

Performance evaluation of a power operated maize sheller

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■ **ABSTRACT** : The research was conducted on development and evaluation of power operated maize sheller in Department of Agricultural Engineering during the year 2010-2011. Maize (*Zea mays* L.) is one of the most important cereal crop in the world agricultural economy. It is called as queen of cereals and king of fodder due to its great importance in human and animal diet. It is being used for manufacturing industrial products like starch, syrup, alcohol, acids, etc. The traditional shelling methods are rubbing the maize cobs on one another, rubbing on bricks or stone and by using iron cylinder consisting of wire mesh inside. These methods are time consuming involves drudgery. The study was undertaken to survey the different shelling methods used for maize by the small and marginal farmers and different power operated maize sheller were evaluated for suitability in terms of socio-economic conditions that are prevailing in Karnataka and also to improve its efficiency. To address this, power operated maize sheller was developed and its performance was evaluated. The maize sheller consisted of a cylinder and a concave. The cylinder made up of high carbon steel of size diameter 6.5 cm. The cylinder length 15 cm, having beaters which rotates along the cylinder and separates grains from the cobs. While the concave was fabricated using 6 mm size mild steel rods. The length of concave was 60 cm with slotted opening size of 7.0cm×1.0cm. The developed power operated sheller had the shelling efficiency, total recovery, breakage and shelling capacity of 98.51, 66.62, 1.60 per cent and 402.01 kg/h, respectively, at a cylinder speed of 350 rpm. The cost of shelling 1kg of maize cobs at 13 per cent moisture content was 0.08, only.

■ **KEY WORDS** : Maize cobs, Maize sheller, Shelling, Cylinder, Concave

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Maize (*Zea mays* L.) is one of the most important cereal crop in the world agricultural economy. It is said to have originated from Mexico several thousand years back, even before Columbus landed in South America. It is called as queen of cereals and king of fodder due to its great importance in human and animal diet. Maize is next to rice, wheat and jowar with regard to area and production. It is being used for manufacturing industrial products like starch, syrup, alcohol, acids, etc. It is a rich source of starch (60-80%), protein (8-12%), fat (3-5%) and minerals (1-2%) (Hosamani *et al.*, 2000). India ranks fifth with respect to area (7.43 million hectares) and seventh with respect to production (18.7 million tonnes) in the world (2009-10, Business standard).

A survey was conducted to study the traditional process of shelling methods are rubbing the maize cobs on one another, rubbing on bricks, stone, and wire mesh by using iron cylinder. These methods are time consuming, labour intensive involving drudgery and in case of existing different shelling methods

used for maize by the small and marginal farmers and various power operated maize shellers were evaluated in terms of shelling efficiency (%), total recovery of kernels (%), breakage (%), whole kernels (%), unshelled kernels (%) and shelling capacity (kg/h) and then based on these parameters developed the improved power operated maize sheller and its performance was evaluated.

■ METHODOLOGY

Description of maize sheller:

The power operated maize sheller was developed and fabricated in the Division of Agricultural Engineering, for removal of maize grain from the cob, winnowing and cleaning.

The following factors were considered while developing the maize sheller

- Suitability of machine to shelling maize cob to separate kernel
- Ease of operation and maintenance