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Chemical Weed Control in Trees

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Weed control in shelterbelts is necessary for satisfactory survival and growth of trees. Most weeds have more vigorous root systems and grow faster than newly planted trees. Weeds become established rapidly, using soil moisture, nutrients, and shading the small trees, and may stunt or even kill the trees. A thick stand of weeds also provides shelter for insects and small rodents which can be very injurious to young trees.

Cultivation with implements such as a duckfoot cultivator or a tandem disk is commonly used to eliminate weeds between tree rows. Cultivation within the tree row is difficult; however, the use of certain herbicides can be effective in killing weeds in the row without injuring the trees.

HERBICIDE CHARACTERISTICS

Soil-applied herbicides control weeds by inhibiting germination and seedling development. There are two types of soil-applied herbicides, preemergence and soil incorporated. Preemergence herbicides are applied to the soil surface, and rainfall or irrigation is necessary to move the herbicides into the soil for activation. Soil incorporated herbicides are incorporated mechanically after being applied to the soil surface and are less dependent on rainfall or irrigation for activation.

Postemergence herbicides are applied to the foliage of weeds when they are growing actively. Annual weeds should be treated when they are in the seedling stage while established perennials such as Canada thistle should be treated in the early bud to bloom stage. Most postemergence herbicides used

in trees are absorbed primarily through the leaves and translocated throughout the plant. Postemergence herbicides may be applied from late spring until early fall, depending on weed development.

The choice of herbicides depends on several factors including site conditions, tree species, and weeds present. For example, soil-applied herbicides are usually more effective when applied to clean cultivated soil since they have little or no activity on emerged weeds. Select a herbicide that is safe for use on the trees in your shelterbelt and that is effective on the weed species that infest the shelterbelt.

SOIL-APPLIED HERBICIDES

Soil-applied herbicides are less likely to injure trees growing in soils with medium to heavy texture and high organic matter than in sandy, low organic matter soils. Herbicides adhere to the humus and clay particles of the soil and are retained near the surface of the soil. In sandy soils, the herbicide may leach into the root zone and injure the trees.

Treflan, Princep, Karmex, Casoron, and Ronstar are soil-applied herbicides that may be used for controlling weeds in tree rows.

Treflan (trifluralin)

Treflan is formulated as a liquid (4 pounds active ingredient per gallon) or as a 5 percent granule. The granular formulation of Treflan may perform better than the liquid under trashy conditions. Treflan should be applied at 0.5 to 1.0 pound per acre (1 to 2 pints liquid or 10 to 20 pounds granule). Use the

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higher rate on finer textured soils or those high in organic matter and the lower rate on sandy, low organic matter soils. Treflan should be applied and thoroughly incorporated 2 to 3 inches deep with a power driven rotary tiller, tandem disk, or similar implement within 24 hours after application. Treflan is usually applied before the trees are planted but may also be applied after planting. However, incorporation of Treflan is more difficult after the trees are planted.

Treflan is cleared for use on many species of trees and shrubs. Treflan gives more effective control of grasses than broadleaf weeds but controls several species of both, including green and yellow foxtail, barnyardgrass, redroot pigweed, common lambsquarters and kochia. Established weeds and wild mustard will not be controlled by Treflan, so some late season cultivation may be necessary.

Princep (simazine)

Princep, the most widely used herbicide in trees, controls many species of annual grass and broadleaf weeds. Princep is safe to use on many species of established deciduous and evergreen trees (see label for detailed lists of tolerant species), but should not be used for weed control in shallow rooted species such as lilac, cottonwood, green ash, or poplar as tree injury may result.

Princep is a preemergence herbicide, applied after the trees are planted, which kills germinating weeds by being absorbed through the roots. Princep has low water solubility and persists in the top 2 inches of soil. Princep selectively controls annual weeds in trees because of the differential rooting habits of weeds and trees. Trees escape injury from Princep because their roots are below the herbicide-treated zone while annual weeds are controlled because they usually germinate in the herbicide-treated top 2 inches of soil.

