

## Strawberry Weed Management

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Weed management is among the greatest challenges of commercial strawberry production. Indeed, the most common reason for early bed failure, that is, why a planting lasts only one or two harvest seasons, rather than three or more, is weeds. Nearly all aspects of strawberry production can have an impact on weed populations, and growers must constantly focus on how their practices can prevent weeds from becoming established in the field.

From the beginning, any strawberry planting is threatened by weeds. The first step in managing this problem is to select a site where the weed pressure, especially from perennial weeds, is low. This means a site that has previously had well managed cover crops and/or cash crops that either smothered weeds or allowed effective cultivation. Avoid sites where tomatoes, potatoes, peppers, or eggplant have been grown in the past four years to prevent possible root rot caused by *Verticillium*. Do not plant strawberries into recently plowed sod, as this can lead to devastating weed problems in addition to white grubs, a common turf pest, which also feed on strawberry roots.

Delaying the planting date can help to manage weeds in a new strawberry bed. By preparing the ground in the fall or in the early spring, then allowing the first flush of spring weeds to germinate before planting, growers can kill those early spring weeds with a light cultivation, a contact herbicide or flaming, and plant soon after. By eliminating the first flush of weeds and planting into a warmer, drier soil, the need for early cultivation and hand weeding is greatly reduced. The delay in planting of four to six weeks can have a negative impact on the quality of your stored strawberry plants and you should discuss your plans with the nursery well in advance so that they will store and ship the plants appropriately. It also reduces the amount of time the new plants have to develop and form runners during the planting year, but early results from grower trials in New England have been very positive for this strategy.

Organic strawberry fields have typically been planted on open ground following the incorporation of a cover crop. Weeds are then managed with a variety of cultivation methods such as tine cultivators, blind cultivators (e.g. Lely) and/or finger weeders (e.g. Buddingh, Regi). This can be effective early in the season, as long as it is combined with vigilant hand weeding within the plant rows, where the cultivators can't reach. However cultivation becomes more challenging during the summer when the plants throw runners in the aisles in the path of cultivators. Using sweep blades to push the runners out of the way in front of the cultivating tines can work, but generally the need for hand weeding will become more intense as the season progresses. Flaming weed seedlings between the rows has also been used with some success in strawberries, but it is costly, and the burners must be well shielded to prevent burning the strawberry plants. This technique has the advantage of not disturbing the soil surface, which avoids bringing more weed seeds up from the soil.

Another strategy for managing weeds in the planting year is to use strip or zone tillage. In the late summer of the year prior to planting a cover crop of oats or winter rye is grown. Oats will winter kill, but rye will need to be crimped, mowed or killed with a contact herbicide (e.g. acetic acid) the following spring. The plant residue is left undisturbed on the soil surface except for narrow (8-12") strips or zones that are tilled for the strawberry plants. Leaving most of the soil surface untilled with a heavy plant residue will prevent most weed seeds from germinating. The rye residue last longer than oats, but killing the rye can be problematic. Zone tillage requires specialized equipment to make the soil strips suitable for good plant growth. The equipment is both expensive and heavy, requiring a fair amount of horsepower, but it can be used for many crops on the farm. Toward the end of the season, as the residue breaks down, weeds can once again become an issue, and hand weeding will be required within the tilled strips of the plant rows. After harvest the following spring the planting is usually plowed down and the field put back into rotation crops for a minimum of three years. A potential alternative to plowing down after harvest would be to seed the aisles to some sort of cover crop to prevent weed growth, such as oats, sorghum/sudan or buckwheat. The grasses should be mowed when they reach a height of two feet to prevent them from shading out the strawberries, and enough nitrogen fertilizer and water must applied to prevent competition between the cover crop and the strawberries. The cover crops will keep the weeds down in the aisles and the grass residues will help provide winter protection, but hand weeding within the plant rows will still be needed. Grower results with this technique have been mixed, but some studies have found it to be effective.

Plastic mulches can also be used to reduce weed problems in strawberries, although organic regulations restrict the length of time that plastic mulch can stay in place, generally to one growing season. Planting strawberries through black plastic will eliminate much of the weed pressure within the planting, but it prevents the use of runner plants to fill out the row. Therefore, plasticulture systems require about two to three times as many plants as a matted row system at planting, and plants are initially spaced only 8 to 12 inches apart. Once again, specialized equipment for making beds and laying plastic mulch is required, but vegetable growers would likely have such equipment already. Strawberries are typically planted later into a plasticulture system to reduce runner production. Runners need to be removed in this system, which is quite labor intensive. The plants are overwintered and harvested the next spring. After harvest the plastic must be removed, and the planting is generally plowed down. Research is underway to evaluate the feasibility of removing the plastic without disturbing the plants in the second season and allowing the planting to become a matted row for harvest a second year. It is hoped that weed problems would be reduced from having the soil covered for the previous year. The experience of most organic strawberry growers using the matted row system is that the beds should only be fruited one year then plowed down and put into rotation crops. Trying to renovate a bed and carry it over a second year inevitably leads to major weed infestations and increased insect and disease pressure. However, using a plasticulture system in the first year and converting it to a matted row for a second year with minimal soil disturbance could provide a workable two crop system that would significantly increase the profitability of the planting.

Growers have also been trying to develop a renovation scheme for matted rows that would prevent the typical flush of weeds. This entails renovation without tillage. The thought being that much of the weed pressure following renovation is due to the tillage prescribed in the

renovation process, i.e. bringing up new weed seed from the soil every time it's tilled. So, rather than tilling to narrow the rows after harvest, contact herbicides or flaming is used. The sprayer or flamer must be adequately shielded to prevent burning the plants in the center of the rows (they should be narrowed to about 8 to 12 inches). Repeated burning will be necessary to manage weeds between the rows through the summer, and regular hand weeding within the rows will also be necessary, but by not tilling the soil, growers are finding that weed pressure in the second year is significantly reduced. Yields tend to be lower and fruit size smaller in the second harvest year, but it seem to be profitable enough to make it worthwhile.

The one harvest year rotation is probably still the best option for most organic growers (plant year one, harvest year two, plow down and plant to rotation crops) to manage weed problems in strawberry beds. However, some of the new strategies being developed may allow growers to extend the productive life of strawberry beds and thus improve their profitability. With any new strategy, it is critical that strawberry growers maintain soil health and fertility and prevent the build up of pest organisms; therefore each new technique must be evaluated not only in terms of how it affects short-term yield, but also how it may impact the long term success of future crops.