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Drudgery Reduction through Farm Mechanization in Land Preparation and Sowing Operations in Paddy

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SUMMARY

Agriculture mechanization is a crucial component of present-day agriculture. Along with minimizing labor costs and human struggle, it increases productivity. Mechanization also enhances the safety and comfort of agricultural workers, the efficiency with which other inputs are used, and the quality and added value of the produce. Aside from allowing farmers to grow a second crop or many crops, efficient machinery increases output and productivity, transforming subsistence agriculture in India into a profitable industry. More agricultural inputs will need to be used, and crops will need to be protected from various pressures, in order to increase yield. To meet the rising need for food grains, the average farm power availability for the nation's cultivated lands has also increased, from 0.48 kW/ha in 1975–1976 to 1.84 kW/ha in 2013–14 and 2.49 kW/ha in 2018–19. This average has to rise to 4.0 kW/ha by the end of 2030. Numerous tasks are strenuous and necessitate bending or crouching postures for prolonged periods of time, which is harmful to their health. Therefore, farm mechanization is crucial in reducing the laborious tasks that farm laborers must perform.

INTRODUCTION

Mechanization in agriculture is a powerful tool when compares with traditional methods in achieving higher results as it enhances human capacity and allows timeliness of operation along with efficiency and consistency in field operations. Crop production cannot be increased by increasing labour productivity. The use of labor can be reduced to some extent for reduced cost of cultivation as the cost of labor also high in demands. This practice of using mechanization in agricultural fields can reduce the drudgery in cultivation operations. Paddy cultivation is one of the most hazardous cultivation which involves more hard work to the agricultural workers. The following are some of the machineries for land preparation and sowing operations in paddy, which reduces the drudgery of the farm workers with increased production and productivity.

I Land preparation Machines/Implements

1. Rotary spading machine

This is a machine which is developed in such a way that it not only reduces drudgery but also saves 50-60% of diesel. The power of the tractor required to operate the machine is 35-45hp.

Features:

1. Capacity – 1.2ha/h
2. Saving in time – 96-98%
3. Saving in cost – 30-40%
4. It can also be used for land preparation and also for inter-cultural operations.

2. Terracer cum leveler

It is small terrace cum leveler attached to the power tiller. It is used for field levelling, moisture conservation, soil erosion management, field bunds and terraces forming.

3. System for controlled level of puddling

This system is developed by TNAU, Coimbatore. This is rotavator with transmitter and receiver along with the attachment of puddlers to the rear wheels. The receiver receives the signal from transmitter and adjusts the depth of operation of rotavator and simultaneously the level of puddling is adjusted.

Lifting and lowering the implement (by pair of externally mounted hydraulic cylinders)

2. Field capacity - 0.26 ha/h
3. Cost of entire system – 5.50Lakhs

4. Self-propelled hydro-tiller

This is developed by ANGRAU, Bapatla. This is self-propelled, walking type implement with power operated cage wheels suitable for puddling in light and medium soils. 4-5 passes are required to achieve the desired quality of puddling

1. Width of puddling – 1.09m
2. Filed capacity – 0.15ha/h
3. Width of operation – 60mm

5. Ridge plastering machine

Before puddling all the sides of the bund must be trimmed and plastered. Then only seepage of water can be arrested. Usually this operation is done by the male workers by using the spade. Hence to reduce drudgery, these machines are easily available in the market. The tractor power required is 35-45hp

6. Tractor drawn manure spreader

Spreading the farm yard manure is a tedious operation. This spreader automatically spread the farm yard manure uniformly**.**

II Seed sowing machines/Implements

7. Power tiller operated Farm yard manure

Sprading the farm yard manure by using power tiller.

1. Low land manual rice seeder

It is capable of sowing 8 rows @ 150mm row spacing. It requires puddled and levelled field at least two days before. It was developed by Indian Rice Research Institute, Hyderabad.

2. Paddy cum Daincha seeder

It is a manually operated equipment. In between the rice seeds, daincha green manure crop can be sowed. It was developed by TNAU, Coimbatore.

1. Seed rate – 72-75 kg/ha
2. Seed weight – 15 kg
3. Coverage – 0.1 ha/h

3. Improved Drum seeder

This was developed by TNAU, Coimbatore (2000-01). This is very simple and light equipment made up of plastic.

