## **2.5 Transplanting of Rice**

The transplanting of rice is the most commonly practiced traditional establishment method by the farmers in the Asian region (Mabbayad and Bordo, 1971). The pre-germinated seeds are sowed at the nursery beds at where the seedlings are raised until they reached the correct age for transplanting. The type of nursery bed use for raising seedlings is decided according to the availability of water, labor, land and the mechanization methods followed. The nursery types which are used for transplanting are Wet bed, Dry bed, Dapog, Modified dapog nurseries in mats and trays, Parachute nurseries in the trays (bubble trays). The transplanting of rice is the process of uprooting the seedlings form the when at the correct seedling age for the field establishment and replanting of them in the fields in which puddling and leveling is done. The transplanting of rice can be done either manually or mechanically. The manual transplanting of rice is the most popular transplanting method among the Asian farmers (IRRI, 2007).

The most important factors to concern in the transplanting of rice in order to achieve a vigorous stand of plants in the field after established in the field are, properly managed nutrient application to the plants, optimum seed rate for seed beds and transplanting of tender seedlings at the correct age by avoiding the delayed transplanting of seedlings (Himeda, 1994; Lal and Roy, 1996). The advantages of the transplanting of rice compared to other establishment methods are, optimum spacing between the plants in facilitating the agronomic practices like weeding, low seed rate required for the nurseries, ability of the plants to withstand over the weeds and the uniform maturity of the crop can be obtained (Desai, 2012). As the transplanted rice plants has the ability to compete and suppress the weed growth, higher economic yield can be obtained from the transplanted rice through proper weed management measures (Hossain et al., 2002). And also due to the optimum space between rice plants maintained by the transplanting method, a significant increase in the yield can be observed as the low plant density and proper penetration of sunlight through the canopy of the plants reduced the occurrence of pest and disease damages compared to direct seeding of rice (Baloch et al., 2002).

The transplanted rice cultivation gives significantly increased number of productive tillers per hill and increment in number of spikelets per panicle which ultimately gives an increased gran yield compared to the direct seeding. The deep penetrated and the wide spread root system of the rice plants facilitate the plants with sufficient amount of nutrients and moisture content during the panicle initiation and flowering stages which are considered as more critical stages having a noticeable impact on the final yield (Septiningsih et al., 2003).

The main problems associated with the transplanting are, the deficit and overhead costs on the labors at the peak transplanting period which is the root cause for the delayed transplanting of seedlings. It is a time consuming establishment method and requires more expenditure on the nursery management, uprooting of seedlings and transplanting of them to the field (Das, 2012; Singh et al., 2018).

The highest gross economic return can be obtained from the transplanting of rice than other establishment methods with the availability of ample amount of labors for field practices. The throwing of seedlings which is known as the parachute method can be used as an appropriate solution to tackle the problem scarcity of labors and improve the harvest (Akbar et al., 2007; Manjappa and Kataraki, 2004; Rani and Jayakiran, 2010). The mechanical transplanters can be named as the most attractive suggestion to the areas with shortage of labor (Singh et al., 2018).

Akbar, N., Jabran, K., Habib, T., 2007. Comparison of different Planting Methods for Optimization of plant population of fine rice ( Oryza sativa L .) in Punjab (Parkistan) 44, 597–599.

Baloch, A.W., Soomro, A.M., Javed, M. a., Ahmed, M., Bughio, H.R., Bughio, M.S., Mastoi, .N. N., 2002. Optimum Plant Density for High Yield in Rice (Oryza sativa L.). Asian J. Plant Sci. 1, 25–27. https://doi.org/10.3923/ajps.2002.25.27

Das, F.C., 2012. Status and prospects of mechanization in rice. Rice Knowl. Manag. P ortal,〈 http//www. rkmp. co. 753006, 1–24.

Desai, K.S., 2012. Development and Performance Testing of Two Row Paddy Transplanter. College of Agricultural Engineering and Technology.

Himeda, M., 1994. Cultivation technique of rice nurseling seeding: Review of research papers and its future implementation. Agric. Hortic. 69, 679–683, 791–796.

