplanting (T_0)	–	113.75 b	39.75 b	27.75	58.20 b	16.88 bc	1.83 bc
S.E. ($P < 0.05$)	114.04	36.16	54.25	NS	7.0	1.22	0.91

Note: *: Treatments having the same letter do not differ significantly at the 5% level by LSD Test.
NS: Non significant at 5% level.

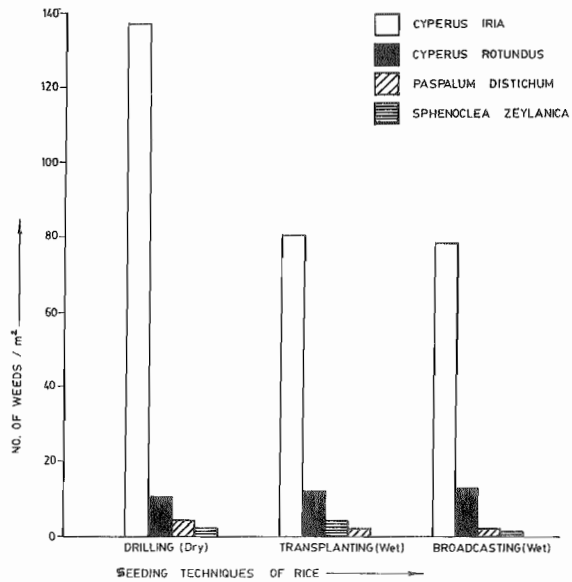

Fig. 1. Weeds response to different seeding techniques of rice.

seeding techniques had any significant effect on plant density at the farmer field (Table 1). The increase in plant density was 33% and 22% over the transplanting through drilling and broadcasting, respectively (Fig. 3).

Plant height showed significant difference ($P < 0.05$) amongst all the seeding techniques at both the sites during 1982-83. Broadcasting of the pre-germinated seeds resulted into maximum plant height (82.75 cm) which remained at par with drillIng of the ungerminated seeds (Table 1). The minimum plant height (54.75 cm) was by ungerminated seed through drilling during 1982, also remained insignificant with transplanting technique (Table 1). The lowest height was most probably due to more weed population, as they compete with crop plants for nutrients, moisture and light.

Highest 1000 grain weights of 25.13 and 20.03 g was found through broadcasting of pre-germinated seeds at NARC and farmer's field, respectively (Table 1), having an increase of 14.3 and 14% in weight over transplanting, (Figs. 2 & 3). During 1983, direct drilling of ungerminated seeds caused 6% reduction in grain weight (Fig. 3). This might be due to poor crop stand and high weed density (423.7 m^{-2}).

Fairly highest grain yield, (5.10 t/ha) was observed through broadcasting of pre-germinated seeds under the puddling conditions (Table 1) which ultimately registered 35% increase in paddy yield over the traditional method of transplating. Similar results in direct seeding were also reported by Modgal & Sebastian (1971), Prasad & Singh

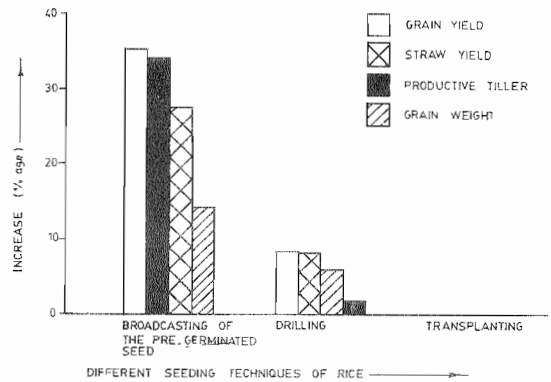

Fig. 2. Seeding effect on rice yield and its components (1982, NARC).

