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FOR THE LIFE OF THE SOIL

Farmer perspectives and experiences adopting reduced tillage organic agriculture

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In an effort to document how and why farmers are reducing tillage in their organic operations, the authors visited two farms in Western Washington utilizing reduced tillage practices.

JIM MEYER, CASCADIAN FARMS, ROCKPORT

In the foothills of the Cascade Mountains sits the Cascadian Home Farm where farm manager Jim Meyer cultivates crops on a gravelly silt loam, or what he calls "mountain-puke soil." This is Jim's fifth year of no-till; persistence, optimism, and wild enthusiasm for cover crops are what make Jim Meyer successful. During the preceding autumn, Meyer, an inveterate experimenter, had sown four separate cover crops in adjacent 4,000 square foot blocks: 'Nash's' rye/vetch mix, 'Merced' rye, 'Aroostook' rye, and 'AGS 104' rye. After the grain cover crops pollinated and kernels reached the watery ripe development stage, Meyer used a roller/crimper (figure 1) to knock down and damage the stalks of the pure rye stands. Then he used a flail mower to terminate the rye/vetch mix. This year, Meyer was especially pleased with the performance of the vetch mulch. The vetch grew lofty and thick in the spring and "obliterated everything" as it grew. "It was dark as night under there," Meyer noted. He described how non-traditional uses for everyday equipment can be a great low-capital way to emulate some of the specialized reduced tillage equipment. When at the beginning of the project he lacked a proper roller/crimper, he knocked down his rye with the bucket of his tractor, then dragged his rototiller over it, "to rip it up a bit more".

Pumpkins were transplanted into the cover crop mulch on the day of roller crimping using a trowel to loosen the soil. Planting day-of termination maximizes the weed-control effect of the cover crop mulch. While he doesn't own a no-till transplanter, Meyer uses his regular transplanter with a...*continued on page 4*

Figure 1. Jim Meyer, Cascadian Home Farm manager, and his roller/crimper from I&J Manufacturing. *Photo credit WSU.*

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fertilizer hopper (figure 2) to mark the rows and dibble fertilizer amongst the cover crop mulch. Field manager Rocelia Floers-Cruz underlined that individual attention to each young plant was essential to happy adulthood. Each is hand watered with about one of quart water mixed with liquid fertilizer at transplant, and then no other irrigation is supplied. Floers-Cruz, who once called her boss "crazy" because of his no-till cropping, is now nearly as enthusiastic about the no-till pumpkins as Meyer.

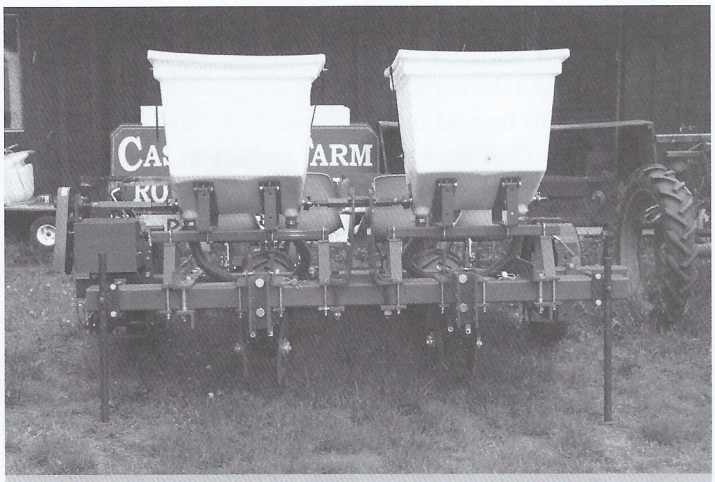

Figure 2. Transplanter and fertilizer used to mark rows and dibble fertilizer at Cascadian Home Farm. *Photo credit Doug Collins.*

MISTAKES ARE FOR LEARNING

The successful no-till strategies at Cascadian Home Farm have evolved through failures. The entire crop was lost during Meyer's second year of no-till planting. That year he hadn't supplied sufficient water or fertility during transplanting. He has learned now that taking extra care of his plants makes a tremendous difference. Tillage loosens soils and may improve root penetration compared to no-till soils. If plants are to thrive in the more challenging environment of no-till soils they need an energetic start.

WHY INCORPORATE REDUCED TILLAGE?

When asked why he works to incorporate reduced tillage in his farming operation, Meyer cites three primary reasons. The first is weed management for the subsequent crop: weeds from the seed bank are not brought to the surface and, according to Meyer, decomposing rye residue suppresses weeds through allelopathy. He has found that in the second year after reduced tillage there is much less redroot pigweed and common lambsquarters. The second reason is to bolster the soil food web by sparing fungi and earthworms the pulverizing action of tillage equipment. And finally, he likes the decrease in fuel use.

