

The use of buckwheat as a precise weed control tool

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New England farmers have long used buckwheat in their rotations to control weeds and improve tilth. In modern farming, it remains useful as a complement to other practices, especially where adequate weed control remains difficult. This paper describes the most valuable situations for New England farmers who raise vegetables and berries, provides a concise procedure that is usually successful, and gives some detail on the factors that are important for being successful.

Buckwheat works as a smother crop, and is one of the best there is. For a smother crop to be effective it must establish fast and completely. It must be inexpensive to use, and should be managed to minimize volunteers. Buckwheat meets all those criteria.

The farming situations where buckwheat has been found most valuable are: After early vegetables, in the year before establishing strawberries, and when bringing idle land into crop production.

The procedures for three common situations

After early vegetables

Goals

- Suppress or reduce weeds
- Improve soil condition

Decision

1. Are the above goals your main management objectives for this field?
2. Is the field open long enough? Buckwheat needs 6 to 7 weeks between vegetable harvest and fall crop.
3. Is the field free of herbicide carryover? The preceding vegetable crop must not have had atrazine, Pursuit, Sandea or Reflex.

Procedure

Give buckwheat the chance to out-compete the weeds.

1. Loosen soil, but don't overtill.
2. Wait about a week for decomposition to avoid gaps in a reduced stand.
3. a) Drill at 50 lb/ac. 1 inch deep, shallower if soil conditions allow; or
b) Broadcast at 70 lb/ac, as evenly as possible. Avoid gaps! Use shallow incorporation, such as a drag, to give the buckwheat a faster start than the weeds.
4. Mow no later than 10 days after they begin to flower, typically 5 1/2 weeks after seeding. Alternatively, let it mature seed and harvest grain.
5. Plant a fall crop, or a winter cover crop to preserve improved tilth.

Before Strawberries

While buckwheat can be beneficial as a single cover crop or a late season grain crop, we have found that not to be enough for strawberries. What's needed is the more-aggressive double crop.

Goals

- Reduce perennial weed growth
- Reduce time spent hand weeding

Procedure

1. Prepare ground in mid-spring when conditions are best.
2. Plant in late May or early June. Drill 50 lb/ac, 1 inch deep or less. Alternatively, broadcast at 70 lb/ac to avoid gaps. Spread as evenly as possible and use shallow incorporation, such as with a drag or chain, to give the buckwheat a faster start than the weeds.
3. Mow after 45 - 50 days, after immature seed have begun to form.
4. Allow second crop to grow from volunteers, or reseed.
5. Mow second crop after within a week of flowering. Plant a winter cover crop (annual ryegrass, oats) in late August or early September.
6. Till in spring and plant next strawberry crop

Alternative winter cover. In wet years, medium red clover can be broadcast with the second buckwheat planting. It will grow after the buckwheat is mowed in the fall and provide both winter cover and nitrogen. If it was too dry for the clover to take, plant a conventional grain winter cover crop.

Controlling volunteers. The program described here should not produce volunteer buckwheat in the strawberries. However, delays in controlling the buckwheat may result in viable seed that mostly germinates in mid-May. If you do get volunteers, they can be easily killed with early cultivation. Many growers who cultivate the seedlings say that control is very easy. Those who wait disagree. Buckwheat volunteers may succumb to your regular herbicide program. Unfortunately, they are relatively tolerant of devrinol and dachthal.

Bring idle land back into crop production

This technique is especially useful for vegetables and strawberries, which are high-value crops with a low tolerance for weeds. Land that has been idle usually has good soil aggregates, but organic matter needs to break down and weed seed bank needs to be reduced

Goal

Bring land into production quickly, with fewer weeds and good decomposition of sod.

