

**Potential Alternative Rotation
for Less than Ideal Drained Soils
By Tom Kilcer**

Nearly every farm has a field, or a number of fields that are less than ideally drained. They often give a great yield one year out of five. Two of the years are nearly complete loss, while the other three are mediocre at best. An old comment on these soils is that they are too wet at 10 am and too dry at 2 pm.



Most farms resign themselves at getting what they can. Others have switched these fields to reeds canary grass with high nitrogen applications. This formerly high productive system has quickly become uneconomical with the nearly tripling nitrogen prices over the past 5 years. What options do we have?

Cooperative Extension in Rensselaer County has been working for the past 5 years on testing alternative crop rotations specifically for these soil types. The objectives were: 1, to produce high yields of high quality dairy forage; 2, to work the soil at a very minimum to reduce having to pick stones, while at the same time staying off wet soils in early spring and fall; 3, to have a crop rotation between grass and broad leaf species to reduce the build up of disease and insects; 4, to have a legume in the rotation to replace the purchased nitrogen and to supply the grass component of the rotation.

The new rotation starts after a summer annual such as corn. After the summer crop is harvested in the beginning of September, the ground can be minimum tilled or aerated, and then planted with a conventional drill. A no till drill could also be used. The crop to be planted is Winter Forage Triticale. This is a cross between wheat and rye. The crop needs to be emerged by end of September, giving soil protection during the winter and establishing its yield potential for the next spring. This crop captures additional sunlight producing yield during the off season. Our research clearly shows, yield plummet the later you plant regardless of how much seed you use.

In late February or in March, when the ground is frozen, a good variety of medium red clover is broadcast at 8 lbs. of seed/acre, into the stand along with about 75 lbs of N. The nitrogen is to feed the early rapidly growth of the winter triticale. The clover will establish as a frost seeded crop and come up under the triticale. Research on area farms plus a 3 year study at the National Tillage lab in Iowa, found this system is very effective at establishing clover under the triticale. The triticale is harvested as very high quality forage at flag leaf stage (where the flag leaf shows but NO head is showing). The flag leaf stage occurs about the 18 – 23 of May in lower Rensselaer County, the same time that intensive managed reeds canary grass is ready for harvest.

Following triticale harvest, if there is normal rainfall, you can expect two cuttings of very high quality, high yielding clover. Farmers have harvested three cuttings of clover. Seeding year clover at Cornell's trials typically yields 2.2 tons of dry matter/acre.

The Second year of clover you can expect 3 – 4 cuttings of clover with yields equal or exceeding the peak years of an alfalfa stand. In Cornell yield trials, clover the second year yielded 4.5 – 5.5 tons dry matter/acre.

By the third year, native grubs have built up in the clover stand, destroying most of the root system. You will get a good first cut but then the stand will rapidly disappear.

At this point there are three potential options to choose from. The first choice is no-till plant a very short season roundup ready corn. We planted High Test 1707, a 75 – 80 day corn that is Roundup- ready, on the Swartz farm in Schodack. Yields were in the 12 – 13 tons/acre – or 4.25 to 4.5 tons of dry matter. Keep in mind that on most fields the first cutting will yields 1.5 – 2 tons of dry matter even on a run out stand. This boosts the first year dry matter tons/acre to 5.75 – 6.25 tons; or more than 16 – 18 tons of corn silage equivalent.

A second crop alternative is Brown Mid Rib sorghum sudan. A large number of farmers in Pennsylvania and central New York no till this crop into run out sods with manure for added fertilizer and get excellent results. No-tilling eliminates most of the stone issues. It seems to work best with round bale wrapping systems. It does take a higher level of management and attention to details. Thus it is not a crop for everyone.

A third alternative, especially for those baling hay, is to roundup and no till plant Teff. Teff is a fine leaved plant that in a two cut system, has consistently yielded 3 – 4 tons of dry matter/acre with only 50 lbs of N/cutting. It excels in dry weather (originally from Ethiopia), and makes very high quality hay. Normally there are two cuttings from this rapidly growing crop. If no manure is used, it would be an excellent feed for dry cows.

Each of these three choices comes off for the final (or only) harvest at the beginning of September. At this point we start the cycle over with a planting of winter forage triticale.

Problems, Pitfalls, and Possibilities

There is no perfect crop or crop system. Each step has issues that you need to recognize and manage for this cropping system to succeed.

Triticale issues: Triticale MUST be in the ground by the 25 of September (earlier in colder areas). It needs to be out of the ground by the end of September. Our research clearly showed that planting later with a higher seeding rate only wasted seed and still had major yield penalties the next spring. The crop MUST be drilled in 1 – 1.25 inches deep. Broadcast and harrow in leads to very poor yields at best, and at other times complete failure from winter kill. You wouldn't broadcast and disk in corn for top yields, why to it to winter grains? Winter triticale is planted at 125 lbs of seed/acre. A corn starter supplying 20 lbs of nitrogen plus phosphorous and potash if needed will get the crop off to a good start. We do not recommend heavy manure applications before planting as it supplies to much nitrogen which produces excessive lush growth susceptible to being killed by winter diseases. Nitrogen needs to be applied in the spring. We have been very successful, after the snow melts before the ground thaws, for both frost seeding the clover and the nitrogen. Both are incorporated by the same

Triticale at flag leaf stage can produce more than 2.25 tons of very high quality dairy forage. Its harvest is the same time as intensively managed cool season grasses allowing for both to be stored in the same silo.



