



Hardwood Brush Control for
Cut-Surface Applications

Professional
Vegetation
Management



The Chemical Company

Stalker® Herbicide

Hardwood Brush Control for Cut-Surface Applications

Stalker® herbicide is a versatile, broad-spectrum brush control product that is specifically formulated to be mixed with water or a penetrating oil and applied as a basal bark, cut-stump, injection or cut-stubble treatment.

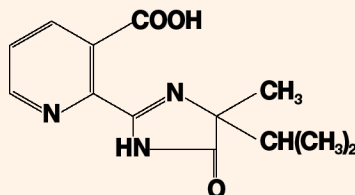
Stalker controls over 30 brush species and applications can be made throughout much of the year, thus extending the spray season. **Stalker** is recommended for the control of brush in pasture/rangeland and noncropland areas such as utility, highway and pipeline right-of ways, fence rows, storage areas, non-irrigation ditchbanks and other similar areas.

Formulations

Stalker is an aqueous formulation that is specifically formulated to be mixed with water or a penetrating oil. When mixed with a penetrating oil, a water-in-oil emulsion is formed.

Chemical and Physical Properties

Family Name	Imidazolinone
Common Name	Imazapyr
Chemical Name	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1 <i>H</i> -imidazol-2-yl]-3-pyridinecarboxylic acid
CAS Number	81334-34-1
Other Designations	AC 243997, CL 243997
Structure	



Molecular Weight	261.28
Solubility	Water 11,272 mg/L at 25° C
Vapor Pressure	<1x10 ⁻⁷ mm Hg at 45° C
pK_a	1.9, 3.6
K_{ow}	1.3
Physical State	Liquid
Color	Hazy, pale yellow to dark green
pH	6.0 – 7.5
Flash Point	>200° F
Aqueous Photolysis Half-lives	3.7 days, pH 9 2.7 days, pH 7 1.3 days, pH 5 Stable to hydrolysis between pH 5 and 9

Herbicidal Action

Stalker® herbicide eliminates plants by inhibiting acetohydroxyacid synthase (AHAS), an enzyme common to the biosynthetic pathway of the branched-chain amino acids: valine, leucine and isoleucine. This inhibition causes a disruption of protein synthesis which, in turn, interferes with DNA synthesis and cell growth. AHAS, and therefore the biosynthesis of these three amino acids, does not occur in animals, which partially explains the low toxicity of **Stalker** to mammals and other nontarget animal species.

Stalker is readily absorbed through the roots and foliage of plants and is translocated rapidly in the xylem and phloem to the meristematic regions where it accumulates. Although cessation of growth and death of meristematic regions occur soon after application, signs of plant death are not immediately evident. The speed of elimination varies according to the species.

Symptomology in sensitive plants can be slow to develop, usually taking 2 to 8 weeks for the first signs of injury to appear. Injury symptoms include stunted growth, tip dieback, chlorosis (yellowing), and deformation of newly developing buds and leaves.