(1975) and Majid & Saeed (1973). With adequate water supply, broadcasting of sprouted seeds in puddled fields could produce paddy yield similar to tansplanting (Sing & Gang, 1983). This increase in yield may be due to low weed density, high plant population and maximum grain weight. Moreover, paddy yield highly respond (r = 0.93) with plant population and with 1000 grain weight (r = 0.99) in a linear fashion during 1982. In the subsequent year 1983, similar positive linear correlation was also observed between paddy yield (r = 0.97) vs plant height and paddy yield vs 1000 grain weight (r = 0.57) at the

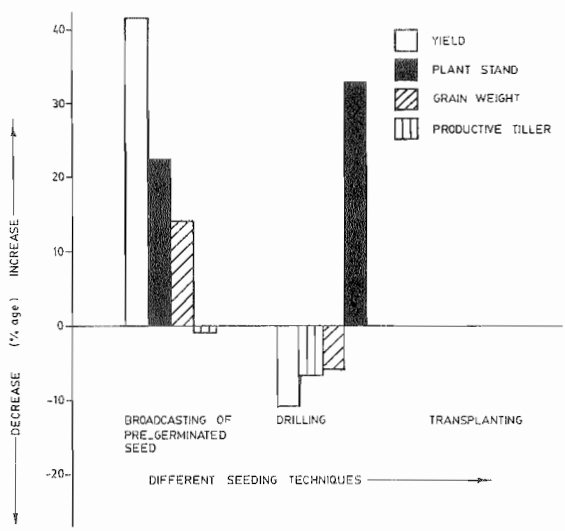

Fig. 3. Seeding effect on rice yield and its components (Farmer's Field, 1983).

farmers field. Nederr (1975) also reported the similar response of the yield component on the paddy yield. The lowest paddy yield (1.83 t/ha) was associated with manual transplanting which remained insignificant with direct seeding of the ungerminated seeds which is simalar to the findings of Prasad & Singh, (1975) and Lokaphadhan (1976). Direct seeding of sprouted seeds with adequate irrigation and through proper weed control holds promise.

Reference

Anonymons 1967. IRRI Annual report for 1966. Los Banos, Philippines 62 p.

Chatterjee, B.N. and S.A. Khan. 1978. Growth of wheat established with different amounts of tillage after the harvest of direct seeded and transplanted rice. *Ind. J. Agric. Sci.*, 48: 654-569.

Goldman, R.H. and R.A. Shad. 1979. Technical and Economic factors influencing rice planting densities in Punjab. Proc. workshop on "*Constraints to Agricultural Productivity*" (May, 1979). IRRI Los Banos, Laguna, Philippines, 62 p.

Haque, Z., P.R. Hobbs and A. Ahmad. 1978. Weeds management studies on direct seeded and transplanted rice in Bangladesh, *IRRI Newslet*, 3: 19-20.

Lokaphadhan, T. 1976. Economic comparison of broadcasting and transplanting dry season rice in Thailand. M.S. thesis. Thammasat Univ. Bangkok, Thailand. P. 193.

Mabbayad, B.B. and R.A. Oborda. 1970. Methods of rice planting. Rice Production Manual. Compiled by Univ. of the Philippines, College of Agric. in cooperation with IRRI: 84-88.

Majid, A. and A. Saeed. 1973. Some studies on direct seeding of rice. Proc. seminar on *"Rice Research and Production"* Dokri pp: 129-141.

Modgal, S.C. and T.K. Sebastian. 1971. Effect of seeding and transplanting on the performance of three rice varieties. RISO, 20: 183-187.

Nederr, O.P. 1975. An experiment on adapatibility of direct sowing of rice variety Mukiribu. *Crop Sci.*, 9: 20-22.

Prasad, R. and V. Singh. 1975. Note on methods of land preparation and weed control in directly sown and transplanted rice. *Ind. J. Agri. Sci.*, 45: 377-379.

Singh, C.P. and I.K. Gang. 1983. Effect of different methods of planting on the yield of paddy. *Jour. Res. Punjab Agric. Univ.*, 20: 503-509.

Steel, R.G.D. and J.H. Torrie. 1967. *Principles and procedures of Statistics.* McGraw-Hill Book Co. Inc. New York.

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