

Planting Corn for Silage after a First-Cut Alfalfa Harvest

by Mike Rankin, Joe Lauer, and Jerry Doll

Introduction

It's early May, you're looking at a rather marginal alfalfa stand, the haylage silo is nearly empty, and you generally use some corn silage in the dairy ration.

Here are the options:

1. Kill (plow or spray) the alfalfa stand now and plant a full-season corn hybrid, control perennial grasses and broadleaves with a post-emergence herbicide, and harvest the corn for grain or silage.
2. Wait and harvest the first-cutting of alfalfa, plow and plant a short-season corn hybrid, figure on controlling perennial grasses and broadleaves with a post-emergence herbicide, and harvest the corn for silage.
3. Keep the alfalfa stand for one more year.

What are the advantages and disadvantages of each option?

With **Option 1**, you give-up all alfalfa production on the field for the current year but insure maximum yields of corn silage from early planting and using a full-season hybrid. This still may not look too appealing if you REALLY need the alfalfa in the short run or if it's a relatively new alfalfa stand and want to capture more return on the establishment investment. Chances are good that you will be taking another field planned for corn and seed it down to alfalfa. Hence, at least some establishment year yield will be recovered.

With **Option 2**, you get some alfalfa production to fill short-term needs at the expense of reduced corn silage yields. Even with this option, you may be seeding another field to alfalfa that wasn't originally planned (unless your other alfalfa fields are in good condition).

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With **Option 3**, you forego the additional corn silage production but increase the amount of total-season alfalfa harvested. The amount, however, will be reduced compared to a full, productive stand.

How important are weather conditions?

The best planting option to choose varies with each year and farm situation. The right decision usually is dependent on both early spring and June weather conditions, the latter of which can never be predicted at the time of the decision. Assessing alfalfa growth as of early May can be somewhat helpful. If growth is well behind normal, you can be sure corn won't be planted until after the first week in June. At this point, silage yields are significantly reduced and may make **Option 2** less desirable. Conversely, if growth is well ahead of normal from favorable April weather, the likelihood of getting corn planted before early-June increases. Where corn is to follow alfalfa, harvest the alfalfa as early as possible.

Whenever **Option 2** is selected, adequate rainfall has to come in June or the impending corn crop will be a disaster (this unfortunately has been confirmed from many past experiences). At the time of planting corn, the alfalfa has already depleted an abundance of reserve soil moisture and the subsequent corn crop has to have post-planting rainfall for early season growth and to compete with weed pressure. If you see that corn planting is not going to occur before the second week of June and soil conditions are dry, it's best to stick with the current alfalfa stand (**Option 3**).

What is the yield and quality penalty for planting silage corn after first-cut alfalfa?

Studies have been conducted at Arlington, WI to assess the yield and quality penalty for late-planted corn harvested as silage (Lauer, 2003). In corn silage, a key quality component is the ratio of grain to stover in the forage. Less grain yield usually lowers silage quality. Corn forage yield decreases with later planting date (Figure 1). Forage yield of corn planted on June 1 is lower than earlier planting dates in May and April. By the end of June, yield levels are about 50% of the maximum yields observed around May 1.

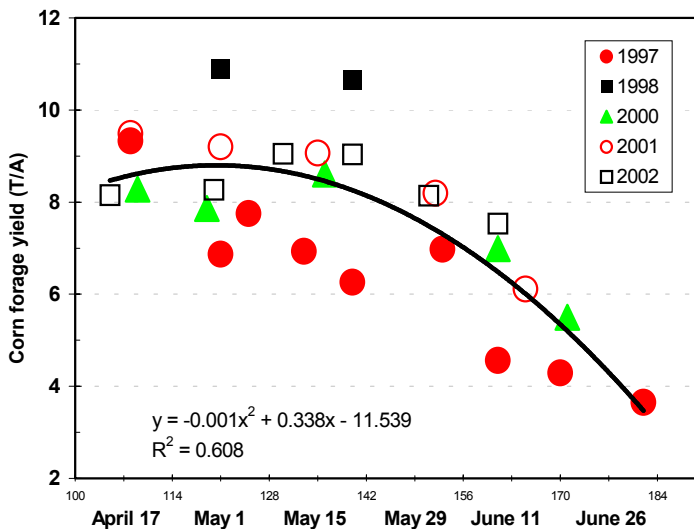


Figure 1. Relationship between corn forage yield and planting date at Arlington, WI. Values represent the mean of all treatments tested for a planting date within a year.

Later planting dates do not affect corn stover yield as much as grain yield, so the grain:stover ratio decreases with later planting date primarily due to lower grain yield. Lower grain:stover ratio results in less Milk per Ton for June planting dates than earlier April and May planting dates. Milk per Ton ranged from 3200 to 3600 lb milk / T for most planting dates in most years, however, the last planting dates in 1997 and 2001 had significantly lower Milk per Ton values.

