



Weed Control Strategy Differences in Alternative/Organic vs. Conventional Farming

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Let no weeds go to seeds. Farmers wanting to control weeds with non-chemical herbicide alternatives should not underestimate their challenge. There is a conflict between the goals of improving soil health and achieving weed control sufficient for viable crop yields and profitable farming. Table 1 provides a glimpse at the changes in farmers' time and effort required for alternative management.

Farming without herbicides on mid-Atlantic Coastal Plain soils (coarse and sandy) pushes farmers in opposing directions. Farmers forego building soil quality with aggressive mechanical tillage and cultivation sufficient for controlling weeds. These practices decrease (oxidize) soil organic matter and reduce tilth. Alternatively, farmers can implement multi-year rotations, including fallow and cover crops, but significantly impair their cash crop selection and profits in order to simultaneously control weeds and improve soils. Both goals can be pursued, but remain a challenge demanding more manager time, intensity, creativity, and compromises based on personal farming goals.

Most sustainable farms integrate **all** mechanical, cultural, and chemical controls available, minimizing inputs. Moreover, cultural weed controls, like those used in conservation tillage, depend upon mechanical tillage and chemical support. Upon removing chemical controls in alternative/organic farming, we become solely dependent on cultural and mechanical methods, which dramatically



Top: With a rotary hoe, Jesse Smith runs shallow, over dry soil, just prior to crop emergence, at high speed on organic fields. Timing and soil conditions are critical to achieve soil "flail," removing emerged weed seedlings without undue crop damage.

Bottom: Close-up of tines on Yetter rotary hoe we purchased used. Popular as a "steel in the field" herbicide alternative for pre-emergence and early post-emergence weed control.

Continued on page 2

Table 1. Role of weeds in managing the farm enterprise	
Alternative	Conventional
Controlling weeds much more important part of farm enterprise.	Controlling weeds less important part of farm enterprise.
Weeds a much higher management priority . A top farming priority becomes not permitting weeds to go to seed.	Weeds a lower management priority.
More time and money managing and performing weed control tasks.	Less time and money in weed control tasks.
Timing of weed control practices very critical.	Timing of practices less critical.
As the farmer, you decide where your time is most valuable. How will important farm tasks change due to weed control?	



Left: In organic field corn at the Rutgers Agricultural Research and Extension Center farm, Pigweed and Ragweed escaped because we missed cultivating at a critical time period. USDA Northeast Sustainable Research and Extension (SARE) fund on-farm alternatives training to meet these challenges. **Right:** Using wider row soybeans and rotary hoe just prior to emergence, followed by precisely timed aggressive cultivation based on “footprints in the field” crop observance, our organic soybean fields were freer from weed competition.

elevate weed control on already burdened farm managers. We replace chemical use with increased management hours and intensity. It can be successfully achieved. Not all farmers want to devote increased management time to weed control, but successful organic farmers are obligated to this path. It becomes part of their passion on the farm.

When practicing even the best alternative/organic weed management strategies, be aware that just as in the 1920s-1950s mechanized but pre-herbicide era, about 25% of crop seedings will regularly suffer reduced yields or fail due to weed competition. Intermittent rainfall and lack of supplemental irrigation remain an equally important additional cause of crop seeding failures.

Farmers pursuing herbicide alternatives, organic farmers, or beginning and part-time farmers cannot underestimate the **time and timing** challenges faced when pursuing soil health, weed control, mechanical tillage, sufficient cash crop acres, manageable farming intensity, and sustainability. Table 2 provides guidance on modifying crop production strategies, practices, and compromises for alternative weed control. In the tension between building soil quality and weed management, there is no free lunch, and there never were any good ‘ole days. Organic farmer surveys repeatedly reveal weed control failures among their priority

production problems.

Options meeting these challenges on coarse Coastal Plain soils emerge from grower experiences and joint efforts by Rutgers NJAES and NRCS USDA. Farmers incorporating municipal leaves, shredded construction or pallet wood, spent mushroom compost, animal manure, or any clean community waste carbon sources can improve soil organic matter far better than cover crops alone, while still performing increased mechanical tillage weed control alternatives. In summary, farmers have four weed control methods in their toolbox:

Mechanical. All common tillage practices before and after planting crops, including frequent cultivation at precise times using specialized implements, deep plowing to bury weed seed banks, etc.

Cultural. Includes fallowing land, stale seedbeds, adjusting seeding dates, transplanting instead of seeding, mowing, and smother cover crops, etc.

Chemical. Chemical weed control reduces human drudgery and suffering from back breaking hoeing labor, reduces fuel use and energy inputs, and helps build soil quality by reducing tillage when integrated with other practices. Conservation minimum-till and no-till practices benefit soil and water quality on millions of acres, yet abso-

Continued on page 3

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lutely depend on chemical herbicide control integrated with cultural control and large implements, “steel in the field.”

Biological. Historically not deployed in intensive farming systems. Successes include rangelands, pastures, and against invasive weeds on non-cultivated land. E.g.,

in New Jersey, beneficial insect releases have combated Purple Loosestrife, and Canada Thistle and Musk Thistle in permanent animal pastures.

The challenge remains integrating their use grow profitable crops and improve soil health at the same time.

Table 2. Strategies for Field & Forage crops

Alternative	Conventional
Fallow fields up to 6 months. Particularly for thistle and nutsedge problems. Till every 7-10 days in weed critical periods. Fuel use and costs increase.	Crop every year. Use cover crops between seasons.
Plant competitive cover crops like Sudax, buckwheat, or alfalfa on stale seedbeds.	Crop every year. Use cover crops between seasons.
Stale seedbeds with later optimum planting dates. Fuel use and costs increase.	Earliest optimum planting dates.
Mow several times.	Post emergence herbicide @ 10 weeks +/-.
Fertilize post planting, only after viable establishment has been determined (or not). Late fall.	Preplant broadcast fertilization and post plant fertilization.
Maximum <i>plus</i> high seeding rates. Higher plant populations to competitively overwhelm weed seedling populations and withstand rotary hoe.	Minimum recommended seeding rates. Saves seed and/or encourages using expensive, but higher performing varieties.
Be prepared to replant 25% of seedings. This is independent of irrigation.	Expect successful stand establishment.
Strategies for annual field or horticulture row crops	
Alternative	Conventional
Limit (reduce) cropped acreage. Achieve time and timing for performing effective of weed control tasks.	Increase acreage and limit time. Use time for management tasks like sales, supervising labor, etc.
Greater impact of field rotations on cash crop selection. Increase length of rotations out of crops competing poorly against weeds. Increase fallowing, only grow your most desired cash crops 1-2 years out of 5, add field and forage crop rotations to high value horticulture crop farms, etc.	Less impact of crop rotations on selecting most desired cash crops. Increase use of cover crops between seasons.
Stale seedbed preparation. Start earlier, use more tillage, and plant later. Fuel use and costs increase. Equipment use and costs increase.	Make multiple plantings.
Open-pollinated seed use.	Hybrid seed use.
No broadcast or banded preplant fertilization. Sidedress only.	Broadcast preplant and sidedress fertilization.
Wider rows. Increases amount of soil cultivated in fields.	Narrower rows. Reduces amount of soil cultivated.
Increase “in-row” plant populations. Assists emergence in some soils. Risk with corn of within-row competition.	Reduce “in-row” plant population.
Determine competitive viability at 3 week +/- critical stage between young crop and weed seedlings. Prepare to replant ¼ to 1/3 seedings.	All seedings succeed.
Transplant hybrids of high value crops.	Direct seed hybrid crops.