Princep is formulated as an 80 percent wettable powder, a 90 percent water dispersible granule, and a 4 percent granule. All formulations can be applied in either late fall or early spring but granules are recommended for trashy conditions. Fall applications should be made in late October or early November, just before freeze-up. Spring applications should be made before weeds germinate. The wettable powder or water dispersible formulations are recommended for spring application (unless trashy conditions prevail) because they require less moisture and time for activation than the granules. Agitation is required to keep wettable powder and water dispersible formulations in suspension in the sprayer tank.

Rates of Princep vary from 2 to 4 pounds per acre, depending on organic matter content and soil texture. Use the higher rate on fine-textured soils or those high in organic matter and the lower rate on sandy soils and soils low in organic matter.

Karmex (diuron)

Karmex is an 80 percent wettable powder that is only slightly more water soluble than Princep. Like Princep, Karmex is a preemergence herbicide that selectively controls annual weeds in trees because tree roots are below the herbicide-treated zone.

Karmex should be used only under established plantings (one year or older) of American elm, caragana, cottonwood, Douglas fir, green ash, honeysuckle, Ponderosa pine, red cedar, Russian olive and Siberian elm. Karmex should be applied as a directed spray in a band 4 feet wide in the tree row (2 feet on each side of the row). Karmex applications should be made in early spring before weeds emerge and before the trees leaf out. Injury to trees may result with application to tree foliage, or application under trees growing in low areas where water may stand. Karmex rates vary from 2 to 4 pounds per acre (2.5 to 5 pounds 80W), with the higher rate used on finer textured soils or those high in organic matter and the lower rate on sandier soils or those low in organic matter.

Casoron (dichlobenil)

Casoron is formulated as a 50 percent wettable powder or a 4 percent granule. Casoron controls many annual broadleaf and grassy weeds by inhibiting seed germination and gives short term suppression of perennial weeds. Most species of trees are tolerant to the herbicide.

Casoron has a short soil residual and gives no postemergence control of weeds. Casoron can be applied in early spring before weed growth has started or in late October or early November prior to soil freeze-up. Fall applications of Casoron are preferred since spring applications prior to weed seed germination are often prevented by wet conditions from late snow melt. **Casoron does not move readily downward or laterally in the soil, so adjacent plants are unaffected.** Incorporating Casoron into the soil or irrigating after application **generally improve weed control.** Casoron should not be used on sandy soils or soils low in organic matter nor applied within four weeks after transplanting.

Ronstar (oxadiazon)

Ronstar is a preemergence herbicide that can be safely used for weed control in a number of common tree species including green ash, Russian olive, and lilac. Ronstar is formulated as a 2 percent granule and has been used successfully for weed control in container-grown ornamentals. Research with container-grown ornamentals has shown that Ronstar controls annual grasses such as foxtail (pigeongrass), barnyardgrass, and crabgrass and broadleaves including common lambsquarters, redroot pigweed and purslane. Apply Ronstar at 2 to 4 pounds per acre (100 to 200 pounds per acre 2 percent granules) in late fall or early spring before

weeds germinate. Ronstar should not be mixed into the soil. Ronstar can be applied to both newly transplanted and established trees.

POSTEMERGENCE HERBICIDES

Amitrol-T, Dowpon, Paraquat, Roundup or 2,4-D may be used postemergence for weed control in trees. These herbicides must be applied carefully, keeping the spray off the trees, or serious tree injury may result.

Amitrol-T, Cytrol, Amino Triazole (amitrole)

Amitrole effectively controls many perennial grasses and broadleaf weeds, especially Canada thistle and poison ivy. Amitrol-T and Cytrol are liquid formulations while Amino Triazole is a water soluble powder. Mix either formulation with water and apply as a foliar spray on actively growing weeds.

Do not permit amitrole to contact any tree foliage as amitrole is injurious to both evergreen and broadleaf trees. The most effective annual weed control is achieved by treating small weeds in spring and early summer with sufficient water to insure thorough spray coverage. Perennial weeds such as Canada thistle should be treated at the early bud to bloom stage. Amitrole effectively kills all vegetation, so avoid application to weeds in turf areas unless the grass is to be reestablished.