Multiplying forage yield by Milk per Ton results in Milk per Acre. The relationship between Milk per Acre and planting date is shown in Figure 2. By May 20, Milk per Acre yields are significantly reduced compared to earlier planting dates. Planting dates the third week in June produce Milk per Acre yields at 50% of the maximum levels seen for April and early May planting dates.

Finally, when faced with late planting dates, choose appropriate short season hybrids to increase the probability that the crop will reach harvest maturity before the first fall frost.

Michigan research results

At Michigan State University, researchers evaluated and measured yields for two years using the three options listed previously (Durling et al., 1997). These results were then validated using DAFOSYM, a computer dairy forage modeling program. The modeling program incorporates long-term weather data and predicts growth and yields of both corn and alfalfa. Based on yields and production inputs, gross margins from employing the three options for each of twenty-six years was calculated.

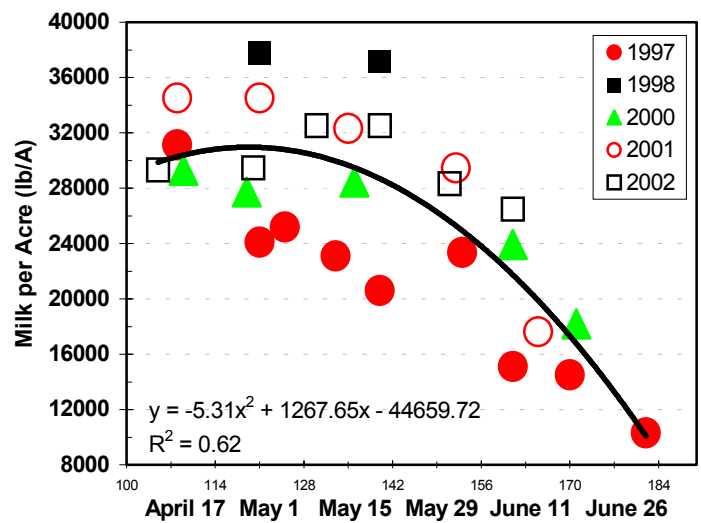


Figure 2. Relationship between corn forage Milk per Acre and planting date at Arlington, WI. Values represent the mean of all treatments tested for a planting date within a year.

The highest overall gross margin was obtained by plowing down the alfalfa in early spring and planting corn for silage (**Option 1**) in 16 of the 26 years. This option also had the highest average gross margin across all 26 years simulated.

Keeping the marginal alfalfa stand and harvesting four times during the growing season had the highest gross margin in 6 of the 26 years (**Option 3**) while taking the first cutting and planting corn for silage was the best option in only 4 of the years (**Option 2**). Corn silage yields when planted after the hay harvest averaged less than half of that where the stand was plowed in early spring and planted to corn. Economical yields from corn silage following first-cut alfalfa were only attained during long, warm and wet summers.

Is it best to plow the harvested alfalfa field or no-till corn directly into the sod?

Wisconsin research during the mid to late 1980's compared moldboard plowing to no-tilling corn into alfalfa sod following a first-cut harvest (Smith et al., 1992). Although the corn was harvested for grain, some comparisons are applicable. For all three trial years, corn emergence was reduced 8 to 20% under no-till compared to moldboard plowing. This was attributed to a dry soil surface. Although stands were over planted to compensate for plant density differences, no-till crop yields were reduced 60 and 20% in the two driest of the three trial years. In the third year, where moisture was adequate, there were no significant grain yield differences. Hence, no tilling into the alfalfa sod is an option, but much more risky if adequate rainfall doesn't occur.

What weed control options exist for late-planted corn following alfalfa?

Weed management for corn following first-cut alfalfa offers some unique challenges because both existing vegetation and in-crop weed management must be considered.

1. Managing the existing vegetation

a. With tillage - Aggressive tillage like moldboard plowing will kill all taprooted perennials including alfalfa, dandelion, white cockle, hoary alyssum, yellow rocket and curly dock. Such tillage will also greatly reduce the aggressiveness of quackgrass, forage grasses and Canada thistle. The downsides to tillage are the extra time it takes and the loss of soil moisture before corn is planted. Minimum tillage operations such as chisel plowing will allow some alfalfa and other broadleaves to escape control unless sweeps are used that sever the taproots. These can be controlled in corn with a postemergence application of dicamba.

b. Without Tillage - In no-till situations, a preharvest application of glyphosate in standing alfalfa should be considered. This will kill quackgrass and at least suppress alfalfa, dandelions and other broadleaves while the corn is emerging and starting to grow. Not all brands of glyphosate are registered for a preharvest application in alfalfa so be sure your product allows this use. Preharvest glyphosate should be applied 2 to 5 days before harvesting the forage and corn should be planted as soon as possible after forage harvest.