Hossain, M.F., Sallam, M.A., Uddin, M.R., Pervez, Z., Sarkar, M.A.R., 2002. A Comparative Study of Direct Seeding Versus Transplnting Method on Yield of Aus Rice. J. Agron. 1, 86–88.

IRRI, 2007. Rice Production Manual 14.

Lal, M., Roy, R.K., 1996. Effect of nursery seeding density and fertilizer on seedling growth and yeild of rice (Oryza sativa). Int. J. Agron. 41, 642–644.

Mabbayad, B.B. and, Bordo, R.A.O., 1971. Transplanting vs. direct seeding. World Farming 13, 6–7.

Manjappa, K., Kataraki, N.G., 2004. Use of Drum Seeder and Transplanter for Increasing Rice Profitability 17.

Rani, T.S., Jayakiran, K., 2010. Evaluation of different planting techniques for economic feasibility in rice. Electron. J. Environ. Agric. Food Chem. 9(1), 150–153.

Sekhar, D., 2004. Productivity and Quality of Rice (Oryza sativa L.) as influenced by Nitrogen source and planting method. Acharya N.G. RANGA Agricultural University.

Septiningsih, E.M., Prasetiyono, J., Lubis, E., Tai, T.H., Tjubaryat, T., Moeljopawiro, S., McCouch, S.R., 2003. Identification of quantitative trait loci for yield and yield components in an advanced backcross population derived from the Oryza sativa variety IR64 and the wild relative O-rufipogon. Theor. Appl. Genet. 107, 1419–1432. https://doi.org/10.1073/pnas.1317360111.

Singh, F., Kang, J.S., Singh, A., Singh, T., 2018. Productivity of mechanically transplanted rice ( Oryza sativa L .) as influenced by time of nitrogen application Productivity of Mechanically Transplanted Rice ( Oryza sativa L .) as Influenced by Time of Nitrogen Application 0–5.

Transplanted crops will mature faster in the production field, however they will take 5‐10% longer after establishing the nursery to harvest. Rice Production Manual

Transplanting is widely practiced in most of the Asian

Direct seeded rice: purely a site specific technology

Int. J. Adv. Res. Biol. Sci. (2017). 4(1): 53-57 countries (Mabbayad and Obordo, 1971)

Transplanting using rice transplanter is a cost effective technology. It is a promising technology in due to labor shortage during peak period of rice transplanting Tray soil management

Due to severe weed problem and grazing in lean season the farmers prefer transplanting than direct sowing of seeds. It is a labour intensive operation which requires 200-250 man-h/ha. During peak season labourers are not available. Status and prospectus

The transplanting has number of advantage over direct sowing, as listed below:

1) The time that a crop occupies the land is reduced by 3-4 weeks.

2) Helps the plant a better start over the weeds.

3) Permits optimum plant spacing, which is critical for higher yield.

4) Ensures uniform maturity of the crop.

5) Less seed requirement.

6) Facilitate better weeding and intercultural operations. Development and performance

Appropriate nutrient management, proper seed rate at nursery bed and

then transplanting at suitable age are the key factors to get vigorous stand in main field (Lal and Roy, 1996, Himeda, 1994).

Influence of Nursery Management and Seedling Age on Growth and Economic Performance of Fine Rice

Transplanting produced significantly more number of productive tillers per hill, more number of spikelets per panicle than direct sowing but planting method had no effect on lOOO-grainweight.

Identification of quantitative trait loci for yield and yield components in an advanced backcross population derived from the Oryza sativa variety IR64 and the wild relative O-rufipogon

Although transplanting is the common method of rice production but it is more laborious, cumbersome, time consuming and entails a lot of expenditure on raising nursery, its uprooting, transporting etc., whereas for direct seeding only two man hours are required for the same area (Hashimoto et al., 1976). Careless transplanting by hired labour results in low planting densities in the farmer's field. The scarcity and high cost of farm labour invariably delay transplanting and often lead to the use of aged seedlings (Santhi et' al., 1998).

transplanting gave significantly higher paddy yield (2.77 t ha") than direct seeding (2.30

Transplanting produced significantly more productive tillers hiU-1

(14.51) than direct seeding (8.30).

