Transplanters

The Rice Transplanter is a specialized machine which is having the capability of transplanting the seedlings in the puddled field according to the adjustments done by the operator as proper number of seedlings at proper place, in the given planting depth and within row spacing (Gaikwad et al., 2015; “Present status of Rice Transplanter use for Paddy Cultivation in Bangladesh,” 2013). The common transplanter contains mainly a feeding tray where the seedlings in the nursery tray or the mat type is placed, pick up forks which contains needles for the process of picking up the seedlings from the nurseries on the feeding platform and placing that seedlings on the puddled soil. The nurseries are separated in to the rectangular blocks according to the dimensions of the feeding tray on the feeding platform when mat type nurseries are used and if the nursery trays are used the can be directly inserted to the feeding tray. The transplanter pegged the rice seedlings in the puddled soil according to the planting depth, fixed between row space in the machine, with in row space, number of seedlings dispersed per hill as adjusted by the operator by giving a uniform plant stand (“Hayleys empowers greater productivity via mechanised rice transplanter | FT Online,” 2013; Singh and Rao, 2010).

There are mainly two types of rice transplanters used by the farmers as Manual Transplanter and Mechanical Transplanter. The manual and mechanical transplanters reduced the labor requirement from 75-80% and the cost of transplanting from 45-80% (Das, 2012). The rice transplanters are first introduced at 1960 by the Japan (Behera, 2000). Manual transplanter is higher in capacity when compared to the fatigue operation manual transplanting of rice. So, the manual transplanter can be named as a good solution for the marginal and small-scale farmers to replace the manual transplanting of rice. Manual transplanter is a single operated machine which is operated through the simultaneous push and pull action. First the operator has to move backward pull the machine and simultaneously push the handle to cut the nursery for transplanting in the soil (Guru et al., 2018). Working with the manual transplanter in the puddled field through the multiple action push and pull is a very fatigue task for the operator. The operation of the mechanical transplanter is classified as a heavy work after evaluating ergonomically (Pradhan and Mohanty, 2014). The use of manual transplanter reduced the working capacity from 0.01 to 0.015 hectares per hour with increased fatigue on the operator. Therefore the researchers focused their attention on shifting to the mechanical transplanting from manual transplanting (Behera, 2000).

The reduced labor availability due to the movement of human force towards the urban area with the industrialization is one of the main problems associated with the transplanting of rice. The prevalence of these circumstances increased the need for mechanization inorder to maintain the economical consistency which occurs due to the transposition of the manpower from agriculture towards the industry and service sector (Islam et al., 2016; Tripathi et al., 2004). The mechanical transplanter act as a conserving method of land and labor compared to the manual transplanter. The capacity of the transplanter is increased and the proximate area that the operated is able transplant with in a day increased from 0.7 to 1 hectare per day. The mechanized transplanter facilitate the operator in working faster than the manual transplanter without any fatigue compared to the manual transplanter. The mechanical transplanter pegged the seedlings in the puddled soil at uniform depth and spacing which increased the number of tillers and ultimately increased the rice yield (Alizadeh et al., 2011; A. K. M. S. Islam et al., 2015; A. K. M.S. Islam et al., 2015; Islam and Khan, 2017; “Present status of Rice Transplanter use for Paddy Cultivation in Bangladesh,” 2013; Singh and Rao, 2010; Singh and Vasta, 2006).

In mechanical transplanting the selection of the most suitable transplanter should be done according to the field condition, available resources and the cost feasibility. The self-propelled transplanter act as an labor saving method which conserves labor consumption up to 90% when compared with the manual transplanter (Vasudevan et al., 2014). The self-propelled walk behind type facilitate better establishment of seedlings which increases the number of panicles per square meter and proportionally the yield is increased when compared with the self-propelled four wheel type and self-propelled single wheel transplanters (Manes et al., 2013). The self-propelled walk behind type 6 row and 8 row transplanters are able to reduce the labor intensity in to a large extent. But these transplanters can performs well under the large-scale farms and the purchasing cost of these machines are also high. The four row self-propelled walk behind transplanter has become more popular among the farmers in Asian countries as it is most suitable for small size lands and affordable for the small marginal farmers (Gaikward et al., 2015). And also the labor requirement is reduced to 2 man days per hectare whereas for manual transplanting required 32 man days of labor per hectare (Murumkar et al., 2015).