

THE EXTENSION LINE

Bob Mugaas of the University of Minnesota Extension Service is a regular contributor to Hole Hotes. As Hennepin County Extension Agent, Mr. Mugaas compiles various articles related to the golf field for our information. Bob is an excellent source for answers to many questions on horticultural problems. He may be reached at 542-1420. Written requests should be sent to:

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This month's articles cover Tree Mulch, Tree Stress, and Verticillium Wilt.

MULCHING TREES AND SHRUBS - ADVANTAGES & DISADVANTAGES

by **Thomas L. Green**
MORTON ARBORETUM

Mulch has been defined as "any material used at the sur-

face of soil primarily to prevent loss of water by evaporation, to keep down weeds, to dampen temperature fluctuations or to promote soil productivity." Organic mulches include a full range of organic and inorganic materials. Organic mulches include leaves, wood chips, bark, sawdust, perennial groundcovers, peatmoss, moss, lawn clippings, hay, straw, nut shells, grain hulls, corn cobs, mushroom compost, manure, conifer needles, newspaper, sludge, and numerous other organic by-products. Inorganic mulches include polyethylene, river stone, crushed rock, volcanic rock, crushed bricks, ground tires, aluminum foil, asphalt, synthetic fabrics, and numerous other materials.

When mulches are used correctly they can greatly enhance plant growth and make the landscape more attractive. Incorrectly used, mulches can be harmful to plant health.

Part I: ADVANTAGES

Plants grow best when conditions are favorable for root growth. Mulches can enhance root growth by creating a favorable microclimate in the rhizosphere and improving the physical, chemical, and biological properties of the soil.

Favorable Microclimate. Few people water established trees and shrubs sufficiently during dry periods. Mulch --

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over a properly prepared surface - improves water infiltration and retention during the hot dry summer weather and reduces the need for irrigation. Soil moisture vapor can condense on the cooler mulch at night and return moisture to the soil. In the spring or during rainy periods, when the upper soil layers tend to be saturated, some mulches act like sponges and hold water. Unless the mulch texture is too fine, roots can grow through the upper mulch layers and receive adequate amounts of oxygen and moisture.

Soil temperature moderation is important. Mulch can keep summer soil temperatures lower and winter soil temperatures higher. Turf and bare ground temperatures in the summer often exceed the limits past which roots of trees and shrubs can live. Without snow in the winter, turf and bare ground may freeze, and when soil temperatures drop below 10 degrees F roots begin to die. Summer heat and drought can kill tree and shrub roots that grew in late spring. Then they'll regrow them in the fall, only to lose them again to winter cold. This abnormal root loss requires great expenditures of energy for regrowth and winter loss may affect mineral absorption in early spring during foliation. By minimizing temperature fluctuations, mulch helps more roots survive to support top growth.

Soil Property Improvement. Physical Properties. Most organic mulches are light and porous. When incorporated, they can improve the aeration of heavy (clay)

soils and the water-holding capacity of light (sand) soils. Organic mulch can increase the size of soil aggregates in the surface soil and total porosity. Improved aeration favors root growth and other biological activity which, in turn, enhances soil structure. Mulch helps prevent erosion and compaction. It also prevents cracking of clay soil. Cracks increase water loss and break roots.

Chemical Properties. As organic mulches decompose they are converted to humus. During this change, much of the nitrogen, soil phosphate, sulfate, and other inorganic elements become part of the humus fraction of the soil. With the aid of various microorganisms, the minerals of humus are made available to the roots. Also, by lowering surface soil evaporation, mulches reduce the soluble salt content which can build to toxic concentrations during periods of low rainfall.

Biological Properties. Mulch provides a favorable environment for the growth and development of many types of soil fauna and flora. The stimulation of aerobic organisms will improve soil granulation, stability, and water infiltration. Mulch makes a favorable environment for earthworms. Research has shown that composted hardwood bark mulches can reduce root diseases: the increased biological activity is helpful in favoring decomposing organisms and reducing pathogens. Mulches reduce weed competition by inhibiting germination.