Amitrole may be applied in a mixture with simazine. Amizine is a commercial mixture of the two herbicides. The amitrole in the mixture is effective in killing existing vegetation while the simazine provides residual control of germinating broadleaf and grassy weeds. Amitrole alone may be applied more than once a year to persistent weeds. However, **do not** use amitrole-simazine mixtures more than once a year.

Dowpon M (dalapon)

Annual and perennial grasses in trees can be controlled postemergence with Dowpon applied to the grass foliage. Dowpon is a soluble powder that mixes readily with water and translocates rapidly from the grass leaves to roots and rhizomes.

Apply Dowpon as a directed spray in established trees. Avoid getting the herbicide on the tree foliage as injury may result. Dowpon may be mixed with 2,4-D or amitrole to kill broadleaf weeds as well as grasses when desirable.

Paraquat CL, Gramoxone (paraquat)

Paraquat is a nonselective, nontranslocated, post-emergence herbicide with rapid contact action which kills seedling annual plants. Large, well established annual weeds and perennials will generally recover from paraquat injury since only the

treated portions of the plants are affected by the herbicide.

Paraquat has no residual effect and repeated applications are required during the growing season, especially for the control of perennial weeds and grasses.

Apply paraquat as a directed spray and avoid contact with tree foliage. **CAUTION:** Take special care when applying paraquat near conifers (evergreens) since damaged needles will be lost permanently. Avoid inhalation of paraquat spray or direct contact with skin and eyes. Paraquat can be irritating if not handled properly. Paraquat is a restricted use herbicide and may be applied only by certified applicators or people under the direct supervision of a certified applicator.

Roundup (glyphosate)

Roundup is a nonselective, translocated, post-emergence herbicide with no soil residual activity, which effectively controls numerous species of annual and perennial broadleaf weeds and grasses. However, Roundup is used primarily for perennial weed control, especially leafy spurge, Canada thistle and quackgrass. Roundup has not been consistent in the control of field bindweed.

Apply Roundup in late summer, from about August 15 to mid-September but prior to frost. Roundup is absorbed by leaves and other photosynthetically active portions of the plant and translocated throughout the plant. Broadleaf trees and evergreens will be injured if Roundup contacts the foliage or green bark. Carefully apply Roundup as a directed spray, using low pressure and large droplet size to minimize the possibility of spray drift. Do not apply Roundup when winds are gusty or in excess of 5 miles per hour.

2,4-D

Postemergence applications of 2,4-D control many broadleaf weeds. 2,4-D is absorbed by foliage and is translocated rapidly throughout the plant. Do not permit 2,4-D spray drift to come in contact with the leaves or branches of the trees since it can readily damage or kill many species of deciduous trees. Conifers are more tolerant to 2,4-D than hardwood trees, especially when not in active growth.

The oil soluble amines of 2,4-D such as Dacamine or Emulsamine 3E, or a water soluble amine formulation of 2,4-D are suggested for use in and among trees. Do not use ester formulations of 2,4-D in trees as vapor drift may cause tree injury. Do not apply 2,4-D under windy conditions when spray drift onto tree foliage may cause injury.

2,4-D is used frequently as a post-directed spray in trees to control such perennial weeds as leafy spurge, Canada thistle, field bindweed and perennial

sowthistle. Apply 1 to 2 pounds per acre acid equivalent, preferably twice a year, when weeds are in the early bloom stage and again in late August or early September.

APPLICATION EQUIPMENT

Many sprayers are satisfactory for applying liquid herbicides in tree rows providing the solution can be agitated and the discharge rate calibrated. At least 25 gallons of water per acre should be used. Large volumes of water give uniform distribution of the herbicide and less spray drift than low volumes.

Commercial spray units equipped with by-pass valves do not always agitate the herbicide satisfactorily. It is desirable to have a regular agitator in addition to the by-pass.

Fan type, Tee Jet nozzles or other similar nozzles are satisfactory. The size will depend on individual requirements. For hand units, use Tee jet nozzles No. 80033 or 80043 or similar nozzles.

Granular herbicides can be applied with mechanical applicators such as the Gandy Ro-Bander or even

a cyclone seeder. Care must be exercised in using the cyclone seeder so that the granules are confined to the area to be treated.

