

PROFITABLE SOYBEAN HARVESTING

Every bushel of soybeans saved by careful operation of your combine is profit. Poor field conditions and a poorly adjusted combine may cost you 6 to 8 bushels of soybeans per acre. Harvesting losses cannot be completely eliminated, but they can be reduced to only 1 to 2 bushels per acre if you take the time to check the performance of your combine.

To be an expert combine operator, you need to know where harvesting losses occur, how to measure them, what reasonable levels of losses are, and what machine adjustments and operating practices will reduce losses if yours are too high.

Where Do Losses Occur?

Preharvest losses are pods and beans that are shattered from the plants before harvesting begins. These losses are not caused by the combine, but they can be reduced by harvesting early.

Harvesting losses can be separated into several types of losses according to their location. **Gathering losses** occur at the front of the combine:

- Loose beans and beans in pods that are shattered from the stalks by the cutterbar, reel, or cross auger.
- Beans in pods attached to stalks that are cut off and dropped before entering the combine.
- Beans in pods attached to lodged stalks that are not cut.
- Beans in pods attached to the uncut stubble.

Cylinder and separating losses are found on the ground and in pods attached to the straw behind the combine. Cylinder losses are beans in pods that were not threshed by the combine cylinder. Separating losses are loose beans lost out the back of the combine.

How to Measure Losses

The easiest way to measure harvesting losses is to use a rectangular frame enclosing an area of 10 square feet. Forty beans in an area of 10 square feet is approximately equal to 1 bushel per acre loss. For convenience, the frame can be made from heavy cord or clothesline rope so it can be coiled and carried on the combine. The width of the

frame should be equal to the cutting width of your combine header, and the length is listed in table 1. Tie four pins to the rope frame to mark the corners. Make the pins of No. 9 wire, 3 to 4 inches long, so they can be pushed into the ground to hold the frame tight.

To measure losses, stop your combine well in from the edges of the field, disengage the platform drive and raise the platform, then back up 15 to 20 feet. Place the frame across the harvested rows **behind** the combine, count the beans on the ground inside the frame, and divide by 40. The result will be the total loss in bushels per acre. This is the **sum of preharvest and harvesting losses**.

To measure **preharvest losses**, place the frame across the rows of standing beans in **front** of the combine, count the beans and divide by 40. Then subtract this preharvest loss from the total loss found **behind** the combine to determine **total harvesting losses**.

If harvesting losses are too high, place the frame across the harvested rows in **front** of the combine just ahead of the drive wheel tracks. Count the beans inside the frame, subtract the number of beans found in the preharvest count, and divide by 40. The result will be **gathering losses**. When making this count, divide the losses into the four types of gathering losses to make it easier to determine the proper machine adjustments if losses are too high. **Cylinder losses plus separating losses** can be found by subtracting gathering losses from total harvesting losses.

Table 1. Dimensions for a rectangular frame enclosing an area of 10 square feet for checking soybean harvesting losses.

Width of head (feet)	Length down row (inches)
15	8
20	6
22.5	5.3
25	4.8
30	4

What Are Reasonable Loss Levels?

In 1972, 40 combines operating in central Iowa were checked by extension personnel. The average and lowest harvesting losses are listed in table 2. Gathering losses accounted for 89 percent of the total harvesting loss.

Almost all the gathering losses were shattered beans and loose stalks.

The average losses in table 2 are quite low, indicating that field conditions were good and that most operators were doing an excellent job of adjusting and operating their combines. The moisture contents of all soybean samples obtained from the combines were above 11 percent, and preharvest losses averaged less than 0.1 bushel per acre.

If your harvesting losses are greater than the average values in table 2, take time to find out why and readjust your combine. Your goal should be to keep harvesting losses below 2 bushels per acre.

Table 2. Harvesting losses for 40 randomly selected combines harvesting soybeans in central Iowa in 1972.

	Average (bu/acre)	Lowest (bu/acre)
Gathering losses		
Loose beans and loose pods	1.0	0.3
Beans on loose stalks	1.1	0.2
Beans on lodged stalks	0.1	0.1
Beans on uncut stubble	0.3	0.0
Total gathering loss	2.5	0.6
Cylinder plus separating loss	0.3	0.1
Total harvesting loss	2.8	0.7

Adjustments and Operating Practices to Keep Losses Low

Keep your combine in good repair. A cutterbar in poor condition will increase gathering losses. Be sure knife sections and ledger plates are sharp, and that wear plates, hold-down clips, and guards are properly adjusted. Keep chains properly adjusted and belts tight. Lubricate bearings and roller chains when they're warm to get better lubricant penetration; oil roller chains in the evening so excess oil can drop off overnight.

File Code: Engineering 2-2

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Jack M. Payne, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

Properly governed engine speed is essential for proper separator action. The recommended speed for either the engine crankshaft or the cylinder beater shaft is in your operator's manual. Measure speed at the proper shaft with a tachometer when the engine is at operating temperature.

Proper reel speed in relation to ground speed will reduce gathering losses. A 40-inch reel should rotate about 12.5 rpm for each 1 mph of forward speed, a 42-inch reel 12 rpm, and a 44-inch reel 11.5 rpm. The reel will shatter beans if it turns too fast, and stalks may be cut and dropped if it turns too slowly.

The reel axle should be 8 to 12 inches ahead of the sickle on a standard header. A pickup reel should be used with a floating cutterbar, and the reel axle should be 8 inches ahead of the sickle. A bat reel should be operated just low enough to tip cut stalks onto the platform. If it is too low, stalks may be carried over the reel and dropped on the ground. The tips of the fingers on a pickup reel should clear the cutterbar by about 2 inches.

Cut as low as possible to reduce stubble losses. An automatic header-height control will reduce stubble height and operator fatigue, a prime cause of combine accidents. If fields are rough, or if your combine wheels do not match your row spacing, a floating cutterbar will reduce stubble losses. It will operate level while the combine is at an angle with one wheel between the row and one wheel on the row ridge. In the 1972 combine survey, 7 combines had floating cutterbars, and their average loss was more than 1 bushel per acre lower than the 3 other machines.

Keep forward speed at or below 3 miles per hour. If stubble is high and ragged, or if separating losses are high, slow down.

Adjust cylinder-concave clearance according to your operator's manual, usually 3/16 to 5/16 inch at the back and a little wider in front. Then adjust cylinder speed to meet threshing conditions. When beans are tough, cylinder speed may have to be increased to 700 to 750 rpm. Decrease cylinder speed as beans dry to reduce breakage; 450 to 500 rpm is high enough for dry beans.

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