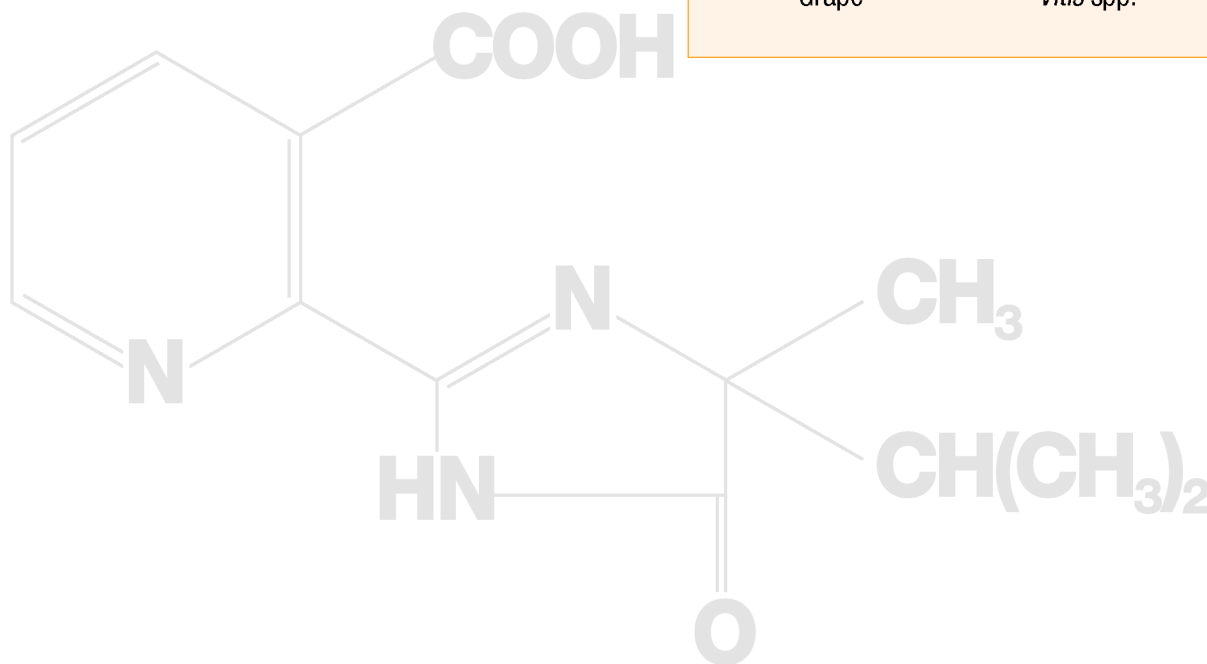
Weeds Controlled

Stalker will provide control of the following species, shown in Tables 1 and 2.

Table 1

Species of Vines and Brambles Controlled by **Stalker**

Common Name	Scientific Name
Poison ivy	<i>Rhus radicans</i>
Trumpet creeper	<i>Campsis radicans</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Grape	<i>Vitis</i> spp.



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Table 2
Species of Woody Brush and Trees Controlled by Stalker® Herbicide

Common Name	Scientific Name	Common Name	Scientific Name
Alder	<i>Alnus</i> spp.	Madrone, Pacific	<i>Arbutus menziesii</i>
Alder, red	<i>Alnus rubra</i>	Magnolia, sweetbay*	<i>Magnolia virginiana</i>
Ash	<i>Fraxinus</i> spp.	Maple	<i>Acer</i> spp.
Aspen	<i>Populus</i> spp.	Maple, bigleaf	<i>Acer macrophyllum</i>
Australian pine*	<i>Casuarina equisetifolia</i>	Maple, red	<i>Acer rubrum</i>
Autumn-olive	<i>Elaeagnus umbellata</i>	Melaleuca	<i>Melaleuca quinquenervia</i>
Bald cypress	<i>Taxodium distichum</i>	Mulberry tree	<i>Morus</i> spp.
Beech, American	<i>Fagus grandifolia</i>	Oak	<i>Quercus</i> spp.
Birch*	<i>Betula</i> spp.	Oak, California black	<i>Quercus kelloggii</i>
Blackgum	<i>Nyssa sylvatica</i>	Olive, Russian	<i>Elaeagnus angustifolia</i>
Blueberry	<i>Vaccinium</i> spp.	Peppertree, Brazil	<i>Schinus terebinthifolius</i>
Boxelder	<i>Acer negundo</i>	Persimmon	<i>Diospyros virginiana</i>
Broom, Scotch*	<i>Cytisus scoparius</i>	Poisonoak, Pacific	<i>Rhus diversiloba</i>
Ceanothus	<i>Ceanothus</i> spp.	Poplar	<i>Populus</i> spp.
Cherry tree	<i>Prunus</i> spp.	Poplar, yellow	<i>Liriodendron tulipifera</i>
Chinaberry tree	<i>Melia azedarach</i>	Privet, common	<i>Ligustrum vulgare</i>
Chinquapin, golden*	<i>Castanopsis chrysophylla</i>	Saltcedar	<i>Tamarix ramosissima</i>
Cottonwood	<i>Populus</i> spp.	Sassafras, common	<i>Sassafras albidum</i>
Dangleberry	<i>Gaylussacia frondosa</i>	Sourwood	<i>Oxydendrum arboreum</i>
Dogwood	<i>Cornus</i> spp.	Staggerbush	<i>Lyonia mariana</i>
Elder*	<i>Sambucus</i> spp.	Sumac	<i>Rhus</i> spp.
Elm*	<i>Ulmus</i> spp.	Sweetgum tree	<i>Liquidambar styraciflua</i>
Eucalyptus	<i>Eucalyptus</i> spp.	Sycamore, American	<i>Platanus occidentalis</i>
Fetterbush	<i>Lyonia lucida</i>	Tallowtree	<i>Sapium sebiferum</i>
Gallberry*	<i>Ilex glabra</i>	Tanoak, scrub*	<i>Lithocarpus densiflorus</i>
Gallberry, tall	<i>Ilex coriacea</i>	TiTi, black	<i>Cliftonia monophylla</i>
Hawthorn	<i>Crataegus</i> spp.	Tree of heaven*	<i>Ailanthus altissima</i>
Hazel*	<i>Corylus cornuta</i>	Waxmyrtle	<i>Myrica</i> spp.
Hickory	<i>Carya</i> spp.	Waxmyrtle, Pacific*	<i>Myrica californica</i>
Holly	<i>Ilex</i> spp.	Waxmyrtle, southern*	<i>Myrica cerifera</i>
Honeylocust*	<i>Gleditsia triacanthos</i>	Willow	<i>Salix</i> spp.
Huckleberry, tree	<i>Vaccium arboreum</i>	Yaupon	<i>Ilex vomitoria</i>
Locust tree, black*	<i>Robinia pseudoacacia</i>		

