Study of Various Types of Threshers for Ragi Crop

Shubham Khatkhede
UG Scholar
KIIT University, Bhubaneswar, India

Abstract— The project has been done to study various types of thresher for ragi crop which are used in India. Ragi or finger millet are very rich of nutrition crop but less in use. Due to various constraints, these crops are not harvested even though the harvesting of ragi can be done during any season and most type of soils in India. Traditional method of threshing by animals are very slow. It gives very low output. Thresher can overcome these difficulties to a great extent. There are many types of thresher available in India.

Keywords: Threshing, Drummy Thresher, High Capacity Threshers, Paddy Threshers, Sunflower Thresher, Raspbar Thresher, Finger Millet

I. INTRODUCTION

Millet or Ragi is one of the ancient human foods and it was believed to be first cultivated cereal grain. It is the staple food for especially for millions of people in drier parts of tropical Africa. Prasannakumar et. al.[6] conducted on evaluation and testing of threshing methods for finger millet in the Department of Agricultural Engineering. Finger millet (Eleusine coracana Craetn) commonly known as ragi is one of the important small millet crops grown in red-soil areas of India. Millets are rich sources of minerals such as calcium, iron, zinc, copper and manganese. It has been reported that the air-dried grain of millet contains approximately 12.4% water, 11.6% protein, 5% fat, 67.1% carbohydrate, 1.2% fibre(referred from the research conducted by G.B Adebayo, G.A Otunola and T.A Ajao on Relationship between Nutritional Qualities of Millets and Temperature, Advance Journal of Food Science and Technology et. al. [1]. The major Finger millet growing states are Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Jharkhand, Maharashatra and Uttaranchel. Finger millet is the main food for millions of people in India and Africa, as it can grow in simple cultivation condition.

K.N. Hanumantharaju et. al. [7] describe the comparison study of prototype thresher with different methods of threshing whole crop finger millet. The operation of detaching the grains from the ear head, cob or pod is called threshing. It is the removal of grains from the plant by striking, treading or rupturing. The traditional method of threshing using manual labors requires 150-230 man-h/ha.

Threshing is normally done after the grain moisture content is reduced to 15 to 17%. In various parts of the world, threshing is accomplished by treading the grains under the feet of animals or under the tractor tires, striking the grains with sticks, pegs or loops and removing the grains by rubbing between stone or wooden rollers on a threshing floor or between the rasp bar and a concave of the combine. The threshing can be done by three methods: Rubbing action, Impact, and Stripping[2].

II. DIFFERENT TYPES OF THRESHER

A. Drummy Thresher:
These threshers were very famous in the beginning when threshers were introduced because of its simplicity and low cost. The radially arranged arms known as beaters are mounted on the shaft (Fig. 3). These are made of mild steel square section with mild steel flat welded or bolted at the top. The beaters revolve inside an enclosed casing. Ribs are provided inside of the upper half of the cover to have better threshing. The lower half has rectangular openings made out from square bars. The crop is fed through feeding chute. Crop receives impacts from the rotating beaters till size is reduced to pass through concave. The clearance between beater and concave is about 18-20 mm. The crop should be well dried before feeding in the thresher. A wet crop rap around the beater shaft and the machine becomes overloaded. These threshers do not have provisions for separation and cleaning of grains. The threshed material is later separated and cleaned by a small pedal type blower.
B. Paddy Threshers:

Paddy thresher of pedal operated type (Fig. 4) have mainly a well-balanced cylinder with a series of wire loops fixed on wooden slates. It have got a gear drive mechanism to transmit power. While a cylinder is kept in rotary motion at high speed, the paddy bundles of suitable sizes are applied to the teeth. The grains are separated by combining as well as by hammering action of threshing teeth. Paddy is threshed due to impact and rubbing action between threshing drawn loops and concave screen. The grains are cleaned with the help of a speed fan and cleaned grain goes down through the drain outlet at the bottom of the thresher. They are available in a different range of horsepower.

C. High Capacity Threshers:

It is a basically a chaff-cutter type thresher (Fig.5). It consists of a threshing cylinder, concave, two aspirator blowers, reciprocating sieves, feeding chute, feeding conveyor, feed rollers, safety lever in the feeding chute and flywheel. A platform is attached to the main frame of thresher, on which a person stands and feeds the crop into thresher. All the crop materials are fed through the conveyor of feeding chute and feed rollers move the crop into threshing cylinder. A safety lever provided in feeding chute prevents the entrapping of hands by the feed rollers. Threshing cylinder has two chaff-cutter type blades and beaters. Chaff-cutter blades cut the crop into pieces and beater helps to detach grain from crop. All the threshed materials pass through the concave where it is subjected to aspiration action of blower. The clean grain is collected in trolley through auger elevator. It can be used to thresh the crop having high moisture content also. The machine is operated by PTO of a 35-hp tractor and is mounted on two pneumatic tyres for easy transportation. It can thresh 1.5-2.0 tonnes/h.

D. Sunflower Thresher:

It consists of a threshing cylinder, concave, casing fitted with louvers, cleaning system, feeding hopper and frame (Fig. 5). The cylinder concave clearance is 40 mm and is uniform throughout its length. The diameter of cylinder is 65 cm and length 150 cm. The first part of cylinder of length 133 cm has flat bars for crop threshing and the 2nd portion of length 17 cm has straw throwing blades. The cylinder casing is of hexagonal shape and is fitted with 7 louvers. The louvers help the crop to move axially and the crop is rotated three and half times for complete separation of grains. The cleaning system has a blower and two sieves. The opening of top sieve is 16 mm and of lower sieve 6 mm. Recommended cylinder and blower speeds are 300-350 rpm and 1200-1400 rpm respectively. A tractor or 7.5 hp motor can operate machine. The machine has a capacity of 600-900 kg/h of clean grain.

E. Raspbar Thresher:

This paper deals with the materials used and the methods employed in the experiment on evaluation and testing of threshing methods for ragi threshing with respect to grain moisture content output, threshing efficiency, damage, germination percentage and cost of threshing conditions [6].
F. Single Plant Thresher:

Main parts this thresher consist of drum, concave, feeding tray, cleaning fan, chassis, collecting chute and grain speed reducer. Procedure is in this manner that Single plant (a handle) is feed into threshing unit via feeding try. Grains are threshed as the product. The maximum threshing and cleaning efficiency of the developed thresher was found to be 95.3% and 95.2%, respectively. The average threshing efficiency, cleaning efficiency, grain damage and total grain loss were obtained as 92.2%, 93%, 2.3% and 2.5%, respectively. With increasing of drum speed at all varieties, threshing loss decreased. At all drum speed levels, by increasing drum speed, damaged grains percent increased. In ragi threshing method, the raspbar thresher has given the maximum grains output of 140.5 kg/h for variety MR1 and 130.3 kg/h for variety for HR911. Even though the mechanical damage to grain was high and germination of seed was less when threshed at lower (10%) grain moisture content. The output of the threshed grain, threshing efficiency and cost of threshing operation were lower.

III. CONCLUSION

Threshing of ragi in traditional method is very time consuming, tedious and labourious activity. Also, the output capacity is very low, less economic and produces low quality result of the impact force of rotating drum. Then grains are fell on reducing roller. Here the speed of grains is reduced. Thereafter grains are cleaned by air current of fan. Cleaned grains are collected into the chute [8].

REFERENCES