

CRRRI Implements for rice mechanization

M. Din, P. Mishra, S.P. Patel and P.C. Mohapatra



Rice is the most important and extensively grown food crop in the world. It is the staple food of more than 60% of the world population. Rice is mainly produced and consumed in the Asian region. Asian countries produce 92% and consume 90% of world rice. Rice is a labour intensive crop and requires about 800 to 900 labour-hours for cultivating one hectare of land. Rice farming operations include land opening, puddling, transplanting, weeding, harvesting and threshing. Of these operations, transplanting, weeding and harvesting together consume 77 % of the total labour requirement.

There is shortage of farm labourers and declining interest of youths in agriculture. With increase of wage rate of farm workers along with cost of other inputs, rice farming is gradually becoming less remunerative. Mechanization of the farming practices can overcome the crisis and help in drudgery reduction. Mechanization of rice production and post harvest processing is a package of technology which, ensures timeliness of each farm operation, increases the land use, enhances the effectiveness of other inputs, makes farming cost effective, reduces losses, improves quality and adds value to the produce. The selective mechanization of rice crop production and processing operations, both under irrigated and rainfed farming conditions is essential to increase in production and productivity of rice and reduction of drudgery of farm workers.

Operation wise mechanization requirements of rice crop, specially for small land holdings, have been identified and matching implements have been developed at Central Rice Research Institute, Cuttack. A brief description of each implement/technology is given below:

Implements for puddling

CRRRI two gang notch type disc harrow is bullock drawn implement which is used for puddling the field. It has two gang with 2 notch type disc mounted over each hollow drum. It has provision for adding weight (sand) inside the drum to get better penetration in the soil. Its unit cost is Rs. 20,000.



CRR I drum type disc harrow is a bullock drawn implement used for puddling. It has two gang with 3 plane disc mounted over each hollow drum. Its field's capacity is 0.4 hectare per hour. Two operations of float-harrow are sufficient to create field conditions ready for transplanting the seedlings. Its unit cost is Rs. 20,000. The puddling time is decreased from 42 hours which is required in case of indigenous plough to 11 hours.



Seed drills for dry sowing of rice

CRR I One row manual paddy seed drill is suitable for dry sowing of paddy seed in row spacing of 20 cm. Its field capacity is 0.008 to 0.01 hectare per hour. Its unit cost is Rs. 1500.



CRR I two row manual seed drill is a manually pulled seed drill. It consists of frame, seed box, 2 cup metering wheels with ten cups in wheels, one axle, two ground wheels, float and two furrow openers are fitted in the frame for dry sowing. It is suitable for dry sowing of paddy seed at row spacing of 20 cm. It has cup type seed metering mechanism. Its field capacity is 0.019 to 0.022 hectare per hour. Its unit cost is Rs. 3000.



CRR I Three row manual paddy seed drill has fluted roller type seed metering mechanism. It is suitable for dry sowing of paddy seed at row spacing of 20 cm. Its field capacity is 0.03-0.04 hectare per hour. Its unit cost is Rs. 4000. The machine saved seed and labours in sowing of crops along the rows that helped in weeding and inter-culture operation.



CRR I Bullock drawn three row seed drill is a three row seed drill having cup type seed metering mechanism pulled by a pair of bullock. It is suitable for sowing rice in dry field. Its field capacity is 0.15 hectare per hour. Its unit cost is Rs. 8000.



CRRRI Three row self propelled hill seeder is a three row seeder suitable for dry hill seeding of rice. It has 3.5 H.P. petrol start kerosene driven engine as a source of power. Its row to row spacing is 20 cm. Its field capacity is 0.1 hectare per hour. Its unit cost is Rs. 50,000.



CRRRI Power tiller operated seed drill for rice and pulse is a five row seed drill having fluted roller type seed metering mechanism. It is suitable for dry sowing of rice, wheat, green gram, and black gram etc. Its field capacity is 0.14 hectare per hour. Its unit cost is Rs. 20,000.



