

Manual Operated Farm Implements Useful for Rice Cultivation

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INTRODUCTION

Rice is the most important and extensively grown food crop in the world. It is staple food of more than 60 per cent of the world population. India has the largest area under paddy in the world and ranks second in the production after China. Rice can be sown in dry seedbed, wet seedbed or can be transplanted in puddled field. For cultivating rice in one hectare 800-900 man hours of labour required for different farm operations viz. puddling, transplanting, weeding, harvesting and threshing (Guru et al., 2018).

In India majority of farmers are marginal and small farmers. These farmers are resource poor and not in position to own the requisite farm machinery. Over the 60% of farmer's family own less than one hectare of land (Patel et al., 2018). The involvement of women workers for rice cultivation is more than men. The problem with marginal and small farmers is lack of awareness about the available farm machines and the skills required for their operation and maintenance (Guru et al., 2019; & Shrivastava et al., 2021). In the view of these problems brief information about some of the improved manual operated implement is provided below.

Three row manual seed drill

Row seeding is the most efficient means to sow the crops with optimum seed rate and also with maintained row to row spacing. Row seeding also promotes maximum tillering and better sunlight penetration. This is a small manually operated three row seed drill for dry direct sowing of rice. Fluted roller metering mechanism is provided to adjust the seed rate. Two ground wheel is provided on both sides of seed hoppers to drive the metering rollers. Seed are filled in the hopper and a long beam is provided by which the implement could be pulled by one operator. Shovel type furrow openers are provided for easy operation. The row to row sowing distance is 20 cm.

The depth of sowing and seed rate can be adjusted as per requirement. The capacity of this machine is 0.04 ha/h. The machine save seeds and labours in sowing of crops along the rows that helped in weeding and inter-culture operation.



Three row manual seed drill

Three row manual puddle seeder

It is a manual drawn seeder suitable for sowing of pre-germinated rice seed in puddle field. It has float on the front to avoid sinkage of the machine. Metering device consists of plastic wheels having grooves on its periphery. The seed rate is controlled by varying the positioning of seed box. It is made by using G.I. sheet, MS flat, Angle iron, MS Pipe, plastic wheels etc. The row to row distance is 20 cm. Depth of sowing and seed rate is adjustable. Field capacity of this seeder is 0.08 ha/h.



Three row manual puddle seeder

Four row manual drum seeder

Paddy drum Seeder is suitable for sowing sprouted paddy seed in puddled field. It is useful for uniformly seed sowing. It is reduce

the manual effort and help farmers for maximize their output. It is light weight pulling machine and also it is very easy to handle. Each seed drum has two rows of planting. Two drums can be assembled to form 4 rows of seed drum. Wheels are provided at both ends. These wheels are made up of Light iron rods and adjustable floats are provided for easy operation under puddle field condition. Seed is prepared by soaking in water for 24 hours and incubation for 12 – 24 hours. The row to row distance of this seeder is 20 cm. The field capacity of drum seeder is 0.030 ha/h. Sowing of this method reduced seed rate by 60-65 % as compared to broadcast seeding. Uniformity in seed sowing and Plant population by elimination of continuous drilling of seeds.



Four row manual drum seeder

Four row manual rice transplanter

The four row manual transplanter was comprised of floats, a main frame assembly made of MS pipe that supported the seeding tray made of G.I sheet, pushing lever tray indexing mechanism, picker bar assembly and handle. Manual rice transplanter can be used for timely operation and reduced cost of cultivation with better crop yield. One person can easily operate this transplanter. Row to row distance is 24 cm. The field capacity of transplanter is 0.03 ha/h. It is suitable for transplanting of 20-25 days old mat type rice seedlings. It saves about 30-40% labour requirement and 40 % cost in transplanting operation.



Four row manual rice transplanter

Wheel finger weeder

Wheel finger weeder is suitable for weeding of upland rice. It is a manual pull and push type weeder. The weeder consist of a frame, a wheel, a handle and five number of curved fingers. The wheel is made of M.S flat with 4 spokes and an axle. The spacing between fingers is adjustable. As the operator moves the handle to and fro the fingers push into the soil and loosen it and weeds get uprooted. It is made by using MS rod, MS pipe, MS flat etc. One person can easily operate this machine. The field capacity of this machine is 0.025ha/h. The fingers of this weeder are positioned in staggered manner so that there is no clogging and all the area in between rows is covered.



Wheel finger weeder

Cono-Weeder

It is suitable for weed cutting, churning and mulching in wet land. It covers one row at one operation. The stars and conical drums cut the weeds and churn them into the soil. The weeder consists of two rotors, float, frame and

handle. The rotors are cone frustum in shape, smooth and serrated strips are welded on the surface along its length. The rotors are mounted in tandem with opposite orientation. The float, rotors and handle are joined to the frame. The float controls working depth and does not allow rotor assembly to sink in the puddle. The cono weeder is operated by pushing action. The orientation of rotors create a back and forth movement in the top 3 cm of soil and helps in uprooting the weeds. It reduces labour requirement by 50-75 % and was found ergonomically suitable for local labour. The field capacity of this weeder is 0.013 ha/h.



Cono-Weeder

CONCLUSION

The use of manual implements for sowing, transplanting and weeding operation can increase the field coverage per day. The sowing implements save seeds as compare to manual broadcasting and provide uniform crop stand for weeding purpose. Weeding implements and transplanter reduce the human efforts and save time and drudgery involved in farm operations. By the use of these implements farmers ensure timeliness in farm operations, enhance the effectiveness of farm inputs, and make farming cost effective. Manual operated farm implements are beneficial and cost effective for marginal and small farmers of India. These implements save the time of operation, increase profit and reduce the drudgery involved in farm operations.



REFERENCES

- Guru, P. K., Borkar, N., Debnath, M., Chatterjee, D., Sivashankari, M., Saha, S., & Panda, B. B. (2019). Rice mechanization in India: Key to enhance productivity and profitability, Rice research for enhancing productivity, profitability and climate resilience, ICAR-National Rice Research institute, Cuttack, India, 337-351.
- Guru, P. K., Chhuneja, N. K., Dixit, A., Tiwari, P., & Kumar, A. (2018). Mechanical transplanting of rice in India: status, technological gaps and future thrust - *ORYZA-An International Journal on Rice*, 55(01), 100-106.
- Patel, S. P., Guru, P. K., Borkar, N. T., Debnath, M., Lal, B., Gautam, P., Kumar, A., Bhaduri, D., Shahid, M., Tripathi, R., Nayak, A. K., & Pathak, H. (2018). Energy footprints of rice production. *NRRI Research Bulletin No.14*, ICAR-National Rice Research Institute, Cuttack, Odisha, 753006, India pp. 1-2.
- Shrivastava, A. K., Khandelwal, N. K., Dubey, R. K., & Guru P. K. (2021). Long term study of declining animal usage in Indian agriculture. *Agricultural Engineering International: CIGR Journal*, 23(1), 109-114.