

WHAT IS THE BEST HERBICIDE FOR NEW APPLE PLANTINGS?

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The establishment costs of new high-density apple orchards at 1000-2000 trees per acre are estimated at \$10,000 per acre. Growers plant these orchards on precocious rootstocks so they can harvest a crop as early as 2nd to 3rd leaf. The better the tree growth in the early years, the better the potential yields. But if these orchards have to compete with annual, biennial, and perennial broadleaf weeds, annual and perennial grasses and sedges, for water and nutrients, tree growth is significantly reduced. What is the cost of that reduced tree growth to the grower?

Pre-plant site preparation is critical for any new fruit tree planting. Survey the field the year before for any weed species, especially biennials and perennials since they are the most difficult to control and have a life cycle very similar to your intended crop. Preparing a field right with a glyphosate or glyphosate plus 2,4-D treatment the early fall before planting will help control many of the perennials and biennials; these foliar applied herbicides will be translocated down to the roots to do a better job of killing these problem weeds. We learned in the last EXPO from Dr. Brad Majek that if Canada thistle is a problem in the field, depending on the crop planted or fallow, this weed must be controlled starting 2 years before planting with a combination of glyphosate plus Banvel or Stinger in a fallow field or in Roundup-ready corn starting in spring when the shoots first appear in the spring and followed up on a 60-75 day interval with as many as 3 applications per year. Of course, there are label restrictions for amount allowed per acre per year. In any case, perennial weeds need to be identified and a plan of attack started ideally 2 years before planting.

After planting, because the soil is freshly disturbed and a new crop of weed seeds from the “seed bank” is brought closer to the soil surface with tillage, it is important to apply a pre-emergent herbicide labeled for use in new apple trees. Wait until after a settling rain after planting so the herbicide cannot get washed into direct contact with the fine tree roots. These options include: pendamethalin (Prowl H₂O), oryzalin (Surflan), oxyfluorfen (Goal, GoalTender, Galligen), terbacil (Sinbar), and flumioxazin (Chateau). These materials in combination will broaden the spectrum of weed species controlled and the duration of residual control.

Prowl H₂O is a “newer” formulation of an older herbicide, pendamethalin. Prowl H₂O kills weeds by root uptake and inhibits cell division at growing points. There is no contact activity. The higher the rate used, the longer the weed control duration. It is good for control of grasses, lambsquarters and pigweed, but poor on ragweed. Prowl needs rainfall to move the herbicide into the weed germination zone.

Surflan, oryzalin, is an older pre-emergent herbicide that was unavailable for a time and is available again on the market. Oryzalin is safe for new trees to control many annual grasses and broadleaf weeds. Oryzalin is absorbed by roots of germinating weed seedlings and interferes with cell division. It is weak on ragweed and PA smartweed. It needs ½-1 inch of rainfall to move the herbicide into the weed germination zone before the weed seeds germinate.

Sinbar, terbacil, is also an older herbicide which was relabeled years back to include ½ lb. per acre use rates on new tree plantings to control annual grasses and broadleaf weeds and some partial control or suppression of perennial weeds such as quackgrass, horsenettle, and nutsedge. Rainfall is needed within 3-4 days of application to move it into the weed germination zone.

Chateau SW, flumioxazin, is a residual (PPO) herbicide that will also provide burndown (consequently if drifted will leave spots on leaves and fruit). It will control many broadleaf weeds and grasses, but the first to break are grasses. Chateau is best when mixed with material that will enhance grass control, Prowl H₂O or Surflan. The label allows up to 6-12 oz./acre with 24 oz./acre per season. For pome fruit and stone fruit, Chateau SW can only be applied as a uniform band directed at the base of the trunk prior to “pink bud” in apple and “bud break” in stone fruit and pear and you must avoid contact with non-barked areas of trunks.

GoalTender is a new formulation of Goal (oxyfluorfen). GoalTender, oxyfluorfen in the PPO family (Goal, Galligen) is a pre-emergent and post-emergent herbicide, best on annual broadleaf weeds and must be tank mixed with a grass herbicide. This group must be applied to herbicide strips before bud swell since it can burn the buds, leaves or fruit.

Trees established 1 year:

Diuron and simazine are used as the old standard for comparison. Diuron is absorbed by roots of germinating weed seed and translocated to leaves where it interferes with photosynthesis. The diuron label does not recommend its use on fully dwarf rootstocks or in apple trees established less than 1 year and 3 years in peaches. Simazine is a photosynthesis inhibitor labeled for use in orchards established for 1 year or more. There is resistance in several weed species to these herbicides.

