DORMANT-STEM HERBICIDE TREATMENTS

for Rights-of-Way Brush Control

Dow AgroSciences

Solutions for the Growing World

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An alternative to growing-season foliar applications:

Trees and re-sprouting brush create a special challenge for vegetation managers. To provide safe and reliable power to customers or to keep public or forest roadside areas visible, maintenance must be conducted on the vegetation in these right-of-way areas. For power companies, trees growing under power lines present the risk of a power outage if they grow into the lines. Vegetation touching the lines or even close to the lines can cause power outages. Along roadsides, trees encroaching into the right-of-way can make it difficult for motorists to see signs and around corners. Forest roads, if not maintained, can become impossible to use, a fire hazard, and a hazard to crews and equipment.

On these sites, vegetation managers have several options: cut the trees or brush with mowers, large brush machines or by hand with brush axes and chain saws; use herbicides to control some or all of the tree species on the site; or a combination of the two — mechanical plus herbicides. Some management programs use herbicides to selectively control tall or fast-growing trees, but leave desirable shrubs and low-growing trees, such as dogwood, etc. During the winter months, many animals go into hibernation, and in the world of vegetation management, there is the potential for herbicide spray crews to hibernate as well. However, there are several treatments that can be made later in the fall and throughout the winter months. While foliar applications are made to target vegetation during the growing season, dormant-season herbicide treatments extend the application season through the winter and keep crews productive during these traditionally slow periods. There are several key advantages to dormant-season applications:

1. Potential for herbicide drift from the right-of-way to non-target desirable species is significantly reduced because there is no foliage on most trees and crops are typically not present in adjacent fields.

2. There is no foliar brownout on treated deciduous trees — instead the foliage does not re-emerge the next spring after dormant-season herbicide applications.

3. Where desirable species are mixed with undesirable species in close proximity, directed spray, basal bark and cut-stump applications allow targeted control of undesirable woody plants with little risk of damage to adjacent desirable plants — only the treated plants are controlled.

4. Applications can be accomplished during winter months when work crews are not as busy and potentially have more available time for these programs. Another advantage of employing a dormant-stem treatment is that public visibility and complaints may be reduced, as the brownout of foliage would not be a concern.

How applications are made

Most people are familiar with the typical right-of-way brush clearing equipment — brush-cutting machines and mowers, chain saw crews, brush axes, etc. These programs typically require large crews and a lot of support equipment. Sometimes, in more urban or scenic areas, cleanup crews and equipment — such as wood chippers, trailers or trucks to haul debris and other support equipment — are needed to remove cut trees and brush. A herbicide control program requires less equipment and fewer people, and is generally a better alternative to mechanical-clearing programs. A key benefit is that herbicide spray programs take less time on the roadways versus mechanical programs, so there is less applicator exposure to risky situations, such as passing traffic on roadside rights-of-way. Dormant-stem, basal bark and cut-stump applications are all late fall/winter options and can fit most right-of-way vegetation management programs.

Dormant-stem broadcast applications:

Dormant-stem applications work well as a spot treatment or individual plant treatment (IPT) for scattered stands of unwanted trees or shrubby brush. Dormant-stem broadcast applications are most effective where stems are numerous and average less than 3 inches in diameter. With IPT or broadcast dormant-stem treatments, all stems of trees or brush are wetted thoroughly and the herbicide is carried into the plant by penetrating the thin bark layer on branches and the trunk. Applications timing varies depending on the region of the country where the program will be applied. In the eastern United States and Midwest, the most effective timing is within 10 weeks prior to bud break, when the brush is dormant and most of the foliage has dropped. Treatments in late fall and early winter are generally less effective than mid- and late winter applications in this region. For many areas of the country, the ideal timing is about six weeks prior to bud break up to the beginning of bud break. In the western United States, applications can be made any time after woody plants are dormant. The bottom line is that all dormant applications should be completed before foliage begins to emerge on deciduous trees. Applications must be made when the bark, stems, and branches are dry. Applications made in cold weather are fine, but dry conditions are a must for this method to work well. Applications made when bark

is wet will cause the spray mix to emulsify (turn milky white) on the stems, and reduce efficacy.

Ester, or oil-based, herbicides are the foundation formulations for dormant-stem treatments. Garlon® 4 Ultra specialty herbicide is an ester with unique and proprietary oil formulation and is the key to a successful dormant-stem program. Garlon 3A specialty herbicide cannot be used for this application method. There are several methods for dormant-stem applications, but the most common are truck-mounted manifold sprayers and handgun application either from the ground or from a truck.