If no pre-harvest application is made and corn will be no-till planted, producers have two choices. Probably the best is to consider planting a Roundup Ready corn hybrid and applying glyphosate twice: once when the alfalfa and weeds have 4 to 6 inches of growth and again when annual weeds (or recovering perennials) are at the appropriate height for treatment. If conventional hybrids are planted, it will be best to let the alfalfa and weeds regrow to a 4 to 6 inch height and then apply a burndown herbicide to kill alfalfa and weeds before planting corn. Spring applied glyphosate does not completely kill alfalfa and dandelions. Clarity or Banvel can be applied before planting corn and is more effective on alfalfa than 2,4-D, but costs more. The Clarity and Banvel labels do not require a delay between application and planting while 2,4-D requires a 7-day interval, making this an impractical choice. Banvel and Clarity rates are limited to 8 oz/a on soils with less than 2.5% organic matter for Clarity or less than 2% organic matter for Banvel. On soils with higher organic matter, up to 16 oz/a can be used and this rate will give the best control.

2. In-crop weed management

If the tillage or burndown program was effective, most of the weeds that appear after planting will be annual weeds. Because corn planted after forage harvest is planted nearly a

month later than normal, the soils will be much warmer, resulting in relatively rapid corn growth. This means that the crop will canopy sooner than earlier planted fields, reducing the time that chemical and mechanical weed control is needed. For fields with a prepared seedbed, preemergence herbicides at low to moderate rates could be applied. I suggest considering using a postemergence program, and select the weed management program based on the weeds that appear. The only significant risk of this strategy is in fields with crabgrass because there are no postemergence herbicides to kill crabgrass in conventional corn hybrids. If crabgrass appears, be sure and cultivate at least once to control it.

Most of the annual weeds that emerge after corn planting will probably be broadleaf weeds as it seems that annual grasses are less frequent in corn following alfalfa than if corn follow corn or soybeans. In no-till and chisel plowed fields, some alfalfa and dandelion regrowth will probably occur. These and most other broadleaf species can be controlled with dicamba-based products like Distinct, Clarity, NorthStar, Marksman, or Celebrity Plus. If annual grasses except crabgrass appear, then products that contain nicosulfuron (Accent) or Option will be the products of choice.

Of course, all the preemergence and postemergence treatments listed in the 2003 Pest Management in Wisconsin Field Crops bulletin (A3646) could be considered for use in corn planted after alfalfa harvest. Consult this reference for additional information on herbicide use in field corn. It is available on line at:

<http://www1.uwex.edu/ces/pubs/pdf/A3646.PDF>.

What are the soil fertility considerations for corn following first-cut alfalfa?

Nitrogen

Alfalfa will provide nitrogen (N) to the subsequent corn crop at amounts similar to those provided if the legume was killed or plowed in the fall. However, because the crop is being harvested first, no additional credit can be taken for regrowth that is being returned to the soil. Additionally, because these stands are being terminated, in most cases they would need to be categorized as either "fair" or "poor". Table 1 summarizes the appropriated N credits which can be taken for corn following first-cut alfalfa.

Table 1. First-year nitrogen credits for corn following a fair or poor stand of alfalfa with minimal regrowth*.

Stand Type	Stand Density (plants/ft ²)	Soil Texture	
		Medium/Fine	Coarse/Sandy
Fair	1.5 - 4	120	70
Poor	<1.5	90	40

*University of Wisconsin-Extension Publication A2809

On high corn yield potential soils, some additional N will need to be applied to meet the 160 lb./A of N needed for the corn crop. For low or medium corn yield potential soils where 120 lb./A of N is required, additional N fertilizer will also be needed unless the stand falls into the "fair" category and the field is on a medium or fine textured soil.

Phosphorus and Potassium

Appropriate amounts of phosphorus (P) and potassium (K) need to be applied in the corn starter fertilizer based on soil test levels. Even where P and K levels are extremely high, University of Wisconsin research has confirmed a high likelihood of starter fertilizer response with later plantings (Bundy and Andraski, 1999). A minimum of 10 lb. N, 20 lb. P, and 20 lb. K per acre needs to be applied as starter. Potassium may be especially important with corn following first-cut alfalfa because the initial harvest has already extracted a significant amount of K from the soil. If the soil test level is not known, apply a starter fertilizer with a high K analysis.

Summary

Double-cropping corn for silage after a first cutting of alfalfa is a management option when forage is needed early in the growing season. However, the success of this management strategy is highly dependent on spring growing conditions (primarily heat units) along with early summer rainfall and must be done with the realization that corn silage yield and quality will often be significantly less than that of early-planted corn. The practice has a higher likelihood of success in southern Wisconsin than in the north. In Pennsylvania, where extension personnel endorse double-cropped corn after first-cut alfalfa, they are also quick to point out that such a practice is not very forgiving to poor management (Roth et al., 1997).

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