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Through the millennia, organic plant material, mostly leaves, has provided the natural mineral recycling for plants. The establishment of a more natural environment for the root system will allow for optimum root growth, which in turn allows for better top growth. A healthy plant is more resistant to disease and insect attack.

PART II: DISADVANTAGES

Organic mulches are generally better than inorganic mulches. But even organic mulches can be detrimental to plant health when used incorrectly.

Unfavorable Microclimate. Excess moisture may occur with fine textured mulches, organic and inorganic. Sawdust, fine peatmoss, and grass clippings retain moisture and should not be used as a single mulching material. Also, mulches used over poorly drained soils can result in nitrogen loss (denitrification).

Moisture and oxygen deficiencies are major problems under plastic mulches. Plastic mulch is usually not recommended. If used, it must have holes to allow for water and oxygen infiltration.

Unfavorable temperatures can occur with mulch. Mulches that reflect light and heat can radiate enough heat to injure plants. Dark-colored rock can absorb solar

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radiation during the day and radiate heat in the evening. These mulches can stress plants and increase air conditioning costs.

Mulch insulates the soil from surface temperatures. After becoming frozen in the winter, mulch is slow to warm in the spring, which slows root growth and function. It is better to apply organic mulch after a hard frost in the fall or after frost in the spring. The insulating effect of mulch can also delay hardiness development. It should not be placed in contact with trunk surfaces; this will allow the trunk base to acclimate for winter. This may be very important in grafted and budded plants with graft junctions near the ground line. Under certain conditions, as frost occurs, the temperatures just above a mulch may be a few degrees lower than the temperatures above bare soil. This sometimes causes winter injury and bark splitting.

Nutritional Imbalance. A nitrogen deficiency may develop when fresh mulch is used. Mulch should be composted and applied to the surface, but not incorporated. If using fresh mulch, add a little nitrogen fertilizer.

Calcareous materials (e.g. marble, limestone, volcanic rock) should not be used where soil pH is above 6.5. Acidic rainfall dissolves this material, causing the soil pH to raise and makes micronutrients (e.g. iron, manganese, zinc, copper) less available to the plant. This may result

in deficiency-related diseases.

Toxicity. Toxic substances can be produced when fresh organic mulch is improperly composted. Composted mulch has an earthy odor; avoid using any mulch with a sour or foul odor. Fresh mulch, especially wood chips, becomes covered with hydrophobic fungal spores. The water is repelled and the chips do not wet; therefore, they do not decompose. A few drops of dish soap or wetting agent will correct with problem.

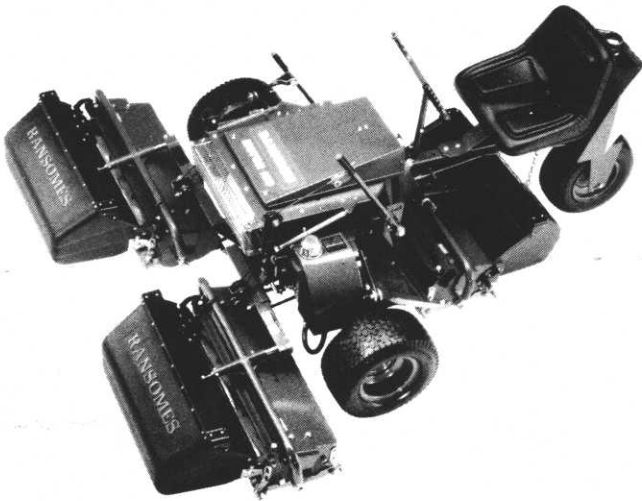
In 1981 an experiment was begun to study the effects of turf and mulch on 40 newly planted, bare root, 2-2 1/2 inch diameter "Green Mountain" sugar maples. Mulched trees received a basal layer of two inches of composted leaves topped with two inches of wood chips, mostly fresh, applied on eight-foot diameters. Turf trees had turf to the trunk. The mulch has reduced scorch, increased growth and color, and increased survival compared to the trees surrounded by turf. Two inches of fresh wood chips are being added every 203 years.

EARLY SUMMER TREE NOTES

by Bert T. Swanson
MINNESOTA EXTENSION SERVICE

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