Incorporating Buckwheat into Oat/Pea Hay

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 Dairy farmers in the northeast are being squeezed out of business. The rising cost of inputs is making it difficult for any dairy farm to reach a point of financial sustainability. In many cases, the survival of a dairy farm depends on its ability to produce its own high quality, dairy-grade feed.

 In the summer of 2010, I grew buckwheat hay. An unconventional crop for dairy farms, buckwheat is easy and cheap to grow, and fits in well with a rotation that includes other small grains, root crops and/or grass/legume hay. Unfortunately, buckwheat is also quite difficult to make into dry hay. It takes five days of dry weather to make dry buckwheat hay-- a rare weather event in humid northern Maine.

 In the summer of 2013, I experimented with growing buckwheat along with oats and peas. I was hoping to combine the benefits of buckwheat—weed suppression and the ability to help to condition the soil for following crops—with the traditional benefits of oat/pea hay. Although the buckwheat hay produced in 2010 proved extremely useful as part of an organic rotation, the quality of the buckwheat hay was only moderate. The new project aimed to increase the protein content and make the hay easier to dry by oversowing oat/pea hay with buckwheat.

 We were attempting in both 2010 and 2013 to develop a dairy-quality hay that could replace purchased grains and/or other feeds. By incorporating buckwheat into oat/pea hay, we hoped to produce more milk with on-farm feeds, while developing a rotation that will allow for production of high-quality organic winter grains—a commodity currently in demand in the northeast. Because many dairy farmers have the ability to produce hay and small grains, this rotation could increase profitability in more than one way for dairy farmers in the northeast.

 Our cows are primarily grass fed—pasture and hay. We usually make roughly 7,500 bales of hay annually. We also grow small grains for other livestock and for cows when necessary. New Sweden, Maine has a short growing season. Our goal is to produce the highest quality forage possible to maximize the economic sustainability of the farm. Our cows excel at thriving on forages; they rarely have health problems, are fertile, and extremely long-lived. (One sixteen year-old cow just calved this January) They produce a modest amount of milk—roughly 16-32 lbs of milk per day on pasture only. The more high-quality hay we have at the beginning of spring and the fall, the more milk we can produce (and turn into cheese) during times when the pasture is not started or when pasture is finished for the year.

 Rye and other grains are in demand currently in Maine. One of our goals is to include a small grain as a cash crop in our rotation. This project attempted to tie together our hay production with our grain production—developing a dairy quality hay crop while making a rotation that will produce winter grain in the most cost-effect, sustainable method possible.

 As far as I know, no one has attempted to use buckwheat with other small grains to produce hay and make an effective rotation. In the spring of 2013, I looked forward to including a legume in my farm rotation and knew that oat/pea hay could reliably produce high quality forage. The question was—how would the three crop produce when sown together?

 Weather-- Like the plans of many farmers, my plans for 2013 were hindered by unusual weather. The last several years in northern Maine have been unusually rainy and stormy. We had 5.8 inches of rain in May and 6.2 inches of rain in June. Although we planted out oat/pea/buckwheat hay at appropriate times, the wet weather increased weed pressure. The rest of the summer was excessively rainy, continuing to make weed pressure high and making hay difficult to make. Although the buckwheat/oat/pea hay suffered from a high amount of weed pressure—partially because of adverse weather conditions-- it still made a suitable hay crop.

 In May 2013 we plowed eight acres for this project. The land received 3 acres/ton of manure prior to and the land was prepared with a field cultivator, harrow and disc. The land was planted to oat/pea hay or oat/pea/ buckwheat hay in the following manner:

1 acre plots—

Plot 1: Sown to Oats/Field Peas/ Buckwheat at a rate of 70lbs./ 60lbs./ 40lbs. In this plot, the grain was all sown at the same time.

Plot 2: Sown to oats/ field peas/buckwheat at a rate of 70lbs/ 60lbs/40 lbs. In order to produce strips of oats/peas vs. the buckwheat, the grain drill was sectioned off into five sections—three openings in each section. The grain was sown at the same time.

Plot 3: Sown to oats/ field peas/buckwheat at a rate of 70lbs/ 60lbs/40 lbs. In order to produce strips of oats/peas vs. buckwheat, the grain drill was sectioned off into three sections-- five openings in each section. The grain was sown at the same time.

Plot 4: Sown to oats/ field peas at a rate of 70lbs/ 60lbs. Six days later, buckwheat was sown at a rate of 40lbs. per acre.

Plot 5: Sown to oats/ field peas at a rate of 70lbs/ 60lbs. Eight days later, buckwheat was sown at a rate of 40lbs. per acre.

Plot 6: Sown to oats/ field peas at a rate of 70lbs/ 60lbs. Ten days later, buckwheat was sown at a rate of 40lbs. per acre.

Plot 7: Sown to oats/ field peas at a rate of 70lbs/ 60lbs. Twelve days later, buckwheat was sown at a rate of 40lbs. per acre.

Plot 8: Sown to oats/ field peas at a rate of 90lbs/ 80lbs. Control

 Plot one initially seemed to be the best way to grow this hay crop. The three seed species were mixed together in the grain drill and seeding only required one pass. The plots planted in strips required a little more time to plant. The plots where the buckwheat was sown after a delay raised the concern of damaging the already started oats and peas. Also, the crop planted in strips and the crop planted with a time delay used slightly more fuel than those planted in plot one.

