

WEED MANAGEMENT FOR BEGINNING FARMERS



PRINCIPLES FOR ORGANIC GROWING

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Organic farmers use a wide range of integrated strategies to manage weeds without synthetic herbicides. Successful weed management often goes beyond protecting crop yields within a single growing season. The beginning farmer may find these tips and tricks helpful in choosing strategies that will contribute to effective weed management, both seasonally and long-term.



Hand weeding organic sweet corn

prematurely, get eaten by rodents, birds, or insects, or simply decay, weed seeds die at an exponential rate after seed rain, so that only a very small percentage of seeds that fall live in the soil for the ‘worst case’ length of time. This means that, with careful timing of your weed management practices, you can significant change the weed population dynamics on your farm in just a few years. For more information, see the Seedbank Management bulletin in this series.

4) Timing is Everything

Most processes on the organic farm serve multiple purposes. Crop rotation and cover cropping are certainly not exceptions – while bolstering soil health and microbial activity, crop rotation and cover cropping can simultaneously contribute to effective weed management.² Timing is everything, however, and these practices can just as easily contribute to burgeoning weed seedbanks if weeds are allowed to go to seed. Strategically planning rotations and cover crops so that tillage events kill weeds when they are most vulnerable, and terminate

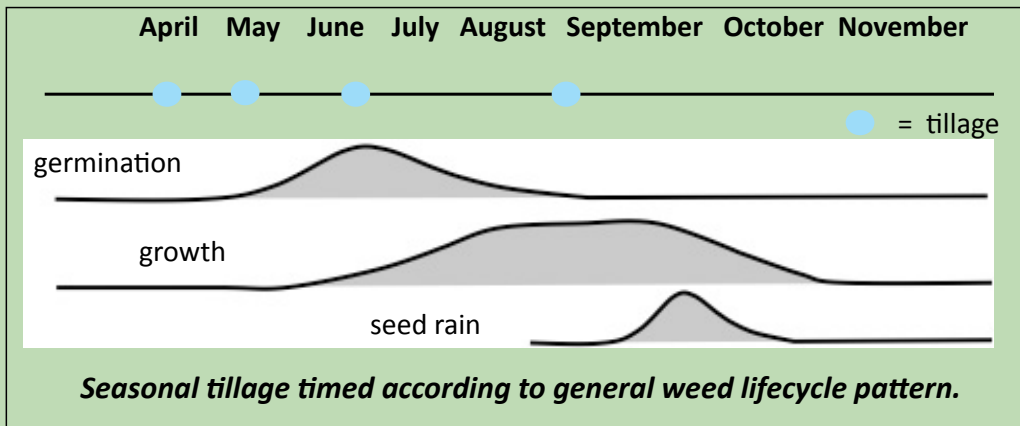
TOP FIVE ORGANIC WEED MANAGEMENT TIPS

- 1) Know Your Weed Biology
- 2) Mulch
- 3) Cultivate Smart
- 4) Timing is Everything
- 5) Think Long-Term

5) Think Long-Term

Though it is possible for weed seeds to remain viable and dormant in the soil for decades, most weed seeds in tillage-based agricultural fields do not remain in the seedbank (the natural store of dormant weeds in the soil) for more than 1-2 years.¹ Whether they germinate

Box 1: Tillage Timing is Key



The image at left shows general periods of emergence, growth, and seed rain for an annual weed (gray curves), and a tillage sequence (blue dots) suggested to interfere with this lifecycle. Note that these patterns will vary by weed species.

During seedbed preparation, an initial tillage event encourages seed germination, and a second event prior to crop establishment kills newly emerged weeds. Two more tillage events, the first timed to coincide with peak germination, the second to preempt seed rain, will result in a high level of weed control. A knowledge of weed biology can help the farmer plan crop rotations, cover crop sequences, or cultivation events to hit a specific problem weed at these key junctons in their lifecycle.

late-germinating weeds before they mature and set seed, is key to effectively utilizing these tactics for weed management (**Box 1**). For more information, see the Cover Cropping for Weed Management bulletin in this series.

