Soil and Water Management in Cherry Orchards

Soil management—cultivation, weed control, irrigation, and cover cropping, can aid in maintaining a productive cherry orchard. Good soil management can assure maximum availability of moisture and essential mineral nutrients; maintain a soil structure that permits the ready penetration and movement of rain and irrigation water; and prevent undue losses from erosion and leaching.

CULTIVATION

Cultivation is necessary in the early spring to kill the cover crop and winter weed growth in order to avoid unnecessary competition for moisture and plant nutrients. This dead and decaying plant material provides continuing protection from erosion by slowing runoff. It also helps the soil take in moisture from rainfall or irrigation. Additional cultivation may be necessary during the season to control weeds. In some orchards it may be necessary to smooth over irrigation rills or other roughness before harvest, and sometimes it is necessary to prepare a seedbed before seeding the cover crop.

Cultivation does not conserve moisture by preventing evaporation from the soil surface. An extra cultivation on a weed-free soil may result in unnecessary moisture losses since most of the useable moisture is lost from the soil to the depth that it is stirred. It is obvious that the operation of an implement that will kill weeds will also kill tree roots. Deep cultivation, especially if repeated, can keep the trees from using moisture and plant food to the depth of cultivation. Small cracks that form on the surface of a weed-free soil surface do not indicate a need for cultivation. Heavy cultivation can create a surface layer of light dust, which may hamper establishment of a cover crop.

Excessive cultivation, regardless of moisture content, destroys the natural soil structure. The resulting fine material runs together, severely limiting the movement of water and air, and impedes root growth. Moisture losses from runoff increase with slow water penetration and extra runoff increases erosion. Cultivation of soils that are on the wet side is especially damaging to structure, leading to formation of near-indestructible clods and development of “plow pans” or clay pans that limit moisture movement and root growth.

Here are some common-sense guides for orchard cultivation: (1) cultivate to kill the cover crop as early as possible in the spring to stop unnecessary competition for moisture; (2) cultivate no deeper nor more often than necessary to kill the cover crop and weed growth; (3) use implements that mix the vegetative material with the surface soil; (4) equip discs or other implements with some means of depth control to avoid over-deep penetration; (5) use implements that leave a semi-cloody surface and avoid those that form a fine, dusty mulch or a smooth, compacted surface; (6) never cultivate when the soil is wet and sticky.

HERBICIDES

The use of herbicides for weed control in cherry orchards is limited because only a few materials have been cleared and registered for use in bearing cherry orchards. It is permissible to use Simazine at the rate of 4 pounds of 80% formulation per acre as a general pre-emergence herbicide if applied from harvest until before fruit forms in the spring. Since it is a general pre-emergence herbicide, it will stop the growth of most cover crops as well as weeds. Simazine is not effective against established weeds or for controlling weeds with underground rootstocks, such as morning glory and Canadian thistle.

Simazine can be used to maintain a weed-free island around trees or to maintain a weed-free strip down the tree rows to eliminate the necessity of cross cultivation. Cover crops can still be grown over most of the area.

New weed growth can be killed back to the ground level by spraying with aromatic weed oil. Such a spray will kill many seedling weeds and may take the place of one or more cultivations.

Dinitro general weed killer, with or without diesel fuel, or any weed oil plus water may be used to kill weeds in cherry orchards. Best results are obtained by spraying when the weeds are small. Complete coverage of the foliage is necessary. Avoid spraying the base of young trees as girdling may occur. Do not allow livestock to graze treated cover. Read and follow label instructions closely.

MULCHES

Mulches, particularly sawdust, can be effectively used to control weeds. Mulches likewise permit the tree roots to utilize the moisture and plant food in all of the surface soils since the roots are not excluded by cultivation. Completely mulched orchards need not be covercropped.

The cost of applying the mulch heavily enough to control weeds—a minimum of 3 or 4 inches thick—is practically prohibitive. However, it is often practical...
to use mulches to control weeds around trees or in tree rows. Mulches have some drawbacks; they provide cover for mice which may girdle the trees at the ground level. Gopher control is difficult where mulches are used. Mulches composed of loose material such as shavings may be a fire hazard. With mulches it is always necessary to apply extra nitrogen fertilizer to make up for the nitrogen used by the soil organisms that live in part on the organic mulch. Sawdust mulches are further described in an OSU bulletin “Effects of Sawdust Mulches,” available from your Extension agent.

