



## Estimating the Value of Nutrients in Baled Corn Stalks and Soybean Hay

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During this drought, many growers are considering baling corn stalks and soybeans for hay. Some drought stressed corn crops may be harvested for silage also. We need to remember that there is value to leaving the crop on the ground as fertilizer and organic matter. With fertilizer prices the highest they have ever been, what is the value of corn stalks and soybean hay? There are three aspects to consider: the nutrients in the stalks or hay, the availability of these nutrients to following crops and the cost of replacing the nutrients so yields of following crops are not reduced.

The NCSU Soil Fact sheet *Nutrient Removal by Crops In North Carolina* provides estimates of the nitrogen, phosphorus and potassium content of various crops and parts of crops such as stover. Baling stover and harvesting soybeans for hay will not remove all of the nutrients from the field and conservation program rules require leaving at least 30% residue or ground cover. Therefore, the nutrient values in the publication have been converted to a per bushel or per ton basis in Table 1. Note that these values are quoted on a dry matter basis so the value in the actual crop material as harvested will be lower because of the moisture content.

Table 1. Nitrogen, phosphate and potash content of selected crops, dry matter basis

Crop	Nitrogen	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Corn grain, per bushel	.9	.35	.27
Corn stalks (stover), per ton	22	8	32
Soybeans for hay	45	10	25

If all of the crop material containing these nutrients was left in the field, they would be returned to the soil but not all nutrients would be available to the crop that follows or would only become available slowly over a lengthy period. Estimates vary but we can use 50% availability as a reasonable estimate for many situations. However, there may be cases when some of the nutrients in the stover would not be needed or used by a following crop, for example, retaining the phosphorus in the stover on a soil which has a very high phosphorus index. The type of crop to follow corn also may affect the nutrient needs and cost.

If some of the stover is baled or a soybean crop is made into hay, some of the nutrients will be removed and less will be available for the following crop or crops. Producers should use the values in the table, and estimate of the availability or nutrients and the results of a recent soil tests to assess the effective reduction in the nutrients available to the following crop. The cost of replacing these nutrients as fertilizer is the economic cost of removing stover or soybean hay. This cost will depend on the type of nutrient (N, P orK), the amount of each to be replaced, the cost of each nutrient, and the application costs of the fertilizer.

The following examples illustrate the effects of farm-specific factors on the economic cost of replacing the nutrients removed by baling corn stover. Corn stalks have an estimated nitrogen content of 22 pounds per ton of dry matter, 8 pounds of phosphate and 32 pounds of potash. Suppose the following crop requires 50% of these amounts be added back as additional fertilizer (that is, the amount over an above what would be applied if all of the stover was left on the field) and these nutrients must be bought as commercial fertilizer. Recent fertilizer price quotes were nitrogen at \$0.46 per pound, phosphate at \$0.48 per pound and potash at \$0.22 per pound. These prices are for bulk fertilizer, picked up at the fertilizer plant. The cost of the added fertilizer to replace the baled stover is  $(11 \times \$0.46) + (4 \times \$0.48) + (16 \times \$0.22) = \$10.50$ . This does not include any application costs. If the stover is baled at 80% moisture, the cost per ton of the actual bales is \$8.40 cents. If 100% of the nutrients had to be replaced, the cost would be \$21 per ton of dry matter, \$16.80 per ton of actual baled stalks. Multiply the estimates of cost per ton by the estimated yield to get the value per acre. However, there may be situations where the nutrients in stover can be replaced more cheaply, for example, using broiler litter, which would reduce the cost of replacement. Also there may be other situations, such as a hog farm, where the removal of nutrients from a spray filed as baled stover results in no additional cost to be attributed to the following crop.