Visiting Meyer's farm, there is a striking difference in weed demography between tilled and no-till fields. Weeds litter his no-till vegetable fields, but they are species that aren't nearly as problematic as those in his tilled fields. Pigweed and lambsquarters are plentiful in Meyer's tilled fields and sparse in the no-till fields. The weed species that are in Meyer's no-till plots are not nearly as troublesome as those in the tilled and are markedly smaller. Perhaps it is allelopathy from the rye, or perhaps the weeds wear themselves out growing through the mulch.

In the coming years, Meyer hopes to follow this year's no-till pumpkins with sweet corn and then no-till pumpkins will take over a currently fallow field.

GARY MILLER AND AMY PLANT, GOOD EARTH CENTER AT TALKING HORSE FARM, SAN JUAN ISLAND

"Every time I use manure, I curse it," exclaims Gary Miller in response to an inquiry about why they use no-till organic methods. Gary Miller and Amy Plant's half-acre farm is nestled on a south-facing slope on San Juan Island. Their major goal in using no-till organic method on the farm is to build soil through cover cropping, not weedy manure.

Miller and Plant's market garden is thick with carrots, greens, broccoli, beans, squash, leeks, and tomatoes all planted with minimal soil disturbance and with reliance on hand tools. Miller met Masanobu Fukuoka, author of *The One-Straw Revolution*, 30 years ago and is inspired by his "natural farming" methods. According to Miller, they have improved soil quality in their sandy loam soils over the last seven years; earthworms are more abundant, the soil holds moisture better, and it has a better crumbly structure.

A YEAR OF NO-TILL METHODS

The no-till methods Miller and Plant adopted begin with winter cover cropping. In some areas they use a cocktail of hairy, common, and 'Purple Bounty' vetches mixed with fava beans, crimson clover, and common rye. Other areas receive a simpler rye/fava mix. In some seasons they even let weeds, especially lambsquarters and chickweed, act as cover crops, citing the

Figure 3. Gary Miller shows a tool used for shallow hoeing of cover crops at Good Earth Center. *Photo credit Doug Collins.*

Figure 4. Reduced tillage vegetables, including direct-seeded carrots, at Good Earth Center. Cover crop residue is piled and composted at the far edge of the field. *Photo credit Doug Collins.*

importance of maintaining something green on the soil. Cover crop seeds are integrated into the soil after raking away crop residues. Then plant residues are spread over them to deter crows from snacking on the seeds before they germinate.

In spring, the growing cover crop is cut with a scythe as many as four times between April and May. Eventually, the cover crop is terminated with a shallow hoeing (figure 3). Cover crop residue is generally left in place if the cash crop is to be transplanted. The residue is raked off and gathered into slow compost piles at the field's edge (figure 4) when preparing for direct-seeded crops. Shallow hoeing is also used to remove quack grass, which is very aggressive in the spring and is probably the most aggravating weed at the farm. Transplants are placed with a hand trowel while seeds are sown in a shallow opening in the soil. Squash and carrots were among the direct seeded crops sown this year.

Miller and Plant emphasized the need to jump on weeds as they emerge. They recognize what their major weeds are (often quack grass) and control them through aggressive pulling. They also recommend transitioning into no-till methods with a deliberate strategy to ward off major weeds. For example, one could summer cover crop for a season to focus on out-competing problematic weeds.

Their farm is admittedly small-scale but Miller believes these methods are scalable with the right equipment. Their shallow hoeing is similar to running an undercutter bar at a shallow depth to disrupt cover crop and weed growth. Heavy cover crop residue is both positive and negative in organic no-till. Heavy mulch is great for reducing weed emergence, but as weeds break through the mulch, controlling them is more difficult. Employing a rotovator at a shallow depth could be used to integrate mowed cover crop, though large cover crop volumes could still be difficult to handle on a larger scale with direct seeding, perennial weeds, and continuous no-till.

They try to farm as holistically as possible, Miller says, "agriculture is a man-made thing, but we look to nature to guide us."

SHARE YOUR EXPERIENCES

Are you using reduced tillage practices in your organic agriculture operation? Please share your experiences or ideas with Doug Collins: dpcollins@wsu.edu. To find out more about ongoing research in reduced tillage organic agriculture and to sign up for the Organic Reduced Tillage in the Pacific Northwest listserve,

REDUCED TILLAGE OPERATIONS AT-A-GLANCE

Cascadian Home Farm

- They practice rotational reduced tillage. After one year of no-till pumpkins, the land is rotated to a different crop where conventional tillage methods are used.
- Cover crops are intended to provide weed-suppressing mulch.
- Pumpkins are not irrigated, possibly reducing weed pressure during the growing season.

Good Earth Center

- Work is done with hand tools.
- Cover crops are scythed several times during the spring, then terminated by scraping at the soil line with a shallow hoeing. Residue is raked off the plots before seeding; more is left in place for transplants.
- Transplanting, direct seeding, and succession sowing are all integrated into the reduced tillage system.
- Crops are watered with drip irrigation.
- Soils are never tilled, even for seeding cover crops. The deepest disturbance happens while transplanting.

Jim Meyer and Sandra Wayman will present their findings and perspectives about choosing cover crops and using reduced tillage methods at the Tilth Producers Conference in Yakima this November.