*Tank-mix with Garlon® 4 as a basal or cut-stump treatment

Application Methods

Low-volume Basal Bark Treatments

Mix 8 to 12 fluid ounces of **Stalker**® herbicide in 1 gallon of diesel oil or a penetrating oil. To control mixed brush species with up to 4-inch stem diameter at breast height, spray the lower 12 to 18 inches of the stem with the **Stalker** and oil mixture. DO NOT over apply, causing dripping or puddling. Maintain uniform mixtures with frequent agitation. **Stalker** may be tank-mixed with Garlon 4, Brush Killer® 800 and other basal products to broaden the spectrum of control. Application rates for basal bark applications, with a tank mixture of **Stalker** plus Garlon 4, depends on the stem diameter, density, species mix to be controlled and geographic location. A standard mix for basal bark application is 3 to 5% **Stalker** plus 15 to 20% Garlon 4. Consult the herbicide labels for rates and susceptible brush species. When tank-mixing, follow all precautions on the tank mix product label and always follow the most restrictive label.

Thinline Basal and Stem Applications

Stalker may be applied as a thinline application to susceptible species such as bigleaf maple (*Acer macrophyllum*), willow (*Salix* spp.) and eucalyptus (*Eucalyptus* spp.) with a stem ground line diameter of 3 inches or less. Mix 24 to 48 ounces of **Stalker** in 1 gallon of diesel oil or penetrating oil. Maintain uniform mixtures with frequent agitation. Direct a thin line of the spray solution to the stems, beginning a few feet from the ground and descending toward the base of the tree, making a zig-zag motion. DO NOT over apply, causing puddling.

Cut-stump Treatments

Mix 8 to 16 fluid ounces of **Stalker** in 1 gallon of water, diesel oil or a penetrating oil. **Stalker** may be tank-mixed with Garlon 3A, Garlon 4, Tordon® K, BK 800, Escort® or Accord® to control labeled species. Spray or brush the **Stalker** solution onto the cambium area of the freshly cut stump surface. Ensure that the application mixture thoroughly wets the cambium area (the wood next to the bark) of the stump. The use of a surfactant or penetrating agent may improve uptake through partially callused cambiums. Applications can be made anytime during the year.

However, control may decrease during periods of heavy sap flow in the spring. DO NOT over apply, causing puddling.

Tree Injection Treatments

Mix 8 to 12 ounces of **Stalker** in 1 gallon of water. Using standard injection equipment, apply 1 mL of **Stalker** and water mixture at each injection site around the tree with no more than 1 inch intervals between cut edges. Ensure that the injector completely penetrates the bark at each site.

Cut-stubble Treatments

Stalker can be applied within 2 weeks following mechanical mowing or cutting of brush. Best results are obtained when some regrowth of brush has occurred. To suppress or control resprouting, uniformly apply a spray solution of 1 to 2 pints of **Stalker** plus 2.5 gallons (5% v/v) penetrating basal oil, plus enough water to make 50 gallons of spray solution to treat 1 acre. **Stalker** may be tank-mixed with 1 to 2 quarts of Garlon 4 or Tordon K and other labeled products to aid in control or suppression of brush. When tank-mixing, follow all precautions on the tank-mix product label and always follow the most restrictive label. Tank mixes should include at least 5% (v/v) penetrating agent. The addition of at least 5% (v/v) penetrating agent can aid in uptake through the bark or exposed roots.

Cut-stubble applications are made to the soil and cut-brush stumps. This type of application may increase ground cover injury. However, vegetation will recover. Making applications of **Stalker** directly to the soil can increase potential root uptake, causing injury or death of desirable trees.

Frill or Girdle Treatments

Mix 8 to 12 ounces of **Stalker** in 1 gallon of water, diesel oil or a penetrating oil. Using a hatchet, machete or similar tool, make cuts through the bark and completely around the tree with no more than 2-inch intervals between cut edges. Spray or brush the **Stalker** mixture into each cut until thoroughly wet.

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Acute Toxicology

Stalker® herbicide features exceptionally low mammalian toxicity and, as a result, it poses no significant hazard to humans or other mammals when used according to label directions.

Results from acute toxicology tests are contained in Table 3.

