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SANDA Method in Rice (Double Transplanting)

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Abstract

Sanda rice yields (1.8-3.5 q ha[1]) and pH (8.1-10.2), as income from rice crop is a major source of livelihood to them, studied farmers are increasingly adopting the Sanda method of double rice transplanting to enhance the resilience of the rice agro-ecosystems. In this method, farmers broadcast only about a fifth (6-8 kg ha-1) of the recommended seed rate (30-40 kg ha-1) in puddled fields around mid-May using tube well water. After about 25 days (*i.e.*, around 15th June), the seedlings are uprooted and transplanted in another field where they are grown for about 20 days (5-10 July). About 50-55 days old seedlings are then moved to the main fields. Rice crop grown using sanda technique withstands extended dry spells in the uplands and prolonged water inundation in the low-lying fields. Almost negligible incidence of pests and diseases ensures little or virtually no use of pesticides. Compared with the puddled transplanted rice, sanda method provides about 20-25% higher grain yield. This community-knowledge, which probably originated in the eastern parts of India, has gradually spread to the eastern UP via migrant labourers from Bihar and West Bengal. This method of rice growing represents a characteristic example of autonomous adaptation to alleviate the risks caused by multiple stressors. Notably, this method has now become a part of the agricultural contingency plan of the State Government. It is possible that sanda technique may be of immense use in rice-wheat system of north-western India where a multitude of problems including widespread land degradation, water scarcity, pest and disease outbreaks and declining crop yields have caused immense harm.

Keywords: SANDA Method, double transplanting, rice crop.

Introduction

Uttar Pradesh has favourable and suitable climate, vast areas of fertile soils, sunshine and adequate water resources. The state ranks 3rd in the country in production of rice. The major area under lowland and flood prone is located in eastern part of Uttar Pradesh.

While a major cause of rice yields appears to be the uncertainty about the availability of water in the rainfed fields, even the yields of irrigated rice are low. International Journal of Current Microbiology and field experiment was conducted during the wet season of 2018 and 2019 at Crop Research Station, Masodha, Uttar Pradesh to assess the

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performance of high-yielding varieties of rice (Oryza sativa L.) under double-transplanting (Sanda) method in rice., Sanda, very little progress seems to made on technology development for rainfed rice which constitute nearly 70% or rice hectare in U.P. Indian farming was largely based on indigenous technical knowledge of the farmers. Indigenous knowledge is the knowledge of indigenous people inhabiting different geographical region of the world with their own language, culture, tradition, belief, folklore, rites and rituals (Chhetry and Belbahri, 2009). Traditional farming consists of technologies developed by farmers over decades of adjusting farming systems to local agro climatic and social conditions. Double step transplanting referred as kaiam is followed in Siddharth Nagar for establishment of crop of the traditional tall scented rice cultivar Kalanamak in rainfed lowland areas. Singh et al., (2005) enumerated potential benefits of the practice over normal transplanting as saving of seeds, staggered use of labor, protection from lodging, increased number of grains per panicle, larger panicles and about ten days of advanced maturity. farmers practice a system of double transplanting of rice, locally known as Sanda to avoid crop failure from submergence. One-month old seedlings are transferred to another field with dense transplanting, and then re-transplanted to the main after the risk of flash flood is over. Scientists argue that the system would have lower yield and higher costs, This practice helps in producing healthy and taller seedlings that can easily overcome the adverse situation like high water depth at the time of transplanting (Rautaray, 2007; Ashim et al., 2010). In some flood-prone areas, farmers practice double transplanting (even triple transplanting) to produce taller seedlings for transplanting in standing water at the beginning of the season (India and Bangladesh) or to rejuvenate seedlings while waiting for the floodwater to recede to levels that can allow transplanting in the main field, proper management of seedlings in nurseries or after transplanting in the field (Ram et al., 2010). It is also said that double transplanted rice produce more yield than normal transplanting with same aged seedlings (Ziagua, 2000; Satapathy, 2015). At present as mentioned earlier the practice double transplanting or two-step transplanting is prevalent in Ballia, Gazipur, Azamgarh, Mau, Jounpur, Varanasi and Siddharth Nagar (Uttar Pradesh), Central Bihar, and Chhattisgarh in India, Bangladesh and Eastern Nepal. For double transplanting or locally known as “Sunda planting” of Ballia, Gazipur, Azamgarh, Mau, Jounpur and Varanasi rice in rice grown areas, nursery period of seedling should not be extended beyond 7 weeks. It

