

Orchard Floor Management, Row Middle and Tree Row

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The ground cover in an orchard must be managed just as the tree canopy is managed. The orchard floor can be divided into two distinct areas: the area between the tree rows, and the area directly underneath the trees.

Row Middle Management

The vast majority of commercial orchards in Pennsylvania are grown under a ground management system of a sod row middle with a vegetation-free zone underneath the trees. Sod between the rows prevents soil erosion, provides traction for equipment, adds organic matter to the soil, improves soil moisture and structure, and can be a site for beneficial predatory insects.

Grass covers used in row middles tend to grow rapidly and require frequent mowing. Perennial ryegrass, K-31 tall fescue, and clover are covers that have been traditionally grown in Pennsylvania orchards; however, a number of turfgrasses have been found to perform well as slow-growing cover crops. Because they grow more slowly, these new grasses require fewer mowings. They tolerate low-fertility soils, poor growing conditions, and heavy traffic, and they grow densely enough to crowd out weeds.

The addition of clover or other legumes is not recommended for orchard row middles. While they may provide additional nitrogen to the orchard, the release of that nitrogen is unpredictable. Legumes also can serve as reservoirs for tomato ringspot virus, which causes stem pitting in peaches and apple union necrosis in pome fruit. Clover can also attract pollinating insects into the orchard when insecticides are being applied causing them to be harmed.

A relatively recent criterion of grass cultivar quality is the presence of endophytes. Endophyte-enhanced varieties are recommended over those without endophytes. Endophytes are fungi that live within the grass plant and deter certain turf insects from feeding. Some species and varieties have naturally high levels of endophytes. Penn State researchers have been evaluating these grasses primarily for use in ornamental nurseries. This research and other observations made around the state indicate that hard fescue, chewings fescue, creeping red fescue, and slow-growing, turf-type perennial ryegrass can be used with success in orchard row middles. Each type may contain many acceptable cultivars. New cultivars regularly become available; check with your local supplier.

Using these grasses successfully depends on proper establishment practices. Failure to follow the steps below may result in a cover that is too sparse to be effective.

- Eliminate perennial weeds before planting. During their establishment phase, slow-growing grasses do not compete well with perennial weeds.
- Have soil tested and amended according to crop needs. Apply 20 to 40 pounds of actual nitrogen per acre when the cover is being established.
- Thoroughly work the soil before seeding. Any broadcast machine will do. Do not cover the seed with soil.
- A cyclone spreader, drop spreader, or Brillion seeder is recommended for planting seed. If a grain drill is used, disconnect the hoses at the grain box and let the seed fall to the ground. The light, fine seed of the fescues will not fall through the hoses.
- Seed the grass at a rate of 20 to 60 pounds per acre. The higher rates will produce a faster cover.
- The best time to seed is late August to late September. The next best time is mid-March to early May. If planted



in spring, slow-growing grasses will not compete well with weeds the first growing season.

- Limit weed competition the year of planting by mowing weeds before they reach 10 inches tall. Timely applications of 2,4-D will prevent broadleaved weeds from becoming established.
- If desired, you may want to add a nurse crop of oats in the seeding mix at a rate of 5 pounds per acre to help establish a covering to prevent erosion.

Other comments

- To remain effective, turf-type perennial ryegrasses need two applications of nitrogen each year at 40 pounds per acre. All others need an application of nitrogen only every other year.
- Chewings fescue and creeping red fescue grow taller than hard fescues and mat down more, but they seem to establish faster.

Orchard Sod Management

Managing the sod middles properly can prevent the invasion of unwanted weeds, provides a firm drive row for early spring orchard chores, prevents or reduces soil erosion, and increases soil organic matter. Weeds in the sod middles can serve as alternate hosts for insects, diseases and nematodes. Weeds such as dandelion that come into bloom can attract your bees to them rather than working your apple trees. At other times of the year weeds that come into bloom can attract native pollinating insects that might be harmed during the normal application of insecticides to the fruit trees.

Sod management practices will help suppress weeds including white clover, which can be difficult to control. Using herbicides with good management practices will help maintain the sod middles free of weeds. Fertilizer application to the sod middle is a management tool that can be utilized to favor grass growth rather than clover. Application of nitrogen will stimulate grass growth and phosphorus and potassium stimulate clover growth when present. Therefore, do not apply phosphorus and potassium fertilizers if clover is a problem in your sod middle. If the trees need phosphorus or potassium band those materials in the grass free area underneath the trees. Close mowing will favor clover growth, while, higher mowing heights will favor the grass growth. Do not mow closer than four inches if clover control is a problem.

Weed control in the sod should be completed in early spring or delayed until fall. Weeds are most susceptible to 2,4-D when they are vigorously growing and before the flower buds appear. When using 2,4-D make sure you are using a formulation that is labeled for orchards and is an amine formulation that will not drift. Do not use ester formulations that may volatilize and drift causing damage to surrounding vegetation. An application of Prowl H₂O at 1 to 1.5 quarts per acre can help control summer annual grasses such as crabgrass species, foxtail species and others that can weaken the desired sod grass. Certain weeds such as clover, wild onion and garlic can be suppressed or controlled with 2,4-D but it requires

additional effort. Clover leaves are densely covered with fine hairs and wild onion leaves are waxy and vertical and both retain spray poorly. The addition of a nonionic surfactant can increase wetting and spray retention to improve control. Another strategy is to make a split application of the 2,4-D. Applying two half rate sprays spread one to two weeks apart may help improve suppression or control when the weeds have become established. In apples and all stone fruit the addition of three to four ounces of Stinger 3A per acre with the 2,4-D can also improve control of susceptible weeds.

Tree Row Management

The area underneath the trees is important in the development of an orchard. Numerous studies have shown that excessive vegetation underneath trees competes with the tree for water and nutrients and can reduce the growth and cropping of the trees. Research in New York showed that apple trees grown in a mowed sod were nearly 25 percent smaller than trees grown under a herbicide program 6 years after planting. Research at Penn State with peaches also showed that the width of the vegetation-free strip affected tree growth and yield, with a narrower 2-foot-wide strip producing less fruit and smaller trees. Ideally, the vegetation-free strip should extend out to the edge of the tree's canopy width. The width should be established early in the life of the orchard.

The timing of weed control has also been shown to be critical. A study with Gala/M.26 showed that the first crop in the life of the orchard was much larger when weeds were controlled early in the season. The weed competition also affected fruit size. Based on this work, it is believed that the critical period for weed competition in apple runs from bloom to 30 days after petal fall.

At first thought, mulching might seem to offer some attractive potential benefits for orchards. Mulching usually results in greater moisture retention, increased organic matter, and can help to suppress weed growth. However, mulch also provides an ideal habitat for meadow and pine voles, which can feed on tree trunks and roots.

Cultivation under the trees has some potential with the development of improved machinery. However, it can increase erosion and does require frequent cultivation and a skillful tractor driver.

Herbicides are the primary tools used to manage vegetation under the tree row, but they also have risks. Young trees can be very sensitive to herbicides, and drift onto green bark or foliage can stunt or kill the tree. Continual usage of herbicides can also build up residues of the chemical in the soil, resulting in sterilization. Herbicides are, however, the most cost-effective means currently available to control vegetation under the tree.

Source: Penn State [Tree Fruit Production Guide](#). (Updated December 2015).

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