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Forest Health Protection and State Forestry Organizations

Management Guide for

Chemical Injury

Injury is usually found along roads, rights-of-way, fuelbreaks, dwellings, or other areas where road salts and herbicides are

Hosts:

All species

Topics

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Identification

Chemical injury often follows a pattern consistent with application of the chemical. Injury from road salt is usually near a road and herbicide injury can sometimes be seen ad a swath about the size of a spray boom and in disturbed areas where noxious weeds are sprayed. Chemical injury is often more extensive in low area where certain chemicals accumulate after runoff. In many situations, plant tissue samples can be submitted to a laboratory to determine the amount of a chemical in the plant tissue. However, the analysis can be expensive. If a chemical is suspected of causing tree injury, chemical application history should be obtained to determine if patterns of injury and tree injury symptoms are consistent with any chemicals applied at or near the site. Symptoms vary with the type and amount of chemical used. Injury symptoms can be in the form of foliar discoloration, premature defoliation, deformed growth, shoot dieback, branch dieback, reduced winter hardiness, and mortality.

Root Uptake

- Symptoms can be confused with other soil problems or drought.
- Some species will develop a spiral pattern of branch dieback.
- Develop one sided or top dieback.
- Upper crowns tend to develop greater damage than lower crowns.

Injury Caused by Salts

Salts can damage trees either by entering the roots as the salts leach into the root zone or through the foliage or leaf scars on twigs after salt spray settles on trees near high-speed roadways. Injury symptoms can differ for the different entry methods

Root uptake - salt damage is often evident soon after spring thaw in conifers and soon after budbreak in hardwoods.

When damage is severe:

- buds may not break at all and branches or whole trees may die.
- buds will break with reduced foliage that soon turns brown and dies.
- buds further down a branch may break and the trees that survive look ratty.

In less severe cases:

- marginal browning will occur on hardwood leaves and needle tip browning on conifers.
- symptoms can intensify through the season culminating with premature leaf drop.

- Trees that survive injury from salts will often show reduced growth and vigor.

Injury symptoms will usually be worse on trees that are exposed to higher levels of salt, such as those closer to where the salts were applied or trees that are downhill or in depressions where salts may accumulate after runoff.

Foliar and twig uptake

On hardwoods:

- bud break may be delayed for several weeks or buds may be killed resulting in twig dieback.
- When terminal buds are killed, lateral buds will often break resulting in witches' broom-like growths.
- Unlike damage caused by root uptake, marginal browning rarely occurs when salts are received as salt spray in hardwoods.

On conifers:

- Tip browning from salt spray is common. This browning can progress towards the base of a needle throughout the growing season.
- When severe, 2- and 3-year-old needles may fall prematurely.

Patterns of Injury from Salt Spray

More Damage

- Lower in the crown.
- On the sides of trees facing a high-speed road.

Less Damage

- Trees sheltered from spray.
- Branches higher in crowns.

Salt Injury Management

There are several tools that may be used in an attempt to reduce salt-caused injury to trees.

- Large amounts of water can be used to flush salts out of the soil since they are prone to leaching. However, watering should be carried out as early as possible in the spring for maximum benefit. There is potential to exacerbate tree injury on soils that are prone to water logging and excessive water can have a negative affect on nutrient availability to trees.
- There has been a trend to use de-icing agents other than sodium chloride, since they are often deemed less damaging to vehicles, roads, and vegetation. Although, some of these agents have potential, some of the salts, such as calcium chloride and magnesium chloride appear to damage vegetation.
- Road salts are over-applied in many situations. If machines were better calibrated to apply the optimum level of salt for reducing surface ice, while not applying excessive levels of salt, there would be less damage to trees.
- In areas where trees will be planted and road salt is expected, plant more salt-tolerant trees if feasible.

Injury Caused by Herbicides

Preemergence: Photosynthetic inhibitors (simazine) -high rates cause leaf yellowing. May be confused with nutrient deficiency, drought, or viral infections.

Postemergence:

- Growth regulators (glyphosate) - abnormal leaf development, tip yellowing, and dieback; (2,4-D; picloram) – similar to glyphosate in addition to twisted petioles and shoots.
- Contact (paraquat) -injury results from drift causing small dead spots on foliage. May be confused with leaf spot diseases or insect feeding injury.

Herbicide Injury Management

- Read the herbicide label carefully and follow the application directions explicitly.
- Make sure equipment is properly calibrated and use products that pose the least risk to trees.
- Contact of non-target trees must be avoided; however, damage of trees inadvertently contacted by some herbicides could be reduced by immediately washing herbicide off affected areas. Similarly, removing branches contacted by herbicides could reduce damage to the rest of a tree by systemic herbicides if only a few branches are contacted.
- Activated charcoal may deactivate soil-active herbicides on a limited basis.
- Plant tolerant species.

Other Reading

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