Mechanical Transplanters can be name as the most feasible option to the problems associated with the manual transplanting of rice which is very tedious process that consumes for time, energy of the workers and finally gives a low yield than expected by the farmers. Although the researches have proved about higher production, income that can be obtained from mechanical transplanting over manual transplanting, the adoption of the farmers to the mechanical transplanting is very low due to socio economic problems associated with them and lack of technical information regarding this technology (Illangakoon et al., 2017).

In the Asian region most of the farmers in developing countries are having small lands by which they earned their livelihoods. So, their economic position is not powerful enough to purchase a mechanical transplanter and the trays required for the nurseries in their own selves. The other reason is farmers are not willing to buy the transplanter with the idea that it is useless to spend large amount of money on a machine which is consumed for only about 15-30 days in the year. Some farmers are willing to use the mechanical transplanter in hire basis rather than buying a transplanter (Guru et al., 2018; Pradhan and Mohanty, 2014; “Present Status of Rice Transplanter Use for Paddy Cultivation in Bangladesh,” 2013). The government should pay attention to give subsidies to the farmers on machinery, trays in order to induce the farmers more on mechanical transplanting. (Agriculture et al., 2015; Farooq et al., 2001; Guru et al., 2018; Mahbubur Rashid et al., 2015; Senthilkumar and Naik, 2016; “Standardization of Media for Tray,” 2015).

As the cost of large transplanter is high and those are difficulty to use in the small lands it is better to introduce a small transplanter at low cost which is more feasible to the small-scale farmers. The small self-propelled walking type transplanter should be introduced to the small and medium scale land owners of rice. The farmers are not having proper knowledge about how to operate the transplanter, so they have to pay more wages on the skilled man power which increases the cost of production. So, the way of operating the machines correctly, maintenance practices that are required should be introduced to the farmers and trained them properly before delivering to the farmers. Development of automated transplanting machine will increase the efficiency of transplanting by reducing the workload on the operator as a single operator can operate multiple number of machines without any fatigue easily (Guru et al., 2018).

The nursery management can be named as the most crucial operation in transplanting of rice which act as one of the main factors contributing to the final yield. The farmers are not having a proper knowledge about how to handle the infant, tender seedlings used for the mechanical transplanting although it is required for avoiding root damages and better anchorage of the seedlings (Islam et al., 2015; Islam and Khan, 2017). In mechanical transplanting of rice for the nursery preparation farmers are using mat type nursery and the nursery trays. The firm soil free of pebbles are required for this both methods as the presence of pebbles cause damages to both seedlings and the pegging needles of the transplanting machine. The problem is farmers are not practicing this method correctly and also it is difficult to practice in large scale nurseries. So, it required to find alternations associated with the machine to deal with the soils in which pebbles are present. The uneven seedling population a common problem in mat type nurseries that negatively affect the performance of transplanters. The mat thickness, number of seedlings per square meter and the seedling age are the major factors that should be considered in nursery preparation, but neglected by the farmers due to lack of technical knowledge. The preparation of mat type nurseries is complex process with high labor intensity which accounts for about 40% of the total energy requirement of mechanical transplanting (Baruah et al., 2001; Farooq et al., 2001; Guru et al., 2018).

The cutting of the nursery according to the size of the feeding tray of the machine is required when the mat type nurseries are practiced. The handling of mat type nursery is difficult and also in case of large establishment are the nursery size also should increase proportionally which make it more difficult to handle. As an option to the mat type nursery, the nursery trays which are light in weight, easy to handle as compatible with size of the feeding tray in the machine is introduce as introduced recently still not popular among the farmers. The development of transplanter which can work with long mat nurseries will be more beneficial as no need to cut the nurseries and the time spend for feeding the nursery also reduced. Providing a proper hands on training about nursery preparation and handling of properly at the transplanting to the farmers is very essential to overcome these circumstances (Farooq et al., 2001; Guru et al., 2018).

One of the main advantages in the mechanical transplanting over manual transplanting is the seedlings are properly pegged in to the soil. The precise leveling is required for proper pegging in the transplanters. The perfect leveling is not done by the farmers which caused missing hills in the field and they can’t obtain a uniform transplantation. It is important to pay attention on introducing a transplanter capable of working precisely at uneven surfaces. The poor metering of the number of seedlings that dispersed per hill by the machine is another mistake done by the farmers because it should be adjusted properly according to the seed rate applied for nursery. (Farooq et al., 2001; Guru et al., 2018; IRRI-PAK Agri. Machinery Program, 1978; Khan et al., 1979; Sangeetha and Baskar, 2015).

As introduced recently the studies on use of mechanical transplanter to increase the yield of rice under Sri Lankan conditions have not yet been investigated properly, still under studied (Illangakoon et al., 2017; “Sri Lanka as a Rice Exporting Country: Possibilities and Problems,” 2011). The funds should be supplied for the relevant Agricultural Research institutes and Universities on researches in machinery, development and for the extension programs to avoid the constrains associated with mechanical transplanting and increase production (Agriculture et al., 2015; Mahbubur Rashid et al., 2015).

Future thrust areas

For Indian conditions the present need is to mechanize the small holding transplanting operation by introduction of low cost mechanical transplanter. The transplanters are used for only limited period of 15-30 days in a year. Therefore, farmers do not want to invest large amount on costly machines. To reduce the cost and to overcome the problems associated with operation of manual transplanter there is need to develop a small self- propelled type transplanter. The transplanting mechanism and forward speed should be power driven and controlled by the operator, so operator only needs to guide the transplanter.

The existing popular transplanters need to

modify for simultaneously urea application to place urea in root zone of rice and so the nitrogen losses will be reduced. Development of mechanical transplanters for large mat type seedlings is needed so that it can be more popular on custom hiring basis and easily available for small and marginal farmers.

Nursery seeder needs to be developed for

sowing of paddy seeds in nursery trays to ensure uniform seedling population in trays. Transplantercapable for working under adverse field conditions viz., standing water on fields, less prepared field, plant residue on surface, needs to be developed. Root- washed seedlings transplanters need to be developed, so that the need of mat type nursery can be eliminated. Precision transplanters can be developed for large farmers to save time and to reduce the input cost.

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