USE CARE IN APPLYING HERBICIDES

Herbicides can kill or injure trees when improperly used. The chemicals discussed in this circular do not volatilize (give off fumes) to damage the shelterbelt trees or neighboring susceptible plants. However, careless spraying can injure or kill not only the trees but nearby crop plants and ornamentals as well. Avoid getting chemicals such as Karmex, Roundup, Amitrole, 2,4-D and Paraquat onto trees. Prevent spray drift of such chemicals. No attempt need be made to keep Princep off the bark. Thoroughly mix chemicals before and during application. Keep the spray mixture agitated. Read the label on the herbicide container for detailed instructions before spraying.

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Table 1. Herbicides Used for Weed Control in Tree Plantings.

Herbicide	Amount of Commercial Product per Acre	When to Apply	Remarks
Amitrol-T, Cytrol Amino-triazole	1 to 2 gal/A in 30-100 gal. water 2 to 4 lb/A in 30 to 60 gal. water	Spring and early summer, when weeds are young and growing actively. Perennial weeds such as Canada thistle should be in the early bud to bloom stage.	Apply as directed spray. Certain weeds may require a second application. Make only one application of Amizine per year.
Amizine	7 lb/A in 100 gal. water		
Casoron 50W (dichlobenil)	8 to 12 lb/A in a minimum of 50 gal. of water	Early spring through early summer as a preemergence treatment.	Effectiveness increased by clean cultivation prior to application. The first season do not apply until 4 weeks after planting.
Casoron 4G (dichlobenil)	100 to 200 lb	Late fall prior to freeze-up as a preemergence treatment.	Clean cultivation prior to application will increase effectiveness. Use higher rate for suppression of perennial weeds.
Dowpon M (dalapon)	4 to 15 lb/A in a minimum of 10 gal. of water	When grasses are actively growing, and before heading.	Apply as a directed spray. Use lower rates on seedling grasses, higher rates on perennial grasses.
Karmex 80W (diuron)	2.5 to 5 lb/A in a minimum of 25 gal. of water	Preemergence in early spring before weeds emerge and trees leaf out.	Apply as a directed spray in a band 4 ft. wide in the tree row (2 ft. on each side of row). Use only under established plantings 1 year or older. Use restricted to certain species, see text. Do not allow spray to contact tree foliage.
Paraquat CL (paraquat)	1 to 2 qt/A in a minimum of 50 gal. of water	Postemergence when the weeds are succulent and new growth is from 1 to 6 inches high.	Apply as a directed spray. Retreatment may be necessary. Do not allow spray to contact green stems or foliage of trees. Add Ortho X-77 surfactant at 8 oz/100 gal. spray solution.
Princep 80W (simazine)	2.5 to 5 lb/A in a minimum of 25 gal. of water.	Before freeze-up in the fall or early spring, before weeds emerge.	Use low amounts on sandy soils. Remove old weeds prior to application. Do not apply to Christmas tree or shelterbelt transplants less than 3 years old.
Princep Caliber 90 (simazine)	2.2 to 4.4 lb/A in a minimum of 25 gal. of water		
Princep 4G (simazine)	50 to 100 lb/A	Late October to early November, prior to soil freeze-up.	
Roundup (glyphosate)	1 to 3 qt/A in a minimum of 20 gal. of water.	Apply when vegetation to be controlled is in full foliage. Treat leafy spurge, Canada thistle and other broadleaf perennial weeds from August 15 to early September.	Apply only as a directed spray. Drift on tree foliage will seriously damage trees. Use lower rate on annual weeds and on perennial grasses. Use higher rate on perennial broadleaf weeds.
Treflan 5G or 5GL (trifluralin)	10 to 20 lb/A incorporated in soil	Apply before weed emergence in spring	Must be incorporated into soil by mechanical cultivation within 24 hours after application. Does not control established weeds.
Treflan 4EC (trifluralin)	1 to 2 pt/A in a minimum of 20 gal. of water		
2,4-D	1 to 2 qt/A (of a 4 lb/gal conc.) in a minimum of 100 gal. of water	Postemergence treatment when weeds are young and growing actively	Apply as a directed spray. Do not allow spray drift to contact tree foliage or stems. Use of oil soluble amine formulations is recommended.

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