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## Reducing Soybean Harvest Losses

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Reducing harvest losses is a simple and effective way to increase soybean yields and profitability. Losses of 10% are typical and can reach 15%. With careful maintenance and operation, harvest losses can be maintained at 3%. Reducing harvest losses from 10 to 3% in a 45 bushel per acre soybean crop will increase the marketable yield by 3.1 bushels per acre. With market prices projected to be around \$12.00 per bushel, this translates into more than \$36.00 per acre of additional income.

### Harvest Timing

Properly timing your harvest operations is critical to reducing harvest losses. Harvest operations can begin any time after the beans have initially dried to 14 to 15% moisture. Depending on weather conditions, this is usually about 5 to 10 days after 95% of the leaves have reached their mature color. Try to harvest as much of your crop as possible before the moisture level falls below 12% to reduce splits and cracked seed coats. Shatter losses have been shown to increase significantly when seed moisture falls below 11% and when mature beans undergo multiple wetting and drying cycles. Shatter losses can be reduced by harvesting in the morning or the evening when relative humidity is higher.

### Equipment Maintenance

Before harvest operations begin, inspect and repair the cutting parts on the header. Make sure that all knife sections are sharp and tight. Check the hold-down clips to ensure that they hold the knife within 1/32 of an inch of the guards. Adjust the wear plates to the point that they lightly touch the back of the knife. Consider switching to quick cut knives if the existing knife sections need replacing or if shatter losses have been high.

### Equipment Adjustment

Information from the University of Arkansas shows that a skilled combine operator can add more than \$150 per hour in additional profits over an inexperienced operator or one that is trying to hurry or cut corners. Despite this, statewide surveys indicate that only 10% of combine operators check their combine adjustments regularly and match forward speed to field conditions. Combine operators should understand how losses occur and how to make the proper adjustments.

Nearly 80% of harvest losses occur while cutting and gathering the plants into the combine. Most of these are due to shattering. The following recommendations will reduce gathering losses:

- Maintain ground speed at 3 mph or less. Slower speeds will be required if the crop is lodged or if the stubble is high and ragged. Higher speeds are possible when using quick cut knives.
- Set the speed of the reel to run 25% faster than the groundspeed. If the beans are lodged, increase the reel speed up to 50% faster than the ground speed. Setting the reel speed too fast will cause the beans to be beat out of the pods before reaching the combine. Setting the reel speed too slow will cause cut plants to fall forward and out of the combine.
- Position the reel axle 6 to 12 inches ahead of the cutter bar. Ideally, the reel should leave the beans just as they are being cut. Set the height of the reel just low enough to control the beans. Positioning the reel too far forward will increase shatter losses due to excessive flailing action. In lodged conditions, operate the reel as low as necessary to pick up plants. Setting the reel too deep in the canopy will also increase shattering and cause plants to ride over the reel.



Losses can also occur once the beans have entered the combine. The beans may not be completely removed from the pods as a result of incorrect cylinder or concave settings. Shelled beans can also pass out of the machine due to improper blower and sieve settings. However, these losses combined typically account for only 1% of the total harvest losses.

### Measuring Harvest Losses

In order to make the proper adjustments, the combine operator should stop the combine periodically and check the amount and type of loss that is occurring. Since 80% of the losses occur at the header, we will focus our attention on measuring gathering losses.

The first step is to build a frame having an inside area of 1 square foot. A stiff wire frame painted a bright color works well. Next, stop the combine in a representative area of the field and back up 10 to 15 feet. Use the frame to count the number of beans on the ground in the harvested area in front of the header. Take at least four counts across the entire width of the header. For each count, record the following information:

- **Shatter loss:** Count all the loose beans and beans in loose pods on the ground in the standing crop ahead of the combine to determine the pre-harvest shatter losses. Also count all the loose beans and beans in pods you find in the harvested area to determine the total shatter losses. The harvest shatter losses are calculated by subtracting the pre-harvest shatter losses from the total shatter losses.
- **Loose stalk loss:** (count all the beans in pods attached to plants that were cut but not gathered into the combine)
- **Lodged stalk loss:** (count all the beans in pods attached to plants that were not cut)
- **Stubble loss:** (count all beans in pods that remain on the stubble)

Determine the average losses in beans per square foot for each category and divide by 4 (4 beans per square foot equals 1 bushel per acre). Use this information and the recommendations covered in this publication to adjust your combine settings. Make one adjustment at a time and stop periodically to evaluate your progress toward reducing harvest losses to 3%.

### Shatter loss measurement example:

Sample Area	Sample 1	Sample 2	Sample 3	Sample 4
Harvested	14	12	14	15
Standing	2	1	2	2
Difference	12	11	12	13

The average shatter loss in this example is 12 beans per square foot which equals 3 bushels per acre.

$$(12 + 11 + 12 + 13) \div 4 = 12 \text{ beans/ft}^2$$

$$12 \text{ beans/ft}^2 \div 4 = 3 \text{ bushels/acre}$$

This fact sheet was originally produced by the Soybean 2010 project and will be updated as needed by its successor, the Soybean Management and Research Technology (SMaRT) program. The SMaRT program was developed to help Michigan growers increase soybean yields and farm profitability. Funding for SMaRT is provided by MSU Extension and the Michigan Soybean Promotion Committee. Additional information about increasing soybean yields and profitability can be found online at: <http://www.michigansoybean.org>.

### References

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