freezing thawing system. The biggest problem is for the farmer to remember to do this in late February or early March. If you miss the window, you can still put both on after the frost is out. One year of the test we had no frost in the ground. We simply ran over the plots with a cultipacker seeder applying the clover seed to the surface for excellent results. You need to keep an eye on the triticale stand as the flag leaf stage can sneak up on you. It is ready the same time as intensive managed grass and can go into the same silo. The mower should be set with NO shields in the back. This allows the tall forage to fly out the back with minimal bunching. Yields are heavy at 2 – 2.5 tons of dry matter/acre (nearly double first cut alfalfa yield) so if you use a conditioning mower, it may need to be slowed down to allow the heavier yield to feed through. Wide swathed, triticale can be ensiled the same day it is mowed, thus preserving the high sugars the crop naturally contains. We have found that while conditioning does not help the crop to dry, tedding after 1 – 3 hours of drying has a very big effect at lifting and loosening the heavy swaths for rapid dry down and same day chopping. Forage quality is 4,000 to 4,200 potential pounds of milk/ton of dry matter. To put this in perspective, high quality corn silage is 3,700 to 4,000 potential pounds of milk/ton of dry matter. What if it rains the week you want to cut? In our worse case the forage still tested 3,600 lbs of milk/ton. Like reeds, triticale has an excellent root system that pumps out a tremendous amount of water, drying the ground and allowing for harvest while minimizing the chance for rutting the field.

Clover frost seeded into winter grains is a very old technology that is still can be used today. Excellent stands were established on farms with this method

Clover: Isn't that the stuff we used to grow that never got dry? Yes, if you are making dry hay. For haylage, clover has an un-deserved sullied reputation. As you can see in the graph, first cut clover starts at the same moisture as alfalfa.

Mowed wide swath and NOT conditioned, it dried at the same rate as alfalfa, until about 70% moisture. At this point clover slowed slightly while alfalfa continued to dry. As the alfalfa dried, the leaves curled, exposing the leaves underneath to the drying sunlight. The much bigger clover leaves, stayed flat as they started to wilt and shaded the under leaves from the drying sun. Tedding clover an hour or two after mowing will move these upper leaves and expose the lower levels to the same sunlight- rapidly drying the crop. (Dr. Cherney at Cornell firmly believes from his research that tedding all haylage after an hour or so of drying is highly effective at accelerating the drying process and assuring haylage-in-a-day). As you can see by the graph though, even without tedding the clover, it was still ready to chop the same day, only slightly behind the alfalfa. An advantage of clover that most farmers do not know is that the protein in clover is protected. It is not broken down as with alfalfa, and remains in true protein form which is much more usable by the dairy cow.

There are excellent breeding programs for clover and improved varieties are much higher yielding than cheap "common" medium red clover. No clover will last past the beginning of the third year due to the native grubs we have that decimate the root systems of clover.



Short Season Corn: When we say short season we do NOT mean the shortest you seed supplier has on hand. That could be an 85 – 95 day variety that will mature to late and either produce wet slop silage, or delay the planting of Winter Triticale, dramatically reducing yields or killing the triticale crop from late planting. We are talking LESS than 80 day corn. Because short season corn shortens the vegetative stage (which impacts on silage yield), we planted at 36 – 38,000 plants/acre. Sod fields have a number of seed eating insects in them. A seed protection

treatment is highly recommended for a successful crop. After the corn was emerged (3 – 4 inches) we came back with roundup and had excellent season long weed control. This could also be accomplished by traditional plowing – but at much greater time and fuel cost. Only 30 lbs of N is needed in the starter for sod fields. In spite of occasional dry spells, the corn matured for silage by the beginning of September.

BMR sorghum Sudan: in Pennsylvania a number of farms no till the BMR sorghum-Sudan directly into the sod with excellent results. We prefer to kill the sod first so the clover eating grubs will starve during the summer and not affect the new clover the following year. Round bale wrapping, especially with processing knives in, makes tight solid bales with excellent fermentation characteristics. Sorghum-Sudan does respond to conditioning for the heavy stems. As with the above crops, a tedding after a couple of hours of drying also works well.

Teff is a very new crop that has a C4 photosynthesis like corn and sorghum. It only gets to be about knee high before it starts to head, but the very thick stands produce tremendous yields. Normally there are two cuttings in a season. The forage can be dry hay baled, chopped or round bale ensiled. The only caution is to NOT mow it to close to the ground on the first harvest. Regrowth is from leaf tissue and the more you leave, the faster it regrows.

Soil: most of the wet soils for this rotation have been moleboard plowed when they were to wet sometime in the past 50 years. The root limiting pan that was put in is still there. We found one after 15 years of an alfalfa timothy sod. The only way to remove it is to deep till. Once it is removed, no-till cropping or the new aerated tillage cropping will allow excellent seed beds, good stands, good yields, without having to plow these delicate soils.

Using yields from the Cornell clover variety trials, and our research triticale yield from the past five years, plus the corn yield from this year, we can get an estimate of what this rotation will produce. The triticale and clover will yield (triticale 2.25 + clover 2.2) 4.45 tons of dry matter in the seeding year. The straight clover will yield 4.5 – 5.5 tons of dry matter in year two. The first cutting of clover haylage (2.5 tons dm/a) and the yield of the short season corn (4.5) or BMR or Teff will yield 7 tons of dry matter. This average of 5.5 tons of dry matter for the rotation is far above the poor yields many farmers tolerate from wet fields. A bigger factor is that the dry matter harvested is as good, or better than that of many well drained fields.

Is this a perfect crop system? NO. The perfect crop system does not exist. This is a potential crop system that can boost your yields on these less than ideal soils without breaking the bank trying to buy nitrogen fertilizer.