Procedure

I. Early planting, double crop

1. Spring: Till field when moisture is ideal for working the soil.
2. Mid-May: Harrow at about 2 weeks to break clumps and kill weed seedlings.
3. Late May: Harrow after soil is over 65°. Sow buckwheat at 70 lb per acre (broadcast and scratched in) or 50 lb per acre (drilled). Don't leave gaps for weeds to grow.
4. Early July: Incorporate buckwheat 6 weeks after sowing and reseed.
Or
Late July: Incorporate buckwheat 8 weeks after sowing. Let volunteers establish.
5. Fall: Sow winter cover crop. If possible avoid tilling by using no-till drill or broadcasting on surface. Buckwheat should leave the ground mellow enough that the cover crop will take without tillage. Seeds on surface will winter kill.

II. Late planting, single crop

1. June: Till field when the moisture is ideal for working the soil.
2. June and early July: Allow residue to decompose for 3-4 weeks. Harrow at about 2 weeks to break clumps and kill weed seedlings
3. Early to Mid-July: Sow buckwheat at 70 lb per acre (broadcast and scratched in) or 50 lb per acre (drilled). Don't leave gaps for weeds to grow.
4. Mid to Late August: Mow six weeks after sowing, or harvest for grain 10-11 weeks after sowing.
5. Late August to early September (October if harvesting grain): Sow winter cover crop. If possible avoid tilling by using no-till drill or broadcasting on surface. Buckwheat should leave the ground mellow enough that the cover crop will take without tillage. Seeds on surface will winter kill.

Keys to success

Weed suppression

Reduce perennial weeds. Some perennial weeds, especially quackgrass, are weakened by mid-summer tillage and recover poorly in a stand of buckwheat.

Suppress summer annual weeds. Seeds of summer annual weeds germinate but are suppressed. That reduces next year's weed pressure. A strong stand of buckwheat suppresses all summer annuals. Weeds should be very rare and only a few inches tall. If the buckwheat starts growing slowly, or there are gaps, the weeds that most often escape are redroot pigweed, lambsquarters, and barnyardgrass. Buckwheat is a strong suppressor of ragweed, galinsoga and purslane.

Procedure

Goal of tillage. Vegetable production leaves the ground too hard for no-till seeding to work. The fine roots need some friable soil volume and percolation below the seed row to grow fast enough to suppress all the weeds. Incorporating the crop residue after an annual crop may be enough tillage to prepare the ground; plowing is needed after perennials to distribute the organic matter and break up compaction.

Buckwheat should be part of an overall soil-improvement program. Vegetable ground is often over-worked; preserve as much existing soils condition as possible by tilling no more aggressively than is necessary. Over-tilling is expensive and counterproductive.

How long to wait after tillage. Sowing immediately after incorporating fresh organic matter can result in greatly reduced stands, either from seed rot or predation. A week is a sufficient wait after incorporating pea or bean residue in the summer. Larger residue, high-carbon residue and colder soils require more time, two or three weeks. Nitrogen tie-up is not a big concern with buckwheat because its nitrogen requirement is low.

It is also worth waiting if a heavy rainfall (an inch or more) is predicted. Buckwheat seeds are susceptible to rot if the soil is water-saturated even for a few hours. The reduced stand and slower growth can make weed suppression fail.

Seeding method. A solid stand is essential to suppressing weeds. Weeds tend to grow in gaps more than 8 inches across. Seven-inch drilled rows allow the use of a minimal seeding rate of 50 lb per acre. For broadcasting, an increased rate (70 lb/ac) is recommended to get the minimal coverage in the thinner spots. The rate can be adjusted if the uniformity is better or worse than average. Broadcasting is faster, so the savings in time and fuel may offset the higher seed cost.

Rapid emergence is valuable for better weed suppression. Seedlings emerge faster with shallow seed placement. The shallowest setting that reliably covers the seed is a good target. With a drill, 3/4 inch is reasonable if there are few clods. For broadcasting, some growers have found the back side of a drag harrow, or a heavy chain, to cover the seed to the right depth. A disk is usually too deep and works the soil more than necessary.

Avoiding volunteers. Timing is important for avoiding volunteers. Seeds begin to appear at the same time stover mass peaks, around six weeks. The crop will just be coming into full bloom; on vegetable ground it is generally about 30" tall. *Don't leave the plants to mature in the fall unless you have a plan that deals with the seeds that are produced.* Some growers find buckwheat volunteers to be a significant challenge the following season, where others have no trouble whatsoever.

