

## Harvesting and threshing of maize with combine harvester

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■ **ABSTRACT** : This study was conducted to evaluate the performance of maize combines having different types of headers *i.e.* snap roll type header and cutter bar type header. The mean forward speed and mean field capacity for cutter bar type header type header was 2.10 km/hr and 0.30-0.40 ha/hr, respectively while mean forward speed and mean field capacity for snap roll type header was 1.50 km/hr and 0.20-0.30 ha/hr, respectively. Shattering loss in snap roll type header combine was 12.50 to 18.50 per cent while shattering loss in case of cutter bar type header was 5.00 to 10.50 per cent.

■ **KEY WORDS** : Snap roll header, Cutter bar header, Maize combine

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Maize (*Zea mays* L.) in India ranks fifth in total area and third in total production and productivity. Uttar Pradesh (15.5%), Bihar (11.9%), Rajasthan (12.1%), Madhya Pradesh (11.9%), Punjab (8.4%), Andhra Pradesh (8.25%), Himachal Pradesh (7.1%), West Bengal (6.9%), Karnataka (5.8%) and Jammu & Kashmir (5.8%) jointly account for over 95 per cent of the national maize production (Anonymous, 2008). Maize occupied 139 thousand hectares, with a production of 475 thousand tones in the Punjab State. The average yield per hectare during 2009-10 was 34.14 q per hectare (Anonymous, 2011). Maize is utilized as human food, animal feed, poultry feed and industrial products. Mostly harvesting of maize crop is being done manually with traditional sickle. After harvesting, cobs are plucked manually by hand and cobs are dried in sunshine to reduce moisture content to 15-21 per cent (dry basis). Dehusking of cob is done by hand to remove its outer shell either just after harvesting or after sun drying. After that grain is obtained from dehusked cob (the process is called shelling). The output in terms of dehusking maize cobs traditionally (by hand) are reported

to 30 kg/h and shelling efficiency with manually shelling (beating wooden stick) is reported to be 80 per cent with 8.3 per cent grain damage (Mudgal *et al.*, 1998). Thus, this operation is highly labour intensive with full of drudgery in addition to losses in quality and quantity. Power operated maize shellers are being used for threshing maize. Punjab Agricultural University, Ludhiana has modified spike tooth wheat thresher and axial flow sunflower thresher to dehusking-shelling of un-dehusked maize cobs (Singh and Pandey, 2008). Harvesting and threshing of maize crop using maize combine helps in saving labour cost as well as time. Self-propelled maize combine harvester are also used for direct harvesting and threshing of maize with husk.

This study was conducted to evaluate the performance of maize combines having different types of headers *i.e.* snap roll type header ( $T_1$ ) and cutter bar type header ( $T_2$ ). The details of different type of headers are given below:

### Snap roll type header:

This type of header has a chain conveyor system (Fig. 1) to facilitate the movement of cut crop towards

auger and auger to facilitate the cut crop towards threshing cylinder. It has 12 snap rolls having cutting blades for cutting of maize stalks. There is no reel in this type of header. The width of cutter bar is 3.5 m. Raspbar type threshing cylinder is used in the combines having this type of header. Fig. 2 shows the demonstration of self propelled maize combine harvester at farmers' field.



Fig. 1 : Chain conveyor system in snap roll type header maize combine



Fig. 2 : Demonstration of maize combine having snap roll type header

**Cutter bar type header:**

This type of header has a square section reel (Fig. 3) and auger to facilitate the cut crop towards threshing cylinder. The width of cutter bar is 3.7 m. Raspbar type threshing cylinder is used in the combines having this type of header. It has 40 extended finger to hold the maize crop. Fig. 4 shows the demonstration of self propelled maize combine harvester at farmers' field.

These two headers were evaluated for maize crop variety Pioneer 1855. The maize was planted at recommended spacing of 60 x 20 cm. The combine was operated at first low gear. The average moisture content of maize crop prior to harvesting was 19 per cent prior to harvesting operation. The mean forward



Fig. 3 : Square section reel in cutter bar type header maize combine



Fig. 4 : Demonstration of maize combine having cutter bar type header

speed and mean field capacity for cutter bar type header type header was 2.10 km/hr and 0.30-0.40 ha/hr, respectively while mean forward speed and mean field capacity for snap roll type header was 1.50 km/hr and 0.20-0.30 ha/hr respectively. Shattering loss in snap roll type header combine was 12.50 to 18.50 per cent while shattering loss in case of cutter bar type header was 5.00 to 10.50 per cent. The shattering loss in case of cutter bar type header combine was less as compared to snap roll type header combine because there was less vibrations in maize stem in case of cutterbar type header combines as compared to snap roll type header combine. Sieve loss in snap roll type header combine was 4.50 to 5.50 per cent while shattering loss in case of cutter bar type header was 3.50 to 4.50 per cent. Harvesting in weed infested fields choked the combine harvester frequently in case of snap roll type header combine. The lodged maize crop required manual attention in combine harvesting of maize.

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