

Drought Stress Symptoms in Blueberries

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About 75% of Michigan's 22,000 acres of blueberries are irrigated. Over 5,500 acres are not irrigated and rely on rain water to meet their needs. All plants need water to survive. Plants take in water from the soil through the roots. Blueberries are normally grown in naturally moist soils. These soils may drain slowly and/or have a water table close to the surface. Blueberries have a relatively small root system that is shallow and seldom extends more than 24 inches (60 cm) into the soil. In addition, blueberries lack root hairs, small extensions that greatly increase the absorptive surface of the roots of most other plants. Blueberries show water stress when the available water reaches 50%. Allowing soils to dry beyond 50% reduces berry size and can cause severe stress. It is important to be able to recognize the symptoms of water stress and drought.

Early in the season when the shoots are actively growing water is being used to expand new leaf and shoot tissues. Shoot tips often wilt on hot days when the plant cannot move enough water into the shoot tip to maintain turgor (internal water pressure) (Figure 1). This temporary water deficit passes after the heat of the day and the shoot springs back and looks normal later in the day. This transient wilt may be one of the initial signals to the plant to stop shoot growth as the soil dries out. Soon shoot growth stops and no new leaves emerge from the shoot.

Once shoots and leaves stop growing, they become more rigid and waxy, and less prone to wilting. Most water loss from plants occurs through small pores on the undersides of leaf (stomata) that open during the day and close at night. Stomata will also close during the heat of the day to conserve water if the supply is somewhat limited. Carbohydrate production in the leaves may be reduced so plants may not have as much vigor, but the symptoms of moderate stress can be subtle. . If moderate stress occurs as fruit are developing, berry size may be reduced.

As soils dry out further, stress becomes acute, the edges and tips of leaves dry out die and turn brown. (Figure 2) This symptom is often confused with burn from a pesticide spray or too much or too little potash in sandy soils. Actively growing shoot tips can die. (Figure 3) When most of the available soil water has been depleted, wholesale death of the leaves followed by shriveling of the current season shoots occurs (Figures 4 & 5). On mature plants, the fruit will shrive before leaf symptoms appear (Figures 6 & 7). The plant uses water in the berries to maintain the health of the leaves. When the ground dries out, severely affected bushes look dead or almost so. (Figure 8) Young blueberry plants are especially vulnerable because their roots tend to be shallow and the top soil dries out quickly. Also young plants create little shade, so the soil becomes very hot.



Figure 1. Shoots wilting from a temporary water deficit during the heat of the day.

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Figure 2. Marginal leaf burn on drought stressed leaves.



Figure 3. Burnt dead shoot tip. Note tips of leaves are burned.



Figure 4. Burned leaves and shriveling stems and fruit.



Figure 5. Bushes with burned leaves and shriveling stems



Figure 6. Shriveling green fruit with leaf symptoms.



Figure 7. Ripe fruit shriveling at harvest due to lack of water.

Figure 8. Blueberry bushes burned up by lack of water and drought stress. Green foliage is visible on the bushes in the lower right. In this situation leave the bushes alone and cut out dead wood in the spring or cut the entire bush down in the spring to grow new healthy shoots. On the burnt bushes in this photo almost all the fruit wood for next year has already been lost.



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