CRRRI Power tiller operated seed drill for rice and Groundnut is a five row seed drill having plastic wheels with grooves on its periphery as seed metering mechanism. It is suitable for dry sowing rice and groundnut. Its row to row spacing is 25 cm. The cost of the seed drill is Rs. 22,000. The field capacity of 0.14 and 0.15 hectare per hour and cost of planting of Rs. 1240 per hectare and Rs. 1200 per hectare was observed for rice and groundnut, respectively.



CRRRI Ten row tractor drawn seed drill is a ten row seed drill and suitable for seeding in dry field. The field capacity of the seed drill is 0.8 hectare per hour. Row to row distance can be adjusted. The unit cost of machine is Rs. 50000. It saved 70% time and 55% labour cost and weeding cost as compared to broadcasting and transplanting method.



Seed drills for sowing pre-germinated rice seeds in puddled field

CRRRI Three row manual puddle seeder is a manual drawn seeder. It is suitable for sowing of pre-germinated rice seed in puddled field. It has float on the front to avoid sinkage of the machine. The seed rate is controlled by varying the positioning of seed box. The field capacity of machine is 0.15 hectare per hour. Its unit cost is Rs. 3500.



CRRRI Four row manual drawn seeder (hyperboloid shape) is suitable for sowing sprouted paddy seed in puddled field at row spacing of 20 cm. Its field capacity is 0.030-0.034 hectare per hour. Sowing with drum seeder reduced seed rate by 60 - 65% as compared to broadcast seeding and reduced weeding cost about 65%. Its unit cost is Rs. 4500.



CRRRI Six row manual drum seeder (Cylindrical shape) is suitable for sowing of sprouted paddy seed in puddled field at row spacing of 20 cm. Its field capacity is 0.037-0.04 hectare per hour. Its unit cost is Rs. 6500. It reduced seed rate by 35-40% as compared to broadcast seeding and reduced weeding cost about 55%.



CRRRI eight row self propelled seeder is an eight row, engine operated paddy seeder. It is suitable for sowing of sprouted paddy seed in puddled field at row spacing of 20 cm. Its field capacity is 0.23-0.25 hectare per hour. Its unit cost is Rs. 60,000. Pre-germinated paddy seeding has economical and operational advantages over traditional planting methods because it eliminates nursery raising, transportation and physical damage to the seedlings.



CRRRI four row manual rice transplanter is suitable for transplanting of 20-25 days old mat type rice seedlings. Row to row spacing is kept 24 cm. Its field capacity is 0.018-0.020 hectare per hour. It saves about 30-40% labour requirement and 40% cost in transplanting operation. Its unit cost is Rs. 8500.



Improved weeders

CRRRI Finger Weeder can be used for upland as well as lowland rice. The operator moves the handle forward and backward so that the weeds get uprooted by both action. Its field capacity is 0.012 to 0.02 hectare per hour. Its unit cost is Rs. 250. It is cheap hand tool which reduced labour requirement by 35 - 40% and was found to be ergonomically suitable for farm women.



CRRRI Star-Cono-Weeder is suitable for weed cutting, churning and mulching in wet land. Its width of cut is 10-15 cm. It covers one row. The stars and conical drums cut the weeds and churn them into the soil. It reduced labour requirement by 50- 75% and was found to be ergonomically suitable for local labour. Its field capacity is 0.013-0.017 hectare per hour. Its unit cost is Rs. 1850.

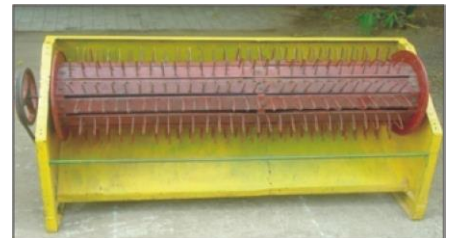


CRRRI wheel finger weeder is suitable for weeding of row crops like upland rice, jute, maize and vegetable crops. It is manual pull and push type weeder. The weeder consists of a frame, a wheel, a handle and five no of curved fingers. The spacing between fingers is adjustable. As the operator moves the handle to and fro the fingers push into the soil and loosen it and the weeds get uprooted. Field capacity of this implement is 0.022-0.025 hectare per hour and its unit cost is Rs. 600.



