

# Modified Combine Harvester



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## Innovation Description

### Profile

Mr. Surendra Prasad hails from Sant Kabir Nagar district of Uttar Pradesh. Due to poor economic conditions and a father's ill health, he had to leave studies at an early age. His father expired when he was 22 years old and he had to take care of his siblings. He started a workshop for agricultural machinery repair in 1986. He has one acre of land which his son is taking care of.

### Purpose

Around 10 years ago, Mr. Surendra noticed that with increased farm mechanization, particularly the usage of the combine harvester, straw is left in the field, which is otherwise needed to feed the animals. The leftover is burnt before sowing the next crop, resulting in loss of nutrition in the soil. It also increases the quantity of carbon monoxide and other gases in the atmosphere. Aiming to utilize straw for useful applications, then he started working on the development of a combine harvester without seeing any combine harvester in 2004. He could develop his first machine in May 2010, which was also showcased on Doordarshan News at the A-2 channel. He modified it two times; the first successful machine was developed in 2011, using which he harvested 75 beegha.

### Technical Details

The modified combine harvester has a collector for collecting chopped straw /chaff without affecting its efficiency. The machine has been manufactured to enable farmers to perform both the tasks viz. harvesting and threshing simultaneously. The height of the left-over was observed 6-7 cm. It has been successfully used for harvesting wheat and paddy and may be suitable for soybean, mustard, and all other crops for which the traditional harvesters are suitable.

It is a tractor operated modified combine harvester with the provision of collecting chaff. It can be operated using a tractor of 60 hp and above. The whole unit consists of gears, blades, augurs (screws that move cut crops), conveyors, belts, levers, wheels, and tanks for collecting grain and chaff. The crop is gathered by the header at the front, which has a pair of sharp pincers called crop dividers at either end. It has reduced the speed of the reel as compared to the conventional combines. The slowly rotating wheel, 'reel' pushes the crops down towards the cutter. The cutter bar runs the entire length of the header underneath the reel. Behind the cutter bar, the cut crops are fed towards the centre by spinning augurs (screws). The threshing drum beats the cut crops to break and shake the grains away from their stalks. The grains fall through sieves into a collecting tank below. The straw chaff after cutting into small pieces tumbles from the thresher at the back of the machine and it is collected into the separate tank. The straw is used as an animal feed. An improved threshing drum and additional blower have been added to increase the efficiency of the clean grain and to blow out the chaff, which otherwise would mix with the grains.

### Performance

Width of cut is : 12ft

Width of cutting blade: 12ft (10ft -12ft)

Height of cut: 2 inches

Height of leftover: 2.5 inches - 4 inches (Variation due to the unevenness of field)

Productivity in wheat was found to be 1 to 1.25 acres per hour and in Paddy field was 2.5 to 3.0 acres per hour.

The speed of operation was found to be 6km per hour with fuel consumption of 7 litres per hour.

### Benefits

The modified combine harvester has the provision of collecting straw and grain while the alternatives are separate combine harvester and straw harvester. The height of leftover straw is much lower as compared to alternatives. The crop

storage chamber of the machine can store wheat up to eight quintals whereas the straw collecting chamber can collect and store about six to eight quintals of straw. The chances of wheat grains getting cut or damaged are considerably low due to the mechanism used in the machine, which separates fine-quality grains from wheat straws very quickly.

**Suggested Reading(s):**

Gryspeerd, J., & Priepke, E. H. (2005). *Combine harvester*. U.S. Patent No. 6,908,379. Washington, DC: U.S. Patent and Trademark Office.

Heidjann, F., & Kleingraeber, K. J. (1991). *Combine harvester*. U.S. Patent No. 5,024,631. Washington, DC: U.S. Patent and Trademark Office.

Kile, R. J. (2016). U.S. *Combine harvester grain bulk tank unloading system*. Patent No. 9,332,693. Washington, DC: U.S. Patent and Trademark Office.

Tang, Z., Li, Y., & Cheng, C. (2017). Development of multi-functional combine harvester with grain harvesting and straw baling. *Spanish journal of agricultural research*, 15(1), 12.

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