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## G84-725 Measuring Harvest Loss of Dry Edible Beans

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## Measuring Harvest Loss of Dry Edible Beans

This NebGuide describes how to measure losses before, during and after harvest operations, so that problems can be corrected and losses reduced.

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Harvesting dry edible beans in Nebraska normally includes three separate field operations--cutting, rodding or windrowing, and combining--over a period of three to seven days. The success of these operations is very dependent on equipment selection and adjustment, weather and field conditions, and operator skill.

A total harvest loss of 1 1/2 bu/A or less is considered an acceptable level under ideal conditions. However, harvest losses can quickly increase to 3 bu/A or more if equipment is not properly adjusted or weather conditions become unfavorable. It is imperative to monitor the harvest loss from each field operation to detect any problems. Corrective action can then be taken.

### When To Measure Loss

The ability to accurately estimate harvest losses by visual inspection is extremely important for spotting problems and reducing loss. The best way to acquire this skill is to make a number of harvest loss measurements following the different field operations and correlate this with a mental picture of the loss as it appears in the field. To make best use of this "experienced eye," the equipment operator must regularly stop and inspect soil surface, under windrows, and the soil disturbed by the implement.

Another time when losses should actually be measured is when an "experienced eye" suggests they are too large or if harvest conditions change and resulting losses seem excessive. Examples include the use

of equipment unfamiliar to the operator, after major equipment adjustments, starting a different field, or a change in weather conditions, such as dissipation of morning dew during the cutting operation. Fifteen minutes spent measuring and reducing harvest losses can save several bushels per acre over many acres.

### **Tools Required**

The only tools required for measuring harvest loss are a tape measure and a measuring frame. The frame serves as an aid in counting lost beans within an accurate area. It can be made from a light weight material such as wood, and should have inside dimensions of 1 foot by 8 feet. If a measurement wider than 8 feet is required, the frame can be repositioned as many times as necessary.

### **Determining Which Operation(s) to Measure**

Be sure that the measurement will be a valid indication of the loss from the operation or operations desired. There are several losses that can be measured.

*Preharvest loss* is that which occurred before the actual harvest began and is not caused by any harvest operation. Examples are hail damage or weather loss resulting from a delayed harvest. Pre-harvest loss should be measured before any field operations begin.

*Total harvest loss* is the sum of all losses from each operation plus any losses that may have occurred between operations. This is determined by measuring the loss after all field operations are completed and subtracting any pre-harvest loss.

The most important measurement is that of an *individual operation loss*. This measurement assigns the loss to a particular operation and allows corrective action. To determine the harvest loss of a particular operation, measure the loss before *and* after that operation.

Combine loss can occur at the pickup or in threshing. It is often helpful to separate these two losses to be able to correct any problem. *Total combine loss* can be found by measuring before and after a pass with the combine. *Combine pickup loss* can be measured by stopping the combine's forward travel and allowing the header to clean out. Lift the header, back up the combine, and measure the loss in an area between the rear of the header and where the tailings dropped from the shoe. Subtract losses that occurred before the combine pickup. *Threshing loss* can be found by subtracting pickup loss from total combine loss.

### **Determining the Width to Measure**

Determine the *full effective width* of the implement or operation measured. The *full width* is necessary because the loss may not be distributed uniformly across the width of the operation. For example, the loss may occur at the edge of an implement or at a particular row. If a cutter is taking six 30-inch rows, then measure a full 180-inch width.

The *full effective width* is important for those operations in which the width of the implement is less than the width of the total number of planted rows taken through the implement. If a windrower picks up six 30-inch planted rows, measure an area 180 inches wide behind the windrower. Another example is the case of 12 planted rows windrowed into two large windrows for combining. To find loss after combining, measure the width of the 12 planted rows and not just the width of the combine pickup. In this instance, the *full effective width* of the combine is the width of the 12 planted rows.

In general, measure a width that is equal to the original total width of the planted rows that pass through the machine. If any windrowing has occurred prior to this operation, the measured width may be greater than the implement width.

## How to Make Field Measurements

After determining which operation or operations to measure, follow these steps.

1. Select at random a minimum of three locations in the field or in the area being checked. One method of finding representative and unbiased sites is to throw a small object and use its landing point.
2. Locate the measuring frame around this point to define the area to be inspected. Examine a width equal to the full effective width of the previous operation.
3. Count all of the beans within the frame area. Beans can be found on the soil surface and also mixed into the soil disturbed by the harvest equipment. Sort through the top several inches of soil, carefully looking for beans which have been stirred in by a previous implement. There are frequently more beans mixed in the top 2 or 3 inches of soil than are found on the surface. Observe the location of pods, whole beans, and cracks. This may be a clue to the source of the problem. Add the number of beans from all locations checked.
4. Determine the total area checked by multiplying the width times the length. Multiply this by the number of locations checked. Use units of feet or fractions of a foot.
5. Divide the total number of beans found in *Step 3* by the total square feet of area found in *Step 4*.
6. Divide the quantity (beans/square foot) found in *Step 5* by the appropriate number in the following list to determine the bushel per acre loss:

2.0 for Great Northern beans	3.5 for small white and Navy beans
1.8 for Pinto beans	3.1 for black beans
1.3 for kidney beans	

These values are a conversion from units of beans/square foot to bushels/acre.

### ***Example***

Measure the Great Northern bean loss from a rodding operation. The beans had been cut with a 6-row cutter. The rod was also 6 rows wide. Row width was 22 inches. The measuring frame was 1 foot long by 8 feet wide.

To isolate the rodding loss from previous losses, measurements must be made before and after rodding. Measure the loss prior to rodding in the same general area of the field, but not the exact spots that will be measured after rodding.

First, measure the loss before rodding:

1. Three sites were selected at random.
2. The full effective width of the rod was 11 feet. All beans were counted within an 11-foot width as outlined by the measuring frame. This was repeated for all three sites.
3. A combined total of 132 beans was found in all three sites. At each site a concentration of beans was found near the center of the implement width. A problem was suspected at the center of the bean cutter, the previous implement used.

4. The area checked at each site was 1 foot x 11 feet, or 11 square feet. Total area was 3 (number of sites checked) x 11 square feet, or 33 square feet.
5. 132 beans divided by 33 square feet equals 4 beans/square foot, average.
6. Divide 4 beans/square foot by the number 2.0 for Great Northern beans, which shows a loss of 2 bu/A prior to the rodding operation.

Now, measure the loss after rodding.

The same steps are repeated with a result of 3 bu/A loss after rodding. Thus, the loss attributed to rodding was 3 minus 2, or 1 bu/A loss.

Excessive and unnecessary dry edible bean harvest losses cost individual growers hundreds and even thousands of dollars each year. The ability to detect these losses by occasional measurement and with a trained eye can substantially reduce this problem.

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***File G725 under: FIELD CROPS***

***F-8, Miscellaneous Crops***

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