Paddy thresher

CRRRI Portable power operated paddy thresher has wire loop type threshing drum. Rotational power to threshing drum is given by 1.0 hp single phase electric motor through belt and pulley. It is economical and suitable for threshing of paddy to small and marginal farmer. Its output is 3 to 4 q/h. Its unit cost is Rs. 20,000.



Improved post-harvest equipment/devices

CRRRI Manual Rice Winnowing Machine is a simple manual winnowing machine to clean threshed paddy crop, suitable for small farmers and women friendly. Its capacity is around 100 kg/hr of clean paddy having cleaning efficiency of 96-98%. Cost of the machine is Rs. 5,500.



CRRRI Power Rice Winnower cum Cleaner is a power operated machine to clean threshed paddy crop. Its capacity is 500 kg/hr of clean paddy, having cleaning efficiency of 99%. Cost of the machine is Rs.1 8,000.



CRRRI Power Rice Seed Cleaner is a power operated machine to clean threshed paddy crop for seed purpose. Its capacity is around 8 q/hr of clean paddy, having cleaning efficiency of 99%. Cost of the machine is Rs. 30,000.



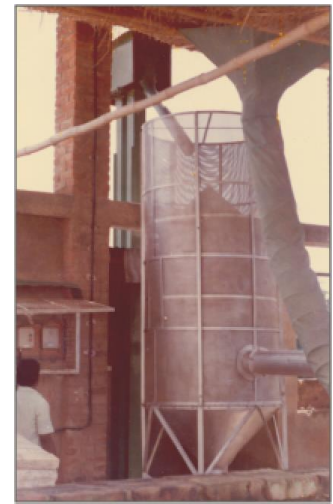
CRRRI Mini Paddy Parboiling Unit is a small size parboiling unit to produce quality parboiled rice by employing improved process. The process involves soaking the paddy at 75 OC for 3.5 hrs followed by open steaming for 30-45 minutes. The process ensures uniform parboiling, without any bad smell and produces light coloured rice with better consumer preference. It takes 5-6 hours to parboil 75 kg of paddy in one batch. Cost of the machine is Rs. 5,500.



CRRRI Mechanical Rice Dryer is a variable capacity batch dryer of 125-500 kg capacity. Both raw and parboiled paddy can be dried in this dryer. Drying is accomplished on thin layer principle. The air temperature can be maintained at 40 ± 2 OC throughout the drying period. Paddy at moisture content of 20% was dried to 14% in 6-7 hrs using 10 kg of coal in the furnace. Cost of the dryer is Rs. 50,000.



CRRRI Community Grain Dryer is a one ton capacity re-circulating type grain dryer using husk fired furnace. A portion of heat was supplemented as solar energy from the black painted tin roof top. Freshly harvested paddy from 24% moisture content could be dried up to 14% in 6.5 hours. Cost of the dryer without shed costs around 2.5 lakhs.



CRRRI Solar and Bio Mass Fired Multi Crop Dryer is a batch dryer of 300 kg paddy holding capacity. Its main components are drying chamber (LSU type), solid fuel fired furnace with heat exchanger, solar air heaters and blower. Provision is made to connect solar air heaters at the suction end of the blower to supplement with solar heat. One side of the drying chamber is provided with a door for placing trays over the inverted 'V' troughs so that it can also work as a tray dryer for drying other food materials. Cost of the entire drying system is estimated approximately as Rs. 40,000 with its payback period of less than one year.



CRRRI Domestic Solar Dryer is a cabinet type domestic solar dryer to dry 0.5 - 1 kg food material. The dryer is rectangular in shape. The top glazing is of 4 mm plane glass. The dryer is placed on a stand inclined at an angle of 30° to the horizontal. A sliding type loading tray enters from the top end of the dryer. Cost of the dryer is Rs. 1,500.



CRRRI RCC Ring Bin is a permanent structure (mini silo), made from pre-cast RCC rings, having capacity of 5 quintals. It is completely rat proof and can be made air tight for fumigation. It is suitable for safe storage of consumption paddy for 6-8 months. Cost of the bin is Rs. 3,000.



CRRRI Chaff and Husk Stove uses 1.2 kg of dry husk and burns continuously for 40 minutes on gasification principle. Cost of the stove is Rs. 550.