 In the end, the results showed that oat/pea/buckwheat hay is a viable crop, though the quality of the hay was only roughly the same as good quality grass-legume hay. In fact, forage test results showed that the oat/pea/buckwheat hay was roughly the same quality as the straight buckwheat hay that we grew in 2010. Available protein was in the 6-10% range. The protein in plot one was only 5%. In both cases, the non-tradition hay crop worked well in a rotation including small grains, particularly because buckwheat is unrelated to oats or wheat or rye or other small grains and thereby helps to break any disease cycles present in the soil.

 Although the quality of the oat/pea/buckwheat hay was somewhat disappointing, some of the lack of quality can be attributed to adverse weather. Usefully, we learned that the most effective way to produce this crop in our conditions was the following: planting the oats and pea, then waiting an interval of eight to twelve days. The oat/pea/buckwheat hay that was sown all at once performed the worst—both as weed suppression and regarding available nutrients in the hay. The crop planted in strips did not control weeds effectively and had a slight added expense in time and fuel.

 One of the important goals of this project was to establish if buckwheat could successfully be grown as a palatable cattle feed in conjunction with oats and peas. Interestingly, our cattle seem to particularly relish the oat/pea/buckwheat hay. Youngstock and dairy cows are thriving particularly well this winter with the addition of the forage from this project. We have noticed that our stock in general are in better form this winter—partially because of the addition of the forage from this project. This project has preliminarily established that oat/pea/buckwheat is a viable crop for dairy farms in the northeast.

 In a previous season, we grew straight buckwheat hay. Although this also was a viable feed for dairy cows, it was very difficult to produce as dry hay, particularly in our humid climate. In contrast, the buckwheat/oat/pea hay dried as easily as standard grass/legume hay. It was not as time consuming to make as the straight buckwheat hay and was not as hard on the haymaking equipment.

1. **Yields per acre of hay**:

Plot 1-- 1.5 tons dry hay

Plot 2-- 1.25 tons dry hay

Plot 3-- 1.25 tons dry hay

Plot 4-- 1.5 tons dry hay

Plot 5-- 2 tons dry hay

Plot 6-- 2 tons dry hay

Plot 7-- 1 ton dry hay

Plot 8-- 1.75 tons dry hay

**Growth July 15th**

Plot 1-- 28”

Plot 2-- 31”

Plot 3-- 30”

Plot 4-- 30”

Plot 5-- 35”

Plot 6-- 33”

Plot 7-- 27”

Plot 8-- 31”

 In general all of the plots were shorter than similar crops grown in more favorable seasons. Plot 7, though not as weedy as some of the other plots, produced a somewhat thin stand with depressed growth. Despite the substandard height, yields were appropriate. This can be accounted for by the relatively high rate of seeding used for this project.

 During the growing season, each plot was evaluated for weed pressure. Each plot was evaluated for weed pressure on a scale of 1-10, with 1 being little or no weed pressure and 10 being extreme weed pressure. In addition, each plot was evaluated for weed pressure by sectioning off a random 1 meter square area in each plot and estimating the number of weeds per square meter.

**Weed Pressure OAT/PEA/BUCKWHEAT— scale of 1-10 (ten being weediest)and sample of weeds per square meter**

Plot 1 (10) greater than 200 /square meter

Plot 2 (9) greater than 200 /square meter

Plot 3 (9) greater than 200 /square meter

Plot 4 (9) greater than 200 /square meter

Plot 5 (5) 100 /square meter

Plot 6 (5) 100/square meter

Plot 7 (5) 100/square meter

Plot 8 (9) greater than 200/ square meter

 The weed pressure was extremely high in all of the plots. This can be partially explained by the cool rainy weather. All of the plots started out well and began the season by competing fairly well with the weeds. By the middle of June, however, growth had slowed in the oat/pea/buckwheat crop because of cool, rainy weather, allowing the weeds to take over. The plots that were sown in strips and the plot where all three forages were sown together fared the worst in competing with weeds. The plots where the buckwheat was planted some days after the oats/peas fared the best. In general, the oat/pea/buckwheat mix was significantly less effective in competing with weeds than a stand of pure buckwheat. Despite the high weed pressure, a decent crop of hay was made in all plots.

**Weed Pressure-- Winter Rye**

 In addition, the project aimed to evaluate the ways in which the oat/pea/buckwheat crop prepared the ground for winter grain. The winter grain was also evaluated for weed pressure following the forage crop.

 Because of the inclement weather and a delayed planting time after the hay was made, winter rye was planted instead of winter wheat. Before snowfall, the winter rye showed significantly less weed pressure than the oat/pea/buckwheat. Again, the plots where the buckwheat was planted after an interval—into the established oats/peas—performed the best in suppressing weeds in the following winter rye crop.

Plot 1 (4) 20 /square meter

Plot 2 (3) 10/square meter

Plot 3 (3) 10/square meter

Plot 4 (3) 10 /square meter

Plot 5 (1) fewer than 5 /square meter

Plot 6 (1) fewer than 5 /square meter

Plot 7 (1) fewer than 5 /square meter

Plot 8 (3) 10 /square meter

 Overall, this project established that oat/pea/buckwheat is a viable crop for dairy farms in the northeast. It is an effective way to condition ground for a following winter grain, especially under adverse weather conditions. Although the quality of the hay produced was only moderate, it works in a grain/forage rotation, especially on marginal land and in a short growing season. This crop produced best when the buckwheat was sown 8-12 days after the oats/peas.

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