Truck-mounted manifold sprayers: These spray systems are typically mounted on the side of a truck or off the back and spray to one side. Sometimes the spray head is mounted on an articulated arm. Manifold arrangements are very effective for roadside right-of-way brush control and electric utility distribution lines that parallel a roadside. The spray head is usually a set of nozzles (combinations of straight stream, off-center and flat-fan) mounted in a shielded manifold and designed to spray a wide, even swath. Other very effective spray heads can be controlled droplet sprayers, such as Widecast 1554, Radiarc®, Directa-Spra, Mini-Wobbler, etc. Truck-mounted sprayers typically apply a set volume of spray mix per acre — trucks travel at a prescribed speed, and spray volume is delivered at a precise rate per acre. Optimum volume per acre for dormant-stem applications is about 100 gallons of total mix per acre. This is considered a high-volume spray and is typically needed for good coverage of the entire crown, all stems, the trunk and branches targeted in the treatment zone.

Handgun applications: Handgun applications are made by using high-pressure-powered pumping systems and usually a hose reel and an adjustable handgun sprayer (Gunjet type or equivalent). When applied from the ground, the applicator pulls a hose off of a reel and usually walks next to the target vegetation. Applications using a handgun also can be made directly from a truck as long as the truck can be driven close enough to the target vegetation. Handgun applications are basically a directed spray application. Gaps between trees, low growing species or open areas are not treated. Therefore, the rate (and total volume) per acre is variable based on target vegetation and brush density. The key for a good handgun applicator is to adjust the spray pattern correctly for the range being treated and, most important, to keep the gun moving. Coverage should be similar to spray painting — even coverage without drenching those results in spray runoff. Garlon 4 Ultra is the standard when it comes to dormant-stem treatments. It provides broad-spectrum control of brush and, when applied properly, controls many troublesome brush species — all in a low-profile winter treatment. Also, Garlon 4 Ultra is not a soil active herbicide, so it will not affect desirable vegetation growing in the next spring, such as desirable grasses needed to hold slopes and prevent erosion. Typically, for truck-mounted manifold spray programs and most

handgun applications, Garlon 4 Ultra at 2 gallons plus 3 gallons of crop oil concentrate (COC) or recommended oil is mixed with water to make 100 gallons total spray mix solution. Applications are made to the entire crown, all stems, the trunk and branches in the treatment zone — similar to a foliar program, except there is no foliage to spray (except conifer foliage, which is present during the dormant season and is treated the same as dormant deciduous trees). Application is made to thoroughly wet all portions of the stems, trunk and branches, but not to the point of runoff.

Where broader-spectrum brush control is needed, add 2 quarts of Tordon® K specialty herbicide. Tordon K is a soil-active herbicide, so be sure to do a thorough evaluation of the site and surrounding area before including it in the mix. Extra care should be taken when applying a mixture containing Tordon K to prevent spray drift onto sites where crops will be grown during the next growing season. The addition of Milestone® specialty herbicide can be tank-mixed at up to 7 fluid ounces per 100 gallons of spray mix for wider-spectrum and improved control or as an alternative to Tordon K as the tank-mix partner.

Dormant-season basal bark applications:

Dormant-season basal applications are ideal for lower-density infestations, especially where selectivity is a key objective. In situations where desirable species are mixed with undesirable species in close proximity, basal applications allow targeted control of undesirable woody plants without danger of damage to adjacent desirable plants — only the treated stems are controlled. Basal bark treatments make sense where there are long stretches of low-density brush with stems of 6 inches in diameter or less or areas where the density may be higher but are in patches more easily accessible during the dormant season. Situations in which basal bark treatments are a good choice include: sites that are inaccessible to heavy equipment; sites that require routine but not intensive maintenance; areas where desirable vegetation surrounds target brush; and as a follow-up on a reclamation treatment. Another advantage of dormant-season basal applications is that public visibility and complaints can be minimized because foliage brownout is minimal. Basal treatments using Garlon® 4 Ultra specialty herbicide are generally one of the most effective treatment methods for targeted IPTs, and form the foundation of any tank mix for basal bark applications. This method is effective throughout the year as long as the ground is not frozen or the bark is not saturated with water. Apply a mixture of 20 percent to 30 percent Garlon 4 Ultra in commercially available basal oil, or diesel fuel or kerosene can be used.