Matrix is a DF formulation for use in tree crops established for at least one full growing season. Matrix, rimsulfuron, is a sulfonyleurea herbicide, which causes a rapid cessation of growth at the tips of both roots and shoots of sensitive plants, eventual plant death. It has pre- and post-emergent activity if weeds seedlings are small, and will control many annual and perennial broadleaf weeds and grasses. The application rate is 2-4 oz., with 4 oz./acre limit per season. It requires rainfall for incorporation within a couple weeks of application for best results.

Sandea (a DF formulation of halosulfuron-methyl) is a sulfonyleurea herbicide with post-emergent control of nutsedge, and pre-emergent control for broadleaf weeds such as horsenettle, pigweed and ragweed. If using Sandea for post-emergent control, you need to wait for 3-4 days before rainfall or overhead irrigation. If using it for pre-emergent control, optimum control will be obtained with incorporation with water (¼ to ½ inch maximum). Other options for 1 year old or older orchards include **Casoron, and Solicam**.

Trees established for 3 years:

Alion, indazaflam, is a new herbicide mode of action that inhibits cellulose biosynthesis, and cellulose deposition in the plant cell wall, only affecting the actively growing root and shoot tissues. It will provide long lasting residual control of a broad spectrum of annual grasses and broadleaf weeds, including glyphosate resistant weeds such as marestail and fleabane. Allows use in pome and stone fruit trees established for at least 3 years.

What is the best herbicide? The best residual herbicide is the one the grower can apply with a tank mix partner for post-emergence control of already germinated weed seedlings (paraquat, glyphosate, or glufosinate=Rely in 1 year old trees) in a timely manner based on tree growth stage and the right environmental conditions.

Many residual herbicides require 0.5 to 1 inch of rainfall or irrigation to activate them in the seed soil germination zone (top 2 inches). This rainfall is necessary within 24 hours of application for older herbicides that photodegrade such as napropamide and some within 2-4 weeks. But most residual labels require incorporation by rainfall **before weed seeds germinate**. This is listed on specific labels and if not incorporated, the weed seeds will be free to germinate after the application and will not be impacted by the post-emergent herbicide in mix at the time of application.

If you start with a program of Prowl or Surflan in combination with Goal or GoalTender, it must be applied by bud swell in a concentrated window of application. After bud swell, any orchards not done can be treated with combinations of Prowl or Surflan plus Chateau up until pink bud in apples, bud break in stone fruit. If applications are not completed after pink bud, you will need to use a tank mix of Prowl or Surflan or Sinbar (8 oz./acre) with paraquat or glyphosate. But the most effective post-emergent control is achieved when weed seedlings are very small (2-6 inches tall), actively growing, not water stressed. Sunny days to follow will speed up the burn-down effect. So watch the weather forecast, look for rainfall in the forecast within a couple days after application to incorporate residual herbicides and sunny weather the days of application for burn-down herbicides. Life is a compromise.

Growers need to be aware of the potential economic impact weeds have on young tree growth. Although we have no data to show a difference in critical weed control timing in high-density orchards compared to semi-dwarf systems (May through July, Merwin), we can show a significant difference in crop load potential and recuperation of investment in the 2nd and 3rd leaf in a recent project funded by NESARE Partnership Grant. The first year in a new planting, the potential crop load based on trunk cross-sectional area (cm²) for the following season in the untreated weedy checks was \$900 per acre, compared to the best treatment (based on tree growth) of Prowl plus glyphosate was \$1700; the second year growth, \$1900 in the weedy checks vs. \$3800 in the best treatment of Prowl plus glyphosate. In the 1-year established planting with lower tree density of 890 trees per acre, there was a potential crop load value of \$900 in the 3rd leaf of the planting in the weedy checks vs. \$1650 in the best treatment in these plots of Prowl plus paraquat or glyphosate or Alion; for the 4th leaf, \$1530 in the weedy checks vs. \$2200-2880 in the best treatments. There will be more detail on herbicide control results in the presentation.

Final precautions in new plantings –

- 1) There is a lot more light exposure in new tree plantings allowing more weed seed germination.
- 2) Irrigation is not always an even distribution of water in the herbicide strip so variable herbicide incorporation can lead to variable results.
- 3) Irrigation in young plantings will increase the need for follow up post-emergence herbicide treatments, more than non-irrigated plantings.
- 4) Be particularly cautious in application so you are not spraying using a flood nozzle across the row when using herbicides that can cause trunk damage especially in green bark.

5) Check all labels for adjuvants required, rate limitations per acre per application and per season, pre-harvest intervals, weed species that are controlled and at what growth stage, and rate adjustments for tree age and soil type.