3) Cultivate Smart

The most common physical weed control methods employed on Maine organic farms are hand weeding and cultivation. Both of these strategies are most effective when weeds are in the tiny 'white thread' growth stage (**Figure 1**). A farmer can achieve a high level of weed control through hand weeding if she is confident with weed vs. crop seedling identification. Hand weeding can, however, be labor intensive and costly when weed density is high. Cultivation by tractor, horse, or person-powered machinery can save time hand weeding, but efficacy varies greatly based on conditions, tool choice, consistency of the soil, and experience of the person

cultivating.³ As with cover cropping and crop rotations, timing is extremely important to maximizing cultivation efficacy (**Box 1**). To learn more, check out the Physical Weed Control bulletin in this series.



Figure 1: Weeds are most vulnerable when they are in the 'white thread' growth stage, shown at right. The larger weeds at left have a higher chance of re-rooting after cultivation.

2) Mulch

Mulch can be one of the greatest labor-saving, weed-fighting, soil-enhancing tools in the beginning farmer's toolkit. A thick layer of mulch – whether plastic, straw, cardboard, wood chips, pine needles, or leaves – can greatly decrease time spent weeding, and minimize weed seedbank inputs. If you have good source of organic

mulch, this can be a great weed management strategy for many crops (**Box 2**).

1) Know Your Weed Biology

A working knowledge of weed biology can greatly contribute to successful weed management. You do not need to intimately know each weed species on your farm;

Box 2: Mulching 101

Mulch suppresses weeds, reduces soil erosion, and holds moisture in the soil; additionally, natural mulches reduce daily temperature fluctuations and add organic matter to the soil.⁴ Many, but not all, crops grow well in mulch.

Mulchable Crop Groups & Examples	
Cucurbit family	Squash, melons, cucumbers
Brassica family	Cabbage, broccoli, kale
Nightshade family	Tomatoes, peppers, eggplant
Berries & fruit trees	Strawberries, blueberries, plum
Perennial herbs	Lavender, rosemary, sage



Tomatoes and peppers planted in black plastic mulch, with straw mulch in the pathways.

Potential Pitfalls:

- Crops that are direct-seeded or require hilling as they grow are not ideal for mulching. This includes potatoes, peas, beans, carrots, beets, turnips, radishes, and sweet corn.
- Natural mulch will not be effective if it is applied too thinly. If light can penetrate through to the soil, weed seeds can germinate and grow through the mulch. Typically 4 or more inches is required for good weed control.
- If natural mulch is applied early in the season, before the soil has warmed, its insulating effect may prevent soil warming, stunting crop growth. Black plastic mulch, on the other hand, lacks this insulating effect; rather, it absorbs solar radiation and can help to warm springtime soils.
- While adding beneficial organic matter to the soil, natural mulches are slow to degrade, and bind up soil nitrogen during the decomposition process. Apply extra fertilizer for the next growing season accordingly.
- Review the organic certification standards for your region, and avoid natural mulches from unknown sources, non-organic straw, chemically-treated wood chips, or hay that is full of weed seeds.

however, the ability to identify key problem weeds, and know when they are likely to germinate and set seed, will be very helpful in timing farm practices that will interfere with their lifecycles and prevent seed rain from occurring (**Box 1**). Appropriate timing of cultivation, cover cropping, crop rotations, and mulch application can lead to a long-term reduction in weed pressure on your farm. For specific information on managing some of Maine's worst agricultural weeds, see our Weed Biology Factsheet series. Talk to experienced farmers, Extension experts, and others for more information.



Literature Cited:

1. Mohler, C.L. (2001). Weed life history: identifying vulnerabilities. In: Ecological management of agricultural weeds (eds M. Liebman, C.L. Mohler & C.P. Staver). Cambridge University Press, Cambridge, UK.
2. Sustainable Agriculture Network (SAN). 1998. Managing Cover Crops Profitably. 2nd Edition. Sustainable Agriculture Network, USDA National Agriculture Library, Beltsville, MD.
3. van der Schans, D. *et al.* (2006). Practical weed control in arable farming and outdoor vegetable cultivation without chemicals. Wageningen UR, Wageningen, the Netherlands.
4. Skroch, W.A., Powell, M.A., Bilderback, T.E., and Henry, P.H. 1992. Mulches: Durability, Aesthetic Value, Weed Control, and Temperature. *Journal of Environmental Horticulture* 10 (1): 42-45.

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