Regional, geographic and species variations influence basal application methods and application rates.

Low volume basal bark: Typically in northern U.S. regions where prolific root and stump re-sprouters are common, wider treatment bands and higher application rates are required for good, long-term control. For these areas, use low volume basal bark methods by spraying a solid band completely around the circumference of the trunk to a height of about 12 to 15 inches above ground line. Spray bark until wet, all the way around the main stem from the ground line up to 12 to 15 inches, including any unsuberized bark (smooth bark at transition from taproot to above ground stem), but not to the point of runoff or puddling. This treatment method is recommended for trees with stem diameters of less than 6 inches.

Low volume stem bark band: In most Southern regions, prolific re-sprouters are less common and streamline basal methods can be used with lower rates which generally provide good control. For these areas, use streamline basal bark application methods by spraying a 6 to 10 inch band completely around the circumference of the trunk at a height of about 12 to 24 inches above the ground line. The treatment band may be positioned at any height up to the first major branch. Spray bark until wet, but not to the point of runoff (much like you would do if spray painting). Complete coverage down to the ground line is usually not required for good control.

Since these are basic guidelines only, consult the Garlon 4 Ultra label and your local Dow AgroSciences sales representative on specific recommendations for your area.

Equipment: Applications are made with a backpack sprayer using low pressure (around 20 psi). An adjustable-cone nozzle, such as Spraying Systems ConeJet 5500-X3 or Y3 up to X8 (personal preference) is ideal and allows for applications to be made standing next to the stem or as far away as 10 feet by adjusting the nozzle. Flat-fan or hollow-cone nozzles also work well but do not allow as much flexibility as the adjustable-cone nozzles. Where multiple branches are close to the ground, basal applications to all branches or stems is necessary — complete coverage of the bark around all stems or branches is very important. Thin bark species are most easily controlled because the basal mixture penetrates the bark easily and enters the active transport tissues inside of the bark.

Thick bark, and particularly corky bark trees such as scrub oaks make control more difficult for basal treatments — more attention to complete coverage all the way around all stems is required

for control. When done correctly, dormant-season basal bark applications are very effective, with nearly 100 percent control of treated stems. Basal bark applications are effective any time of year, however, late winter and early spring applications generally provide the best level of control. Also, winter applications provide the best access for treatment because there is no foliage, grass or weeds growing up around the basal area of target stems. Summer applications provide good control, but applications can be more difficult because of dense foliage, weeds and grasses around the base of target stems. Pathfinder® II specialty herbicide is a ready-to-use formulation for basal bark applications. This product comes ready to be applied as a basal formulation with no mixing.

Follow-up applications on escaping resprouts are a good idea, especially when eradication is the goal, or exotic or invasive species are treated. Follow-up basal bark applications should be made late in the season the following year. Re-growth and/or any re-sprouting may be slowed from herbicide applications made during the previous year, so it is best to allow for maximum growth during the season before treating them with follow-up treatments.

Dormant-season cut-stump applications:

Cut-stump, or cut-surface, treatments also are ideal for lower density infestations and especially where selectivity is a key objective. Cut-stump treatments are perfect where individual trees need to be removed in highly visible areas and unsightly/hazardous standing dead trees are not a sensible option. In situations where desirable species are mixed with undesirable species in close proximity, cut-stump applications allow targeted control of the undesirable woody plants without danger of damage to adjacent plants because only the treated stems are controlled. Cut-stump treatments can be made anytime of the year; however, see the caution note below about tree species known as "bleeders." Capstone™, Garlon® 3A, and Garlon 4 Ultra specialty herbicides are effective products that can be used as cut-stump treatments. The treatment options for cut-stump applications are listed below.

When using Capstone or Garlon 3A, cut the target stem with a chain saw (or handsaw, loppers, etc., depending on diameter) as close to the ground line as possible, and treat the top of the stump and anywhere that the bark is separated from the trunk with the spray mix. Only the cambium layer (between the bar and the dead center of the stem) needs to be sprayed. Apply a liberal amount of spray to the cut surface, but not so that it runs off the sides of the cut surface. Any spray that runs off the sides and down to the ground line is wasted. There is no upper size limit for cut-stump treatments. For larger stumps, the application should be applied only to the outer 2 inches of the stump completely around the circumference and down any bark tears of the tree stump. On larger woody plants and trees, the outer 2 inches all the way around consists of the cambium and sapwood (living vascular tissues), which are the active, living portions of a woody plant. Inside of the outer 2-inch zone is nonliving heartwood that will not absorb the herbicide. Cutting the plant and applying herbicide immediately ensures the herbicide is taken up by the newly cut stump. Woody plants have turgor pressure (suction) in that outer zone and, when freshly cut, will draw the spray mix into the stump. The active movement into the stump only lasts a short time after cutting so immediate application is necessary with Capstone and Garlon 3A.