There are three steps to avoiding problems. First, minimize seed production. Second, minimize winter survival. Third, kill seedlings in spring.

Minimize seed production with timely and thorough mowing. Some bigger plant parts may survive, for instance in the wheel tracks. Even though they are severed from the plant, some seeds on them will mature. There can be a small amount of regrowth from lower nodes that produces a few seeds.

Reduce winter survival by leaving seeds on the soil surface. Exposed seeds tend to survive less than those that are buried by fall tillage. Some volunteer seed on the surface germinate in fall rain, then are killed in the first frost. Animals and fungi also consume seeds over the winter.

Kill spring seedlings when they appear in mid-May. Tillage, cultivation and low rates of many common herbicides are all effective methods.

What to plant next. Use the mellowed soil to your advantage with a fall crop, or stabilize the good soil condition with a winter cover crop. A rye cover crop can be drilled after mowing or an early frost. The soil is somewhat more sensitive to erosion during the winter.

Winter cover crop choices:

- Rye is best for protecting the ground and stabilizing soil aggregates. Some risk of excess growth in spring. Large rye plants are hard to incorporate and excess residue can inhibit the next crop.
- Hairy vetch can be added to rye for nitrogen fixation if left until mid-May. Only for crops to be planted after June 1. Volunteers a problem in future small grains.
- Oats provide dead winter cover and a small amount of soil aggregate stabilization. Good for early spring crops.
- Volunteer buckwheat. Will be killed in first hard frost and leave minimal cover by spring. Allows spring annual weeds to grow. Earliest drying in spring for very early crops.
- Red clover. Must be underseeded; see Strawberry instructions for details.

Comparison with sudangrass. If weed suppression is the main purpose, buckwheat is preferred. It covers the ground earlier than sudangrass, especially in early June, and outcompetes weeds that may establish in sudangrass. Sudangrass requires a higher seeding rate for effective weed suppression.

The amount of time until the fall crop is to be planted is a significant decision factor. Buckwheat is in the ground for 35 to 40 days when used as a cover crop. It can be sown as early as May 20th in a warm spring. Sudangrass needs 60 to 70 days to be effective, and is best planted once June has become thoroughly warm. Both of these cover crops should be mowed after about 40 days. That is the end of the season for buckwheat, but the beginning of major root growth for sudangrass. Sudangrass needs a final flail mowing and immediate incorporation to suppress nematodes.

The condition of the field will determine which crop is suitable. If the soil is hard, or the field is prone to standing water, sudangrass is a good choice, while buckwheat will do poorly. However, if the field is low in nitrogen and phosphorous, buckwheat will do well without additional fertilizer, while sudangrass needs about 40 lb of N to give satisfactory performance.

If the crop to follow needs a fine seedbed, that will be easier to produce after buckwheat. It mellows the soil for easy working, and decomposes quickly after incorporation. Sudangrass crowns take some time to break down, so the following crop needs to be one that can be sown in a somewhat lumpy field.

Risks. The main production risks with buckwheat are a failed stand and letting it go to seed. The failed stand usually follows a heavy rain around emergence. It will be obvious

two weeks after planting. If the seedlings are not doing well then, till them in and plant again. To avoid volunteer buckwheat seed, kill the crop before there are filled green seeds on the plant. That takes about 40 days from a July planting or 50 days from a June planting.

Seed sources. In the Northeast, cover crop buckwheat seed is available from AgriCulver, Birkett Mills, Seedway, Ernst Conservation Seed and Lakeview Organic Grain. Both Birkett Mills and Lakeview have organic seed. Local sources include feed mills and farmers raising buckwheat grain. Many mail-order seed suppliers carry buckwheat. The cost per acre for delivered seed is roughly \$15-20 from a local grower, \$20-25 from a producing seed house, and \$70 to 100 from a mail-order firm.