should be of 3 + 3 weeks or 3 + 4 weeks. All double transplanting performed better as compared to single transplanting.

Method of double transplanting:

Double transplant system is most prevalent in Eastern Uttar Pradesh (Ballia, Gazipur, Mau, Varanasi and Chandauli districts), Bihar, West Bengal, Meghalaya (Garo Hills region), Assam and Bangladesh. This method is known in different names that changes from region to region and country to country. In Assam, it is popularly known as Ballan system, Meghalaya as Changgini geani, Bihar as Kharonha, in eastern Uttar Pradesh as Kalam or Sunda and in Bangladesh as Balon system. The window for transplanting is very wide some times that is extend from early July to late August due to unfavourable moisture/water level in filed during early season. In delayed planting situation, it is not possible to maintained seedling health for 2-3 months in the same nursery due to overcrowding, nutrient deficiency and incidence of diseases like brown spot and leafblast. Thus, double transplanting is desirable as contingent measure in flood prone lowlands of eastern India. Crop management under double transplanted rice system The requirement of seed (35-40 kg/ha) is significantly lower in double transplanting compared to conventional transplanted rice (60 kg/ha). In this method, seeds are first thickly sown in the primary nursery (Bechan bari in Assam). After 4 weeks, seedlings from primary nursery is uprooted and transplanted (9 to 10 seedlings/hill) in a secondary nursery (locally known as Bolon bari in Assam) with closer spacing (7–10 cm apart) with judicious fertilization. The secondary nursery maintained like a main rice field (Dhan bari in sam). The chemical fertilizers, and insecticides are used to nurture the seedlings. Subsequently, after 3 to 4 weeks, seedlings from secondary nursery are uprooted and transplanted in the main field when the seedlings are tall and the risk of flooding is over. The second transplanting is executed when the chance of occurrence of consecutive days of heavy rains is less, and even if it occurs, the tall seedlings would not be submerged. Thus, double transplanting avoids submergence of transplanted seedling from the heavy rain during the peak of the monsoon. At the time of final transplanting the primary nursery and the secondary nursery are also covered with sparse transplanting, so no land is wasted. In this system the labour requirement is slightly higher due to additional labour requirement for land preparation, seedlings uprooting, separation of seedlings and transplanting. The increased labour requirement intern increase the production cost. However, the increased cost of labour for two transplanting is compensated to a large

extent by the less quantity of seeds, less number of irrigations, no weed management and higher yields obtained from sanda method of cultivation. The difference between single transplanting and double transplanting is that all the rice varieties are not suitable for double transplanting. Short duration photo sensitive cultivars are not suitable for double transplanting. These cultivars reach reproductive stage at particular date after sowing. In addition, the crop stand is less dense in the short duration double transplanted cultivars. Because the planting of aged seedling reduces tillers production compared to young seedlings due to shortening of time available for tiller production, which subsequently resulted in lower crop yield. Thus long duration (150 days) photoperiod sensitive rice varieties are suited for double transplanting. Cultivars commonly grown under double transplanting are given in Second transplanting in main field

Primary Nursery

Transplanting in secondary nursery

Double Transplanting

Seedling from secondary nursery

Second transplanting in main field

Reason behind higher crop yield under double transplanting over single transplanting of aged seedlings Ensure optimum crop stand: The mortality rate of young seedlings under adverse weather (flood/ drought) situation is more. Whereas, under double transplanted system, tall and aged seedling survive adverse environment better than young and single transplanted seedlings. Seedlings produced in this method is taller, healthier and easily overcome the high water depth at the time of transplanting or immediately after transplanting.