When using Garlon 4 Ultra, apply with a backpack sprayer using low pressure (around 20 psi). Applications made soon after cutting are best, but not critical. Application is made to the cambium but also to the bark down to the groundline and any exposed surface roots. Some loss in efficacy can be expected as cut stumps dry out; however, cut stumps can be treated with this mix weeks after cutting. The basal mix of Garlon 4 Ultra is an oil-based mix, so it is able to enter through the bark as well as through active movement into the cut surface as with Capstone or Garlon 3A on freshly cut stumps. This is an important advantage of using the basal mix of Garlon 4 Ultra specialty herbicide if stumps cannot be treated immediately after cutting.

Capstone™ for cut-stump applications: Apply Capstone undiluted by spraying or painting the cut surfaces of freshly cut stumps and stubs as soon as possible after cutting. The cambium area next to the bark is the most vital area to wet.

Garlon® 3A for cut-stump applications: Apply Garlon 3A at a 50:50 percent mix with water by spraying or painting the cut surfaces of freshly cut stumps and stubs immediately after cutting. The cambium area next to the bark is the most vital area to wet.

Garlon® 4 Ultra for cut-stump applications: Use the same mix as above for low volume basal applications — 20 percent to 30 percent Garlon 4 Ultra in a commercially available basal oil, or diesel fuel or kerosene. Spray the top of the stump to the point of runoff and around the sides to the ground line. Do not allow the herbicide to puddle at the base. In recent years it has become popular to add Milestone® herbicide at .5-2% solution to the Garlon 4 Ultra and oil mixture to broaden the spectrum and improve control on certain sprouting species (need explanation on how to mix this as it is water in oil) The basal oil should be compatible with a water soluble herbicide such as Milestone. Make a stable tank mixture for basal bark application by first combining each product with a compatibility agent prior to final mixing in the desired ratio. Mix Milestone and Garlon 4 Ultra thoroughly with basal oil; if the mixture stands for more than 30 minutes, re-agitation may be required. Do not store the final mixture.

Dormant-stem broadcast FAQs:

When does a dormant-stem broadcast application make sense, rather than an individual plant treatment?

Dormant-stem broadcast treatments are a great option for controlling woody plants that are numerous and less than 3 inches in diameter. Using dormant-stem broadcast treatments in areas of dense thickets of dormant vegetation, where basal bark or cut stump treatments aren't sensible options, allows a crew to be more productive. It also makes sense to use dormant-stem broadcast applications in areas that are difficult to spray during the growing season, such as sites that are surrounded by sensitive vegetation.

What is the proper application timing of dormant-stem broadcast applications?

These applications should be made after the leaves have dropped. For optimum results, apply anytime within 10 weeks before bud break — generally, in the eastern United States and Midwest, February through April. In the western United States, applications can be made any time after woody plants are dormant in the fall through the winter. Dormant-stem broadcast applications should not be applied to wet or saturated bark, as poor control may result. Making these applications during the dormant season gives vegetation managers a low-visibility treatment option, as there is no unsightly foliar brownout.

How is the actual application made?

A dormant-stem broadcast application resembles a foliar treatment, but is made during the dormant season. It works well as a spot treatment or IPT for scattered stands of unwanted trees and dense thickets of brush. With dormant-stem broadcast applications, all of the stems of trees or brush are wetted thoroughly. The herbicide is carried into the plant by penetrating thin bark on the branches and trunk. Applicators must ensure uniform coverage is achieved.

What type of results can I expect in the spring?

Because Garlon 4 Ultra is selective for broadleaf weeds and brush, desirable vegetation will not be harmed, particularly when grasses are present (NOTE: the oil carrier can injure some grasses causing them to brown out a bit) . Grasses will be released and can be expected to occupy and dominate treated sites the following year. Depending upon size and density, target vegetation treated with dormant-stem broadcast applications using Garlon 4 Ultra will be controlled or suppressed. The level of control or suppression is influenced by species, size and density of the target vegetation, along with other environmental conditions. It is always best to consult with your local Dow AgroSciences sales representative on specifics for your area.

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