



Plant Growth Regulator

CARDINAL™

**For Commercial or Agricultural Use Only
Not for Residential Use**

For use on Turf. Also, for the removal of Dwarf Mistletoe in Ornamental Conifers and Leafy Mistletoe in Ornamental Deciduous Trees and for the elimination of undesirable fruit on Ornamental Apple, Carob, Crabapple, and Olive trees.

	% BY WT.
ACTIVE INGREDIENT:	
Ethephon [(2-chloroethyl) phosphonic acid]*	21.7%
OTHER INGREDIENTS:	78.3%
TOTAL:	100.0%

*Contains 2 pounds ethephon per gallon.

**KEEP OUT OF REACH OF CHILDREN
DANGER - PELIGRO**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

IF IN EYES	<ul style="list-style-type: none"> • 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 eye. • Call a poison control center or doctor for treatment advice.
IF SWALLOWED	<ul style="list-style-type: none"> • Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
IF ON SKIN OR CLOTHING	<ul style="list-style-type: none"> • 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.
IF INHALED	<ul style="list-style-type: none"> • Move person to fresh air. • If person is not breathing, call 911 or an ambulance, and then give artificial respiration, preferably mouth-to-mouth. • Call a poison control center or doctor for further treatment advice.

HOT LINE NUMBER

EMERGENCY TELEPHONE NUMBERS: Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

FOR 24-HOUR EMERGENCY MEDICAL ASSISTANCE: Call PROSAR at 1-888-875-1724.

FOR CHEMICAL EMERGENCY: Spill, leak, fire, exposure, or accidents call CHEMTREC at 1-800-434-9300.

NOTES TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage. Treat symptomatically, as there is no specific antidote. Additionally, patient may have been exposed to materials other than this product. This product is an acid; therefore, it is contraindicated to attempt to neutralize it with alkaline materials. Gastric lavage should be undertaken with care to victims of overexposure by ingestion, given the potential for esophageal or stomach perforation. Due to a potential for pulmonary edema, any patients that have had severe exposure to this product should be kept under medical observation for up to 72 hours.

**PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS**

DANGER

Causes irreversible eye damage and skin burns. Harmful if swallowed or absorbed through skin. Do not get in eyes on skin or on clothing. Avoid breathing spray mist. Avoid contamination of food.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category A on an EPA chemical-resistance chart.

Applicators and other handlers must wear:

- long-sleeved shirt and long pants,
- chemical resistant gloves made of any waterproof material such as polyvinyl chloride, nitrile rubber, or butyl rubber gloves,
- shoes plus socks and chemical resistant footwear,
- protective eyewear.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY REQUIREMENTS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash body thoroughly and put on clean clothing.
- As soon as possible, wash thoroughly and change into clean clothing. Wash the outside of gloves before removing.

ENVIRONMENTAL HAZARDS

Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

IMPORTANT: Use of Cardinal other than as described on this label is prohibited. Do not exceed the rate of Cardinal per acre per year allowed on this label.

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING. READ ENTIRE LABEL BEFORE USING THIS PRODUCT.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulations.

Do not contaminate water used for irrigation or domestic purposes.

Detrimental changes to plant growth, reduced yields, and plant injury may result from spray drift of this product