Number of Spikelets Per Panicle: The number of spikelets panicle'l was significantly affected by the planting method. Transplanting significantly increased the number of spikelets per panicle over the direct seeding method. The maximum number of spiekelets panicle" obtained using transplanting could be due to sufficient amounts of moisture and nutrients available to the plants due to deep penetration and wide spread of roots at the panicle initiation and flowering stages, which eventually resulted in more panicle bearing and more number of spikelets panicle,l. The plants in direct sowing method were at disadvantage due to being shallow-rooted and high infestation of weeds which further reduced the availability of moisture and nutrient to the plants.

Identification of quantitative trait loci for yield and yield components in an advanced backcross population derived from the Oryza sativa variety IR64 and the wild relative O-rufipogon

Maximum number of productive tillersm-2 was recorded in direct seeded rice (3.25.89); (365.67); (380.97) followed by transplanted rice (319.27);

Transplanting of rice required maximum labor resulting in maximum cost of production however planting was delayed due to labor scarcity. Low plant population is the major cause for

low rice (Oryza sativa L.) yields in Pakistan which can be optimized using a proper sowing method. It would be advantageous, if transplanting could be substituted by direct seeding of rice which could result in proper plant population. Direct seeded rice is an alternate option to cope with the problems of water and labor scarcity associated with conventional method (Weerakoon et al., 2011).

A lot of expenditure is required on raising nursery, its uprooting and transporting. Whereas for direct seeding, only two man hours are required to sow the same area.

Direct seeded rice: purely a site specific technology

Paddy transplanting by labour results in low and non-uniform plant population due to which crop yields are reduced

(Mahajan et al., 2009).

Direct seeded rice: purely a site specific technology

For successful rice production, suitable transplanting densi- ties for optimum tillering and essential for improving the growth variables re- sponsible for high yield (Ghosh and Singh, 1998). rowth and yield of rice as affected by transplanting dates and seedlings per hill under high temperature of Dera Ismail Khan, Pakistan.

Transplanting method recorded the highest average yield because the planting distance ensure air circulation, water and light which are basic factors necessary for photosynthesis (Baloch et al., 2002). This is in agreement with reports by IRRI (1984) that transplanting enables optimal spacing, and proper spacing can increase tiller and paddy yield. The

in areas where labour is found, transplanted rice will produce gross economic return than other methods under upland conditions; and even where labour is scarce and costly, transplanting through seedling throwing will give higher yield and income than other methods (Manjappa and Kataraki, 2002; Sanjitha Rani and Jayakiran, 2010).

“ DIGANG ” RICE ( Oryza sativa L .) UNDER UPLAND CONDITION OF BAWKU , UPPER EAST REGION , GHANA

Manual transplanting of rice seedlings into puddled fields is still widely practiced. Transplanted crops require less seed, are better able to compete against weeds but require much more labor to establish. In areas where labor is becoming a problem, mechanical

transplanters are starting to become popular. The total crop duration for transplanted crops will be 5‐10% longer than a direct seeded crop, although the actual time in the production field is be less. The soil type often determines how soon the seedlings need to be transplanted after final working. In many sandy soils, transplanting has to be undertaken within hours of fina

Pulling and transplanting of seedlings is very labor intensive. Depending on soil type, one hectare of rice requires 30 to 40 person days to establish. Seedlings are normally hand transplanted 20 ‐25 cm apart, but this distance may be increased or decreased depending on soil fertility and water supply. The range is normally 15 to 30 cm with 2‐3 seedlings placed in each hill.

Mechanical

Rice Production Manual

can be optimized using a proper sowing method. Transplanting is widely practiced in most of the Asian countries (Mabbayad and Obordo,

1971)

However, an efficient weed management in transplanted rice gave higher economic yields than direct seeding method (Hossain et al. 2002). But transplanting method is more laborious, time consuming and expensive than direct seeding (Hashi-moto et al. 1976). A lot of expenditure is required on raising nursery, its uprooting and transporting. Where as for direct seeding, only two man hours are required to sow the same area

COMPARISON OF DIFFERENT PLANTING METHODS FOR OPTIMIZATION OF PLANT POPULATION OF FINE RICE ( Oryza sativa L .) IN PUNJAB ( PAKISTAN )

(Sekhar, 2004)