Lily Walter
Pilot Parcels Project Review

Project:
I used the Pilot Parcel's project to research the feasibility, limits and benefits of a reduced-till approach in small-scale vegetable production on Martha's Vineyard. Reduced-till agriculture is a relatively new farming method that has been proven to be beneficial for soil, crop, and wildlife health. This agricultural approach reduces erosion, soil compaction, soil structural damage, fuel costs, labor hours, and irrigation needs. Research has also shown that reduced-till farming greatly increases soil fertility and health.

While reduced-tillage farming is gaining interest and acceptance as an economical and practical alternative to conventional systems in large-scale, mono-crop agriculture, little research has been done to test the adaptability of these techniques to small-scale, organic agriculture. Furthermore, if these techniques were to be adopted on Martha's Vineyard, there is no research into how the particular perennial weather patterns and weed pressures would impact a system that intentionally leaves some sod intact.

The goal of my project was to assess the viability of a reduced-till approach for a small-scale production farm.

Method:
I subdivided my plot into three main sections: a strip-tilled section (section A), a mulched section (section B), and a conventional experimental-control section (section C).

Section A: strip-tilled: In this section, I used my walk-behind tractor to rototill strips, each 31 inches wide and 50 feet long, into the already established ground cover (primarily vetch, grass, and clover). These strips became my permanent beds, and I left the ground cover as the pathways, which I mowed as needed throughout the season. I planted these beds with chard, basil, sunflowers, kale, scallions, leeks, strawflowers, zucchini, cabbage, lettuce, and kohlrabi and irrigated with overhead sprinklers.

Also within this section, I experimented with using a seeded cover crop for the pathways instead of the already established cover of grass, vetch, and clover. I rototilled this entire section and then seeded buckwheat. Before the buckwheat flowered, I mowed it and then rototilled strips in the cover for permanent beds, each 31 inches wide and 50 feet long. I planted two rounds of lettuce in these beds.

Section B: mulched: In this section, I first strip-tilled beds (again 31 inches wide, by 50 feet long) into the existing ground cover. I then heavily mulched these beds with a layer of cardboard (acquired free from the dumpster of a local business in Edgartown) then a layer of seaweed (collected on local beaches) or grass clippings (dropped off by a local landscaping crew). The pathways remained mowed. I then transplanted tomatoes,

eggplant, pumpkins, onions, peppers, watermelon, muskmelons, sweet potatoes, herbs (thyme, savory, oregano) and leeks (all long-season crops) directly into the mulch. Each of the mulched beds was irrigated with drip line irrigation.

Section C, conventionally tilled: In the conventional-till section, all of the pathways and beds were tilled regularly in order to reduce weed pressure and to establish new crops. I planted a wide variety of vegetables, flowers, and herbs in these beds and irrigated the area with overhead sprinklers.

Findings:
My experiment confirmed the many benefits of reduced-till agriculture:

- **Decreased irrigation needs:** The soil composition (very sandy) and the perennial weather patterns (high winds) contribute to poor water retention in the Katama soils. These factors, combined with a particularly dry season, made regular irrigation a necessity on my parcel.

  In sections A and B, I was able to irrigate less frequently than in section C.

  In sections A and B, the ground covers and the mulches locked moisture in place and also provided protection from evaporation. On average, these beds required irrigation every 4-5 days for 4-8 consecutive hours in order to remain adequately saturated for productive plant growth.

  Section C, however, required more frequent and longer irrigation. On average, these beds required irrigation every 2-3 days for 9-12 consecutive hours.

- **Decreased topsoil erosion:** Katama is prone to high, consistent winds, which can contribute to topsoil erosion.

  The topsoil in sections A and B were not impacted by the strong winds; the mulches and cover crops provided adequate protection from potential erosion.

  Section C was impacted by heavy winds. Because the bare soil was constantly exposed, erosion was visible on days with high winds.

- **Increased soil fertility and soil health:** A reduced-till approach in agriculture decreases soil structural damage. Each time soil is tilled in a conventional-till system, the microorganisms and soil habitat is disrupted.

  Section A required tilling only within the permanent beds, since the pathways remained mowed. The mowed pathways allowed the soil to remain undisturbed while also increasing the amount of organic matter on the surface of the soil.

After the initial tillage to establish the beds, section B required almost no tillage. The mulch suppressed nearly all of the weeds, thus eliminating the need to disturb the soil while weeding. Furthermore, over time, the cardboard, seaweed and grass clippings will compost directly into the soil, increasing the organic matter.

Section C required regular tillage throughout the entire area to eliminate weed pressure. While the planted crops added some organic matter to the soil at the end of the season, it was significantly less than the added organic matter in section B.

- **Decreased weed pressure:** The weed seed bank throughout the parcel was high. The perennial weeds included vetch, grass, mustards, chickweed, and lambs quarters.

  Section A exhibited moderate weed pressure. The pathways remained mowed, a method that helped maintain the weeds. However, mowing inevitably left a few weeds to grow and then compete for light, water, and nutrients with the planted crops. Furthermore, the permanent beds suffered from encroaching grass from the mowed pathways. On average, these beds required weeding every other week.

  Section B exhibited low weed pressure. The heavy mulch successfully suppressed the weeds, eliminating competition for the planted crops. This section was lightly weeded twice during the growing season.

  Section C experienced very high weed pressure. This section required regular, thorough weeding every other week on average.

In conducting this experiment, I faced several challenges and drawbacks in the reduced-till approach:

- **Time:** The mulching method I chose to use in section B was exceedingly time consuming. It required truckloads of cardboard and then many more truckloads of seaweed and grass clippings. These loads were all free to acquire but the expense was driven up in labor costs, as it required many hours of work to spread the mulch over the beds.

- **Equipment:** I struggled with inadequate equipment throughout the season. The mowed pathways in sections A and B required a functioning lawn mower (with a bag to collect the clippings) and a weed whacker; I was lacking both of these items at various points during the season, which allowed the ground cover to become overgrown, sometimes going to seed. The lack of functioning equipment

contributed to an increase in weed pressure and weed competition with my production crops.

- **Unsuitable groundcover:** Because of financial and time constraints, I decided to use the already established ground cover as the mowed pathways in sections A and B. One of the primary covers was an aggressive grass, which was extremely difficult to eliminate from the beds in section A. The grass was in direct competition for water, sunlight and nutrients with the planted crops.

    If I were to repeat the experiment, I would till in the existing cover in the spring and attempt to establish a less invasive and aggressive cover, such as a low growing clover. The buckwheat that I tried to use for this purpose did not produce enough biomass to act as an adequate cover crop for the pathways.

Summary:

By utilizing both conventional-till and a reduced-till methods, I was able to operate a successful first-year farm business on my one-acre parcel at the Farm Institute; I am not sure I would have been as successful had I attempted an entirely reduced-till growing method since the reduced-till methods that I experimented with are only appropriate for certain crops. For example, the mulching method only works for long-season crops or for beds that the farmer plans to plant in only once during the season. Thus, while the methods I experimented with were largely successful and environmentally beneficial, they could not be used in all areas of a small-scale vegetable production farm. Other reduced-till methods could be experimented with to find one that has a wider usage for all crops on the small farm. With the project now complete, I feel that a mixed-tillage approach is a viable option for a small-scale vegetable farm on Martha's Vineyard.