1. Seed rate – 25kg/ha
2. Can use either 4 row or 8 row

Advantages over transplanting

1. Cost saving – 70%
2. Seed saving – 60%
3. Water saving – 50%
4. Yield on par with SRI
5. Yield is 10-15% more with transplanting
6. Maturity 10 days before transplanted rice.

4. Seeder aerobic rice cultivation

Improved drum seeder was modified by TNAU, Coimbatore. It is used for aerobic upland rice.

1. Capacity – 1ha/day
2. Cost of operation – 400/ha
3. Seed rate – 20-25 kg/ha

5. System for sowing pelletized rice

This is four row seeder for direct sowing of pellets. Electrically driven (metering) geared to ground wheel and remotely controlled.

1. Coverage – 0.08ha/h
2. Cost – 50000

6. Power operated drum seeder in wet fields

This was developed by ICAR-CIAE.

1. It has one forward and one reverse speed
2. Dog clutch for turning the wheel
3. Tested with 12 row drum seeder as an attachment
4. Coverage – 0.413 ha/h

7. Self-propelled seeder

This was developed by NRRI, Cuttack. They have developed two types of seeder. One is having cylindrical drum and another conical drum. Both comes with an attachment with engine.

1. No. of rows – 8
2. Row spacing – 20cm
3. Field capacity – 0.235ha/h
4. Power source – 4hp diesel engine
5. Field efficiency – 81.5%
6. Cost of operation – Rs.740/ha

8. Tractor drawn rice seeder

1. Power – 35 hp tractor
2. Capacity – 4ha/day
3. Weight – 425kg
4. Developed for upland rice sowing by TNAU, Coimbatore

9. Seed cum fertilizer drill

This is commercially available in market for direct sowing of seed along with the fertilizer**.**

10. Manual 2 row seed drill

1. No of rows – 2
2. Row spacing – 20cm
3. Cup type seed metering mechanism
4. Field capacity – 0.02ha/h
5. Cost of operation – Rs. 1543/ha
6. Developed by NRRI, Cuttack

11. Animal drawn 3 row seed drill

1. No of rows – 3
2. Row spacing – 20cm
3. Cup type seed metering mechanism
4. Field capacity – 0.1ha/h
5. Cost of operation – Rs. 1065/ha
6. Developed by NRRI, Cuttack

12. Rice seeders

a. 3-row self-propelled hill seeder

1. Row spacing – 20cm
2. Power source – 3.5 HP (petrol engine)
3. Field capacity – 0.11 ha/h

b. Five row power tiller operated seed drill for rice and pulse crop

1. Row spacing – 20cm
2. Power source – 15 HP power tiller
3. Field capacity – 0.14 ha/h

4. Cost of operation – Rs. 1,445ha/h

13. Direct seeded rice (DSR)

1. Medium to heavy textured soils
2. Well pulverized at the time of sowing
3. Sowing period is first fortnight of June, complete sowing before onset of monsoon.
4. PR-115 and basmati varieties
5. seed rate – 20-22kg/ha

14. Multi crop seed-cum-fertilizer drill

1.Used for direct seeded rice
2. Cost of machine – Rs 54000/-
3. Capacity – 0.3ha/h
4. Cost of operation – Rs. 700/h
5. Adopted in orissa and chattisgarh

15. Happy seeder

This is also used for direct sowing of seeds which is commercially available in the market.

CONCLUSIONS

Farm mechanization and crop productivity are directly related because farm mechanisation increases crop output and farm income while saving time and labour, reducing drudgery, lowering production costs over the long term, and reducing postharvest losses. The size of India's agricultural sub-sectors, however, means that mechanisation has not yet spread to all regions and farm types.

- One of the main causes of the sluggish adoption of farm mechanisation and, as a result, the non-intensification of farm output, particularly among small and marginal farmers, is the lack of access to farm electricity.
- The ability of a farm to effectively own such machinery is one of the key barriers to the deployment of farming machines.
- Since farm equipment requires a lot of capital, small and marginal farmers must make a significant investment.
- Due to the inadequate maintenance in rural areas' remote locations, the quality of after-sale service is another issue.
- One of the main barriers to India's further mechanisation is the commercial banks' reluctance to lend money for farm equipment.

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