**COVER CROPS**

Annual winter cover crops are a necessary part of orchard-soil management in most Oregon orchards. Cover crops prevent erosion and reduce the loss of soluble nutrients by leaching. The growing cover crop slows runoff and aids the penetration of rainfall and irrigation water. The decayed material substantially improves soil structure.

Cover crops provide for the annual renewal of organic matter to support the growth of beneficial soil organisms which aid in providing a continuing supply of necessary mineral nutrients. The cover crop itself adds some nitrogen and small amounts of other nutrients. Cover crops reduce the amount of damaging soil compaction resulting from the operation of spray or other equipment in the orchard during the late fall, winter, or early spring.

Usually the cover crop growth will be adequate if it is seeded early enough to permit germination with the first fall rains. Annual cover crops adapted to western Oregon north of Josephine County include:

1. Willamette vetch, 40 to 50 pounds per acre with AbruZZi rye, winter barley, or winter oats at the rate of 60 pounds per acre.
2. Austrian peas, 75 to 90 pounds per acre.
3. Crimson clover, 20 pounds per acre. Crimson clover should be seeded in late July or August.

Annual cover crops suitable for eastern Oregon and southern Oregon include:

1. Rosen rye, 30 pounds + 70 pounds hairy vetch.
2. Winter wheat + Austrian winter peas.

There are a number of other annual cereals and annual legumes that make a highly satisfactory growth. A light application of nitrogen fertilizer applied at seeding time will often aid in growing an effective cover crop in advance of the heavy winter rains. Nitrogen application should not exceed 30 pounds of actual nitrogen (N) per acre to avoid the possibility of increasing the susceptibility of the trees to winter damage.

Some orchards are so situated that a winter growth of annual weeds or other volunteer plants makes an effective winter cover. If the stand is adequate to prevent erosion during the winter, these volunteer cover crops will be as effective as a seeded cover crop.

Where sufficient irrigation water is available, permanent cover crops may be effectively used in cherry orchards. Extra fertilizer will be needed to counteract the competition between the cover crops and the trees during the late spring and early summer. An adapted strain of white clover makes the best permanent cover for most soil in Oregon.

If erosion from runoff or from flooding is a problem, the use of permanent cover crops may be desirable. It is necessary to mow permanent cover crops periodically during the summer to reduce competition with the trees.

**IRRIGATION OF CHERRY ORCHARDS**

Most of the cherry orchards in western Oregon are nonirrigated. High winter rainfall, deep soils, and the earliness of the harvest contribute to the success of these nonirrigated orchards.

East of the Cascade Mountains, however, there is less winter rainfall. In The Dalles area per-acre yields of nonirrigated cherries have been much lower than those that are irrigated.

In nonirrigated orchards it is necessary to plant trees farther apart, 40 or 50 feet in many instances, so that each tree has a large volume of soil available for moisture storage. In addition to this practice, many Bing and Lambert trees are pruned in order to reduce the top-to-root ratio. Thus there is more root volume per unit of leaf surface and the roots are more able to supply the moisture needs of the tree. Both of these practices, however, reduce the per-acre yields well below those of close spaced, unpruned orchards that have sufficient water to meet production requirements.

In Union County there is a relationship between the percentage of No. 2-size Lambert cherries and the rainfall in May and June for any specific year. During dry years a relatively higher percentage of the cherries are size No. 2. Although cultural practices, such as fertilization and cover cropping, are related to cherry size, moisture appears to be a primary limiting factor.

Hot, dry, windy weather results in greater losses of moisture through the foliage of trees. Under these circumstances, moisture is often drawn out of the fruit through the leaves during the day. The fruit regains the moisture during the night and usually makes some additional growth. Conversely, high humidity and light rains result in less transpiration and more fruit growth.

Contrary to popular belief, fruit cracking is not caused by irrigation. It occurs only when the fruit itself becomes wet from irrigation, rain, fog, or upon immersion of the fruit in water. Attempts to induce cracking experimentally in Bing, Lambert, and Royal Ann cherries by varying frequency and duration of irrigation have failed, even though soil moisture variations were greater than would be encountered under normal irrigation practice.

**DRAINAGE IN CHERRY ORCHARDS**

Cherry trees make little growth and often die if planted in wet, poorly drained soils. One of the first symptoms of “wet feet” in a cherry orchard is yellowing and stunting of new growth similar to that caused by boron, zinc, and iron deficiency. Under surface irrigation, with corrugations or rills, the length of run should not be so long that the top of the field becomes saturated before the lower end is irrigated. A drainage ditch should be provided at the end of the run so that end trees will not stand in ponded “runoff” water.