

JAN 1 1991

EXPT STATION

Managing Weeds in New York Vineyards

Volume I

Number 1

GRAPE  FACTS

I. Choosing a weed management program

Robert M. Pool, Richard M. Dunst, and Andrew F. Senesac

The vineyard is an ecosystem in which many different species of higher plants grow. Viticulturists recognize three different categories of plants in the vineyard: grapevines, groundcovers, and weeds. As with most crops, weeds in vineyards are defined as plants growing where they are not wanted. In some cases, plants of a given species growing between the rows are called groundcover while the same plants growing in the vine row are considered to be weeds. To survive in the unique environment of the bare, partially shaded soil under the vines, vineyard weeds must have the ability to grow vigorously. They compete with grapevines for nutrients and water reducing vine yield and grape quality. We have attempted to find plants that will thrive in these conditions but which will not compete excessively with the vines. Such a "living mulch" would be a desirable alternative to other weed control practices. However, our search to identify plants that are vigorous enough to become established without simultaneously reducing vine size has, thus far, been unsuccessful. Hence we think of all in-the-row non-grape plants as weeds.

Excessive competition with the vine for water or nutrients is not the only reason for classifying a plant as a weed. Plants with tall stature can shade the vine, reducing photosynthesis. Weeds also intercept sprays meant for the vine and they decrease air movement within the vine and the vineyard. As a result, drying time, humidity, and disease hazard are increased. Weed parts mixed in the vine canopy become contaminants of the fruit during harvest. Weeds can serve as alternate hosts to some pests and hence can inoculate the vineyard. Finally, some plants, such as poison ivy or nettles, are directly noxious to vineyard workers.

Because groundcovers are often just weed species growing where they are wanted, and because groundcover growth is often controlled in the same way that weed growth is controlled, its management is generally considered to be part of the overall weed management program. Most New York vineyards benefit from the presence of managed plants growing between the rows. Benefits are several and include: (1) Establishing controlled competition with the vines for water and nutri-

ents in order to prevent excessive vegetative growth and to utilize excess water during rainy periods. (2) Reducing soil compaction caused by the movement of heavy equipment through the vineyard. (3) Increasing soil organic matter through decay of ground cover. (4) Stabilizing soil by roots to decrease erosion hazard. (5) Reduced likelihood of nutrients or pesticides leaving the vineyard ecosystem.

Deciding floor management goals

Effective weed and groundcover management is only possible if the grower has a clear understanding of what is to be accomplished. The overall objectives are to have a vineyard in which sustained yield and fruit quality are maximized, cost of production is minimized, and environmental quality is maintained or improved. Decisions regarding floor management goals should thus be made on the basis of these three factors: production, cost, and environmental quality.

In-the-row goals

As stated, because of their impact on vine growth, the only in-the-row plants which are not considered weeds are grapevines. Thus, the goal is to prevent or eliminate growth of in-the-row weeds in a timely, safe, and effective manner. Grafted vines of

winter-tender grape varieties require special consideration. In the colder parts of New York, the usual practice is to cover the base of grafted vines with a mound of soil to ensure survival of some scion tissue should there be an unusually severe winter. The in-the-row mound is made by moving soil from between-the-rows to in-the-rows using a grape hoe. This limits the width of cover crop which can be tolerated in the fall. To prevent scion rooting, the mound should be removed from the base of the vine at least every other year. In such vineyards, decisions about floor management must be made with the realization that soil will be moved into and out of the row on at least a biennial basis.

When chemical weed control is anticipated there is another special consideration for in-the-row weed management. Because herbicides do not always stay where they are applied, it is good practice to create a mound of soil under the vines (in-the-row). This creates a convex surface in the herbicide spray zone and ensures that, should herbicides move either by solubilization or by physical means, they will not become concentrated in the region of maximal grape root concentration. These "hills" erode with time and have to be re-established on a three- to 10-year period depending on the soil type.

Between-the-row goals

The plants growing between-the-rows can be considered a managed source of competition with the vines. Thus, the primary consideration is to establish the

optimal level of competition. This is done by evaluating the amount of vegetative vine growth. Growth of small vines needs to be promoted, and the goal should be minimal competition. Very large vines not only tolerate competition, they may benefit from it. Excessively vigorous vines create shaded canopies which favor disease, reduce fruit quality, and prevent canes from becoming fully mature and winter hardy. If extremely vigorous, the vineyard may tolerate a permanent between-the-row sod ground cover.

