

Organic Weed Management at River Berry Farm – a Case Study

Background. David Marchant and Jane Sorensen are the owner/operators of River Berry Farm where they have farmed since 1991. The farm is located in Fairfax, Vermont, along the LaMoille River. The soils are primarily river bottom silt loams with some sandy loams on the uplands. The farm totals 150 acres, with 90 acres tillable in a rotation with cash crops and cover crops. The primary cash crops are: root crops (carrots, parsnips, beets,) winter squash, leaf lettuce, zucchini and summer squash, kale and collard greens, cabbage, broccoli, sweet corn, strawberries and raspberries. Several greenhouses also produce bedding plants and tomatoes. About two-thirds of the crops are marketed through wholesale channels and the other third is direct markets at the farm stand, through a CSA and at farmers’ market.

“Our farm was a dairy farm and the fields were in sod when we arrived so the weed pressure was very low when we started vegetable farming” says David. “Early on it was mostly pigweed and lambsquarters that were the main weed issues. Bringing in manure brought us hairy galinsoga. Now crabgrass and galinsoga are our main problem weeds. Also hairy vetch left over from our production of our own cover crop seed is a real weed problem in matted row strawberries in the fruiting year.”

Production practices. There are over a dozen different fields on the farm and they are managed differently in order to meet the needs of the wide variety of crops that are grown. A combination of cover crops, farm-produced compost and bagged fertilizers are used to maintain soil fertility, applied where they fit best in the rotation. Weed control tools include: a Lely tine weeder used on young sweet corn, Brassicas and first year strawberries; Buddingh baskets used on all lettuce and direct seeded root crops; C-shanks with shovels used for hilling established corn and Brassicas, Lilliston rolling cultivators between beds of plastic mulch and sometimes in place of shovels. “We also use hand hoes; with our weed pressure we definitely find ourselves needing to hand weed quite a bit.”



These carrot beds at Riverberry Farm were recently hand weeded to remove large weeds that grew after surviving earlier mechanical cultivations; the weeds were dropped in the walkways where they will dry out and die.

The following systems are used for growing and weeding specific crops:

“Lettuce usually follows carrots, which are harvested late in the season so the ground is bare in spring. We apply a 5-1-9 fertilizer for first 2 plantings, and then we use compost on later plantings when soil will have warmed enough for microbial activity to release nutrients. The field is disk harrowed then shaped into 54-inch wide beds; our bed shaper has 3 deep chisel shanks which line up with the 3 planting rows, spaced 16 inches apart, and it has a fertilizer box to place nutrients right into the bed, not the walkways. Then the crop is transplanted 12 inches apart in the rows. In a week or ten days, once the weeds are up, it is cultivated with the Budding basket weeder, and usually another pass is made about 2 weeks later. All lettuce is hand weeded one time.”



Making beds and applying fertilizer prior to seeding or transplanting crops.

“Carrots follow a rye/vetch cover crop that is harrowed in mid-May, and then disked twice in the next month; then the beds are shaped and planting starts mid-June. Before seeding we stale seed bed by waiting a week after bed shaping and then flaming the beds with a tractor-mounted propane flamer; after seeding, the beds are flamed again in six days, just before the crop emerges. Bagged organic fertilizer is sidedressed a week or so after the crop is up, at the same time it is cultivated with the basket weeder.”

“There may be another one or two passes with the baskets depending on weed pressure and weather conditions. The crop is handweeded once approximately 2 weeks after emergence, and there is usually another quick handweeding a month after that; this involves walking and pulling weeds that were missed. The crop is machine harvested. Parsnips are managed the same as carrots except they’re planted from mid-May to early June.”

“Kale, collards, broccoli and cabbage are planted early, from late April through early May into fields with a cover of young rye. Compost is spread at about 4 tons per acre, then the field is disk harrowed, beds are shaped, and the crops are transplanted. The first cultivation is a blind tine-weeding about 7 to 10 days after transplanting; the key is that the plants are well rooted so they don’t get pulled up. Then there are several passes with the S-tines and shovels. There’s usually one hoeing with cabbage, but no hoeing with broccoli. With kale and collards we often hoe after picking.”



Basket weeding while the crop is young and the weeds are very small.