Transplanting of healthy seedlings: Under double transplanting, seedlings have thick culm and better food reserve. Thick culm prevents the lodging of rice crop and better food reserve helps the plants to withstand

prolonged period of water logging. Reduced competition of growth factors (water, nutrient, light): The competition for growth factors are drastically reduced under double transplanted system compared to conventional transplanting. Which intern reduces the chaffy grains (unfilled grains/panicle) and increases panicle weight and grain yield.

Minimum weed competition/growth: Due to less competition between plants in secondary nursery, seedlings had more shoot length, root length and volume than seedlings Indian Farming 38 May 2019 obtained from conventional nursery. Tall healthy seedlings suppress the weed growth better than short young seedlings.

Reduced insect pest and disease infection: Insect pest and diseased seedlings are omitted at the time of transplanting. Which prevents the further multiplication of disease and other pests. Better aeration: Wide spacing and proper water management provide suitable micro climate for standing rice crop.

Higher nutrient use efficiency: The loss of nutrients especially nitrogen is greatly reduced under double transplanted system due to controlled water management. The plants under the double transplanted plots are usually healthy, have longer panicles and more filled grains than the plants on the single transplanted parcels.

Economics of double transplanting: Overall the cost of rice production would be higher in the double transplanted systems due to the additional cost of labour for seedling uprooting, field preparation, and stiff and not preferred by the cattle as feed.

- It requires more number of labour for two transplanting, uprooting, and separation of seedlings.
- It suits only for long duration photo sensitive rice varieties like Moti, Swarna, etc.
- This system is not convenient for the big farmers because many plots need to be transplanted two times.

Summary:

Double transplanting is an appropriate technology to avoid submergence problem in the floodprone rice ecosystem. It is a contingent strategy in low-lying flood prone areas to realise higher yield. In recent years we are witnessing frequent floods and drought in Easter India due to climate change which subsequently causes yield loss. Double transplanting is a climate resilient technology to low-land rainfed rice ecology. Though this technology requires higher labour, it reduce the production cost by reducing the weed infestation, relatively lesser incidence of insect pest and disease and reduced requirement of inputs like fertilizers, pesticides, and water due to seedling maintenance under smaller area.

Higher productivity as well as significant net return from rice cultivation using double transplanting system indicates that farmers indeed gain by adopting this method of crop establishment. But the recent studies in farmers' field and research institute showed that double transplanting provides yield advantage over conventional methods especially in low-lying areas. So, instead of discarding the system, rice researchers must work on refining the system through developing appropriate varieties and other crop management practices for the system. However, the higher cost of production under double transplanting was compensated by the higher yield of the system. In addition, the cost of inter culture operation is significantly lower in double transplanted system.

Advantages:

- It permits a flexible late transplanting during the rainy season, which is its prime advantage.
- Generates more employment and efficient utilization of farm family labours.
- Ease labour scarcity and avoid high wage rate during transplanting due to flexibility in date of transplanting.
- Save the crop from drought and flood.
- Saving of seeds and seed cost.
- Reduced problem of weeds, insect pest and disease.
- Needs less N fertilizer, because *Sanda* is more efficient N use.
- Bears more number of tillers per hill, all tillers bear panicles, panicles are heavy; the grains are fully filled and test weight more, hence more grain yield.

Disadvantages:

- This system is not convenient for the big farmers because many plots need to be transplanted two times.
- Additional cost involved preparation and transplanting of seedlings.
- It requires more of labour for two transplanting uprooting, and separation of seedling.
- It suits only for long duration photo sensitive rice varieties like MOTI, SWARNA etc.

Conclusion:

Sanda method is a sure shot option under condition of delayed rains as it offers an excellent strategy to avoid impact of early crop growth stage draught. Further, It saves ground water, Enhances nitrogen use efficiency reduces cost of cultivation and ensures high profit.

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