The average vineyard benefits from some intermediate level of competition. Until the vines flower, they usually need to grow vigorously because they are creating the leaf canopy needed for maximal photosynthesis. Thus, early season competition is usually not desirable. Following the beginning of fruit ripening (veraison), further vegetative growth is rarely beneficial. Photosynthates should not be diverted from the maturing crop and are needed to establish the carbohydrate reserves in the canes, roots, and trunks which ensure winter survival and healthy growth in the subsequent year. In this way fall cover crops can be used to discourage late season vegetative growth. The grower must decide how much competition is desirable during the period between flowering and veraison (about mid-June to mid-August). If the soil is deep and well drained and the vineyard vigorous, the vines will usually not be hurt by cover crop competition during this period. When the soil does not have the depth or

capacity to store water, if rainfall is lacking or if the vines are small because of previous stress, then it is best to delay the time at which cover crop competition is allowed to develop.

Once the primary goal of optimal competition in relation to vine health is determined, secondary goals should be considered. These include erosion hazard, soil quality, potential for soil compaction (which is a function of soil type, expected wetting patterns and machinery used in the vineyard), and hazard for ground water contamination. These factors will not change the desirable degree of competition, but may influence the extent to which the grower is willing to tolerate less than optimal vine growth. These considerations will also help the grower choose from among the various available weed management options.

Weed control and floor management options

Options available to control the plant growth on the vineyard floor include, mulching, mowing, shallow and deep cultivation, and a wide array of chemical control agents called herbicides. Typically, several methods will be used in an individual vineyard during the course of a year. Because the goal for in-the-row management is to have no competing weed growth, some options are only suitable for between-the-row use.

Mulching prevents weed growth by preventing light from reaching the young weeds. Mulch can consist of organic matter, such

as straw or hay, or can be inorganic, as with opaque plastic or asphalt covers. Inorganic mulches are sometimes used in-the-row, but create disposal problems and make weed control along the edges of the plastic difficult. Organic mulches are not often used in-the-row because they are difficult to apply and can serve as a haven for rodents which may feed on the vine. Between-the-row organic mulches are beneficial not only because they reduce plant competition, but because they also conserve water and increase the organic content of the soil. In unirrigated vineyards, especially those on shallow soils or which have eroded portions, between-the-row organic mulches can produce dramatic results. They are highly recommended for use on trouble spots in the vineyard. However, availability and cost usually mean that mulching is not the primary weed management method. When the goal is complete weed control, mulch must be applied in a very thick layer to obtain season-long shade of the soil. This is a much heavier application than needed to obtain the other benefits of mulch.

Mowing is a very good way to regulate the amount of cover crop competition, but is not useful in-the-rows where the goal is no competition. However, even vineyards which normally tolerate moderate sod competition may lose too much vine size during especially dry seasons. In such cases, even closely mown sod may be too competitive.

Cultivation is the other non-

chemical method of weed control. At one time it was the primary method, but the realization of the full impact of cultivation and the development of alternative methods has greatly reduced its use. Frequent cultivation controls both annual and perennial weeds, but has high costs. These are not only direct machine and labor costs. Cultivation, with its high energy requirement contributes to national pollution; it damages root systems and trunks. Long term cultivation degrades soil structure causing plow layers to form and it ultimately reduces percolation rates. Cultivated soil is easily eroded; this erosion can result in movement of nutrients or pesticides attached to the soil out of the vineyard and into the surrounding environment. To minimize the direct damage to the vine and its roots caused by cultivation, we recommend that only "trashy" or shallow cultivation be practiced between-the-rows. With trashy cultivation shallow (1" to 2" deep) tillage is used to eliminate a portion (80-90%) of the weed growth retaining some plants to help stabilize the soil.

The development of **chemical weed control agents (herbicides)** has given the grower a new array of tools with which to manage the vineyard ecosystem. As with any new technology, their safe use requires an understanding of their effects, their limitations, and the management goals. Fact Sheet 2 in this series, *Controlling Weeds in the Vineyard*, summarizes information about weeds and general information about herbicide use. Fact Sheets 3 and 4 give

information about the herbicides which may be used in New York vineyards. Information about currently recommended chemical options can be found in the Cornell Cooperative Extension publication *Pest Management Recommendations for Grape*.

Robert M. Pool is Professor of Viticulture, Department of Horticultural Sciences, Cornell University, New York State Agricultural Experiment Station, Geneva, New York

Richard M. Dunst is Superintendent of the Vineyard Laboratory, Cornell University, New York State Agricultural Experiment Station, Fredonia, New York

Andrew F. Senesac is Weed Scientist, Cornell Cooperative Extension Service, Long Island Horticultural Research Laboratory, Riverhead, New York

Grape Facts is a publication of the New York State Agricultural Experiment Station, Cornell University, Geneva, New York

Cornell University is an Equal Opportunity Employer