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Weed Management in Small Fruit Crops

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Introduction

For small fruit growers, weed management is one of the greatest challenges they will face to successfully grow these crops. Factors such as climate, new weed species, weed species shifts, and years of agricultural activity have come together to select for weed species that are aggressive and persistent.

Without management, weeds compete with crops for light, nutrients, and water, resulting in reduced vegetative growth of the crop plant, poor fruit quality and lower yield. Stressed crops are also more susceptible to disease and insect infestations, while excessive weed growth itself creates higher humidity in the crop foliage, enhancing disease spread and inviting unwanted insects. Weed management principles for the perennial small fruit crops are similar, with the exception of strawberries in the annual system. Grapes, brambles, blueberries and matted row strawberries are considered permanent plantings in which weed management must be addressed throughout the life of the planting. When compared to annual crops, perennial culture is a greater challenge, as weeds need to be managed through all seasons and perennial weed species increase in numbers and diversity. Understanding seasonal weed thresholds, and integrating cultural and chemical management becomes even more important in the year-round culture.

Weed Management

Weeds infestations are best considered with an overall "management" versus a "control" frame of mind. Rarely is absolute "control" attained, though it is approached in some herbicide applications for brief periods of time. In reality, no herbicide controls all weed species and weed escapes occur. A management frame of mind not only considers herbicide effectiveness, but also integrates factors such as field history, weed species present and their biology, and the effects of crop culture and environment on weed spectrum, numbers, and growth. It also involves an understanding of threshold damage, i.e. what level of pressure a crop can tolerate before yields decrease. Take that a step further to an economic threshold and one needs to weigh the cost of weed control as compared to potential losses by weed competition. Thus, killing weeds is only part of the picture; understanding them and their relationship to cropping system decisions becomes a part of good management.

Though understanding such relationships and predicting outcomes is at best complicated, there are a few key points about weed ecology worth taking home:

1. Weeds adapt, compete by special means, and have a built-in genetic strategy to survive and continue the species.

2. Agriculture often provides niches for weed proliferation through soil disturbance, herbicide use, and other culture-specific activities. Soil movement by equipment and spreading soil amendments such as manure are two good examples of ways weeds are introduced into an area.

3. Weed seed in soils can be viewed as a "bank" in which withdrawals and additions occur. It takes only a few escapes to re-infest cropped areas. Weed seed can remain dormant but still viable after many years in the soil.

4. Weed escapes occur under many conditions, usually, it is an increase of certain species tolerant to the herbicides or cultural control methods used. Escapes also occur by loss of chemical residual, poor spray patterns and/or coverage, or environmental factors affecting chemical efficacy. Photoperiodism or response to day length will cause some weeds to go to seed not long after they emerge.

5. Certain weed species can be highly competitive at low densities. This makes factors that promote weed growth and size development (light, nutrients, water, and space) as important as weed numbers in predicting competition.

6. On the contrary, some weeds, though high in numbers, may not be very competitive with crops. Thus different species in the weed spectrum may compete with the crop differently, with the season, root depths, and plant sizes just a few factors involved in determining competition levels.

7. Weed species can also respond to our control efforts differently. Our past and present actions (or non-action) influence future weed density.

8. Thresholds values (what we can tolerate) should reflect not only crop yield loss due to weeds, but other criteria as well, such as crop quality, ease of harvest, and effects on pests and beneficial organisms.

In small fruit production, good weed management begins one to two seasons prior to planting. Awareness of previous crops and herbicides used, if the site has been farmed, is important to provide ample time for herbicide dissipation and prevent residual damage to new plantings. Newer field crop herbicides may have label restrictions for 24 months or more before any crop can be re-planted.

Also of great importance is the elimination or reduction of existing perennial weeds. Taking care of these weeds preplant greatly reduces future problems; it is difficult to deal with perennial weeds in a perennial crop. Grasses such as quackgrass, johnsongrass and Bermuda grass, and other weeds such as yellow nutsedge, field bindweed, wild brambles, trumpet vine, and milkweed are important targets. Some spread by vegetative means (roots, stolons, and rhizomes) and all produce seed. In general, late summer to early fall is a good window for effective chemical translocation to roots if applying systemic herbicides, such as glyphosate. By leaving the farmland fallow, and by encouraging weed growth, weeds are weakened by the reduction of stored foods in roots. When combining this strategy with the use of systemic herbicides, such as glyphosate and 2,4-D, to kill underground parts, great inroads can be made toward reductions in perennial weeds. The use of a stale seedbed involves land preparation weeks before planting. Weeds are induced to germinate and then are controlled with a nonselective postemergence herbicide prior to planting. The resulting reduction in the weed seed bank can be significant. Minimize soil disturbance when planting, to avoid bringing weed seed up from deeper in the soil.

Cover Crops

Cover crops can be used to improve soil structure prior to planting the small fruit crop. Once established, cover crops compete well with weeds, and selective herbicidal control is possible (depending on cover crop and weed species). Certain cover crops used for weed suppression, such as sorghum-sudangrass, are killed using a herbicide and then incorporated into the soil prior to planting the crop. Other cover crops, such as tall fescue, are planted in the late summer/fall in the year prior to planting as a permanent cover, and then killed in strips where the crop will be planted.

Grapes, brambles, and blueberries are planted in rows separated by aisles wide enough (about 8 to 10 ft.) for large equipment to pass, with a permanent grass cover grown in the space between the rows. For annual plasticulture strawberry production, aisle space is less wide (2.5 ft.). For annual strawberry production, row middles should ideally be seeded with a cover crop prior to punching holes for strawberry plants. For recommendations on specific cover crops to plant, refer to the manual Virginia NRCS Cover Crop Planning Manual 1.0 <https://efotg.sc.egov.usda.gov/references/public/VA/VA_TN10_Agronomy.pdf>. Once a cover crop is established in the furrow area, weed competition can be reduced, and the greatest threat exists from weeds in the planting holes in the case of annual plasticulture production. Weed removal in planting holes, if not done in a timely manner, can stunt crop growth (Figure 1). In most cases, the weed removal needs to be done by hand pulling, particularly in the case of broadleaf weeds.

Figure 1. Crop growth and flowering capacity are reduced if weeds in the planting holes are left unattended to compete with the main crop. (a) Henbit competing with strawberry crop (top) (b) Crop growth in the adjacent planting hole that was free of weeds (bottom). Photos by Jayesh Samtani

The basic principles of weed management are similar for small fruit crops. However, because of different cultural requirements, each crop should be considered individually. Chemical recommendations for specific crops can be found in the Virginia Cooperative Extension publication: Horticultural and Forest Crops Pest Management Guide, Pub. # 456-017, <http://pubs.ext.vt.edu/456/456-017/456-017.html>. Or, contact your local county extension agent for ordering information.

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