

Converting Land from Poplar Tree Bioenergy Planting to Cropland: An Example

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Introduction

Many landowners ask about the process and costs for returning land to crop production after trees are cut for biomass. A field on the Squaw Creek bottom, Story County, Iowa was planted to hybrid poplar trees in spring 2000. The trees were planted in rows with a 10-ft spacing. The trees were cut in spring 2010. The resulting field was four acres, and this is the account of the first corn crop in 2011 on the area.

Materials and Methods

The stumps were trimmed flush with the ground as much as possible with a shear mounted on a skidsteer. Another nearby area was also included where the trees were originally cut with a chainsaw. Any stumps that were higher than flush with the ground were trimmed with a chainsaw.

Weeds and small trees (< 2 in. diameter) were mowed late in fall 2010 with a rotary mower. A saw blade attachment on a weed whipper was used to cut the 2-4 in. trees. Both methods were effective after sprouts emerged. On May 12, 2011, 64 oz of generic glyphosate was broadcast sprayed as a burndown. The total cost was \$6/acre for the herbicide plus \$6/acre for the sprayer. Note that all machinery costs may be higher for small-scale areas.

Glyphosate was used rather than the Tordon

for brush killing. Tordon may carry over and damage the corn crop.

Nitrogen was broadcast applied on May 23, 2011 at 135 actual lb of nitrogen and 15 lb of sulfur. This is a typical nitrogen rate for corn following soybeans. A few signs of nitrogen deficiency were observed later in the summer. The nitrogen was a blend of environmentally smart nitrogen (ESN) and ammonium sulfate (AMS). Both are a dry granular form. The ESN is similar to urea with an additional polymer coating. The polymer coating reduces losses and slows release. Losses for surface applied ESN should be less than surface applied urea. Ammonium sulfate is a readily available nitrogen and also contains sulfur. Sulfur may or may not have been needed on the area. The fertilizer cost was \$92/acre plus an application cost of \$3/acre. Note that the addition of AMS to the ESN caused problems by prematurely breaking down the polymer coating.

No potassium or phosphorus fertilizer was applied. We relied on the existing fertility for the corn crop. Soil samples were taken in the fall to adjust for future years. A removal rate of P & K for one year of corn for grain is \$40/acre total.

Hybrid corn was planted (102 day) on May 24. It had Roundup, Herculex, and Herculex extra traits. A bag costs about \$210. We planted 32,000 seeds/acre at a cost of \$84/acre. The planting operation cost was \$15/acre. Planting no-till into a variable environment like this can be unpredictable but the stand was more than acceptable.

The planter was a 3-point, 4-row 30-in. John Deere 7100 with no-till coulters. One gauge

wheel was bent while planting, it may have hit a stump. Note: the bearing was not good on that wheel and that may have contributed to the breakdown. The wheel was hammered back in shape, but a bearing had to be replaced. The bearing cost \$40.

On June 8, generic glyphosate was broadcast sprayed at 32 oz/acre at a cost of \$3/acre plus \$6/acre for spraying. On June 28, it was broadcast sprayed again: 40 oz of generic glyphosate at a cost of \$3.75/acre plus \$6/acre for spraying. Both trips were needed, however, the rate should have been increased to 48 oz for each trip. Glyphosate is inexpensive and it may have had a better effect on the poplar sprouts. Note: the total in-crop maximum rate per season is 96 oz for generic glyphosate.

A residual herbicide was not used because of the many rows going in different directions, which would have made it difficult to spray without overlap. A double rate of many herbicides can cause crop injury and carry-over problems.

Corn was planted instead of beans because of harvest concerns. There was a concern that the bean head sickle would be damaged by stumps during harvest. The corn head can be operated higher off the ground and above the stumps. It can be anticipated that the residual tree root collar and roots will break down quickly in the soil after being killed by the glyphosate.

Results and Discussion

Planting went well and crop performance was more than acceptable.

Corn was harvested with a 6-row head. Harvest costs were \$30/acre plus \$.08/bushel trucking. Yields were 138 bushels/acre. The corn was harvested slightly early because of the deer pressure. Drying was \$.04 per point of moisture. An additional \$.08/bushel was spent on drying because of the early harvest.

Corn was planted in the next field and it yielded 178 bushels/acre. However, because the stump reclamation area was not the top priority, planting was intentionally delayed in this area. There was some yield penalty for the late planting. The optimum planting date would have been about the time of the burndown application.

Overall, costs were \$190/acre for seed, herbicide, and fertilizer, \$70/acre machinery costs and \$25/acre labor (1 hour per acre with equipment) to prepare the area for a total of \$285 per acre excluding land costs. These costs do not include the harvest cost of the trees, which would be charged to the production of that crop.