Table 3

ACUTE TOXICITY OF STALKER TO MAMMALS	
Study	Result
Stalker formulation	
Oral LD ₅₀ (rat, male and female)	>5000 mg/kg body weight
Dermal LD ₅₀ (rabbit, male and female)	>2000 mg/kg body weight
Inhalation LC ₅₀ (rat, male and female)	>1.58 mg/L (analytical)
Eye irritation (rabbit)	Slightly to moderately irritating
Skin irritation (rabbit)	Non- to slightly irritating
Dermal sensitization (guinea pig)	Sensitizer (Buehler method)

Mutagenicity and Genotoxicity

Stalker is non-mutagenic, which means it does not cause gene mutations in test animals. It is also non-teratogenic, meaning it does not cause birth defects in test animals.

Imazapyr technical has shown a lack of mutagenic and genotoxic activity in these laboratory tests:

- Bacterial/microsome mutagenicity (Ames assay)
- *In vitro* Mammalian cell gene mutation assay (CHO/HGPRT)
- *In vitro* Chromosome aberration assay
- *In vitro* Unscheduled DNA synthesis (UDS) assay

Environmental Fate

Imazapyr is moderately persistent in the soil, depending upon application rate, soil type and environmental conditions, with an average half-life in the soil of 25 to 142 days. Microbial degradation is the primary means of imazapyr dissipation in the soil. Imazapyr is rapidly degraded (half-life of 2 to 3 days) in shallow bodies of water when exposed to sunlight. Imazapyr is moderately bound to soil and generally stays within the top 12 to 18 inches of soil, with little to no lateral movement. Soil binding increases with increasing organic matter, clay content, time, and decreasing soil pH and moisture.

Handling Precautions and First Aid

Fire Hazard: Slight flammability

Corrosiveness: Corrosive to mild steel and brass

Storage Stability: >24 months

Spray Equipment: Flush tank, pump, hoses and boom with several changes of water after removing nozzle tips and screens (wash these parts separately).

Incompatibility: Strong oxidizing agents and alkalis

Nontarget Plant Injury: Do not apply or drain or flush equipment on or near desirable plants, or on areas where their roots may extend, or in locations where the product may be washed or moved into contact with their roots. **Stalker** is phytotoxic at extremely low concentrations. Nontarget plants may be adversely affected from drift.

Caution

- Keep out of reach of children.
- Harmful if inhaled or absorbed through skin.
- Avoid breathing spray mist.
- Avoid contact with skin, eyes or clothing.
- Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals.
- Applicators and other handlers must wear long-sleeved shirt and pants, chemical-resistant gloves and shoes plus socks.
- Remove contaminated clothing and wash before reuse.
- Wash thoroughly with soap and water after handling.

In case of skin contact: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

In case of eye contact: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center or doctor for treatment advice.

In case of inhalation: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

Notes to Physician

There is no specific antidote for exposure to this material. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

Toxicity to Nontarget Organisms

Results from toxicity tests with imazapyr technical, the active ingredient in **Stalker**, are contained in Table 4 below.

Table 4

TOXICITY OF IMAZAPYR TECHNICAL TO NONTARGET ORGANISMS

Birds

Oral LD ₅₀		
	Bobwhite quail	>2150 mg/kg
	Mallard duck	>2150 mg/kg
8-day dietary LC ₅₀		
	Bobwhite quail	>5000 ppm
	Mallard duck	>5000 ppm

Fish

96-hour LC ₅₀		
	Rainbow trout	>100 mg/L
	Bluegill sunfish	>100 mg/L
	Channel catfish	>100 mg/L

Arthropods

48-hour EC ₅₀		
	Water flea	>100 mg/L
Contact LD ₅₀		
	Honey bee	>100 µg/bee

Annelids

14-day LC ₅₀		
	Earthworm	>132.5 ppm (25% a.e. formulation used in test)

Algae

7-day EC ₅₀		
	Freshwater blue-green alga	11.7 mg/L
	Freshwater green alga	71 mg/L
	Freshwater diatom	55.8 mg/L
	Marine diatom	>85.5 mg/L
14-day EC ₅₀		
	Duckweed	0.024 mg/L

Bioaccumulation

Results of a bioconcentration study with bluegill sunfish (*Lepomis macrochirus*) indicate that imazapyr does not accumulate in fish tissues and that the bioconcentration factor is less than 1.

Effect on Soil Microorganisms

Studies to determine the effect of imazapyr treatments on soil microorganisms show that the compound has no adverse effect on numbers of soil organisms, growth rates of microbial populations, soil enzymes, nitrogen cycling, sulphur oxidation, mineralization of organic substrates or normal soil respiration.

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