“Winter squash fields are prepared like cole crop fields, except instead of forming beds the fields are stale seed bed cultivated with rolling baskets a week or two after harrowing. For our bare ground planting we use transplants and these are tine weeded as a blind cultivation one week after planting. The next cultivation is one pass with belly-mounted Lilliston rolling cultivators. We use the Reigi weeder for the next cultivation, to get a lot of the in-row weeds. Then we usual hoe about two weeks or so after Reigi weeding to get any weeds that were missed. The final pass is with Lilliston rolling cultivators on a 3-point hitch, just before the vines run. Once they run, we try to do one walk thru and handweed the tall weeds above the crop, though we don’t always get to it.”

“To reduce the need for cultivation some winter squash is grown on plastic is direct seeded and row covered immediately. In squash grown on bare ground we use a Rabewerk tine weeder on the young squash and then a 3-point hitch Lilliston rolling cultivator as the squash matures. When squash is grown on plastic then sweeps are used for the wheel tracks. We have moved to using more plastic, though I hate using so much plastic it speeds crop development and helps suppress weeds. Zucchini and summer squash are managed the same as winter squash on plastic, except we use transplants. We use clear plastic, for the first planting, then black when we don’t need the early season heat. There is some weed growth under the clear plastic but we plant at 12-inch spacing, so the canopy keeps the weeds in check.”

“Sweet corn is transplanted for the first planting in early May usually in a field with young rye. Compost is spread and then the field is harrowed and bed shaped. Transplants are planted 12 inches apart in the row, with 34 inches between rows. We use shovels several times on the corn. Early on we set up the Kubota offset cultivating tractor so it is only cultivating one row at a time, with the shovels on belly mounted straight shanks. This allows for more precision. Later we use a two-row 3-point hitch unit with shovels on S tines.”

“Direct seeded corn fields are prepared the same as for transplants except instead of shaping beds the fields are field cultivated with rolling baskets no more than one day before planting. We direct seed Sweet Rhythm from Harris. We have tried many varieties, but this series has unbelievable cold soil emergence. It’s the only variety we can successfully direct seed that is not treated.”

“Just at spiking we blind tine weed the crop. Then we row cover for crow control; it gets moved onto the successive spiking planting so the one piece is used over the whole season. The row cover is left on for one week and then we weed again if needed using belly mounted shovels, cultivating one row at a time. We usually make two passes a couple of weeks apart. Once the corn is 30 inches tall if it’s weedy we will use hilling furrowers that are 3 point mounted.”

“Peppers are planted into a field with young rye; it is prepped with compost, harrowed and rows of black plastic are laid. We plant two rows on the plastic, 16 inches apart with 18 inches between plants. A belly mounted Lilliston works the plastic edges with sweeps for wheel tracks. Individual holes in the plastic holes are handweeded. After the plants are too tall for tractor cultivation we use a Troy-Bilt walk behind rototiller, for weeds that remain in between the plastic.”

Cover crops. “Our main cover crop is rye/vetch. Our approach is to till it in mid- to late May where we want to it to provide nitrogen to a warm season crop in that year. Otherwise we let it go until July and then mow it and harrow it, hopefully before seed is viable. Then the huge amount of vegetation keeps the soil fairly well covered and weed free until September when we disk harrow it in and then usually go to oats; then that field is used for early spring plantings. For fields that we will plant early we use oats Getting a very thick solid planting is key. We drill our cover crops. If we have had a bad weed pressure field, we try to get it into a full year cover of the rye and then oats. “When we have space to grow longer-season covers I will plant things like sweet clover to add nitrogen and organic matter to the soil while suppressing weeds and hopefully reducing soil compaction.”

David Marchant stands next to a field of yellow sweet clover. Planted the previous summer, it has put on a lot of growth by early June.



Costs. Most of our crops require 2 to 4 hours of tractor cultivation per acre to do 2 to 4 passes; hand weeding is much more expensive, with labor at an average of at \$10 to \$14/hr. I estimate that in the carrots and parsnips this costs \$600 to \$1000 per acre; for cabbage, lettuce and peppers it is about \$300 per acre; first year of fruiting year of strawberries can cost \$1,500 to \$2,000 per acre in hand weeding to keep the crop clean.

Conclusions. "While I'd like to think I can get by without hand hoeing, I've learned it is always worth the money spent to hoe a field. It always makes harvesting quicker. We don't have a really clean farm from a weed seed bank standpoint, but I have a very good handle on the critical weed control periods where the crops must be kept weed free to avoid yield losses. Perhaps to our detriment I concentrate on the critical periods and often I am not thorough about weed control later in the season. I am learning to swallow my pride and realize we need to hoe and handweed even more than we do now, though it's not something I like to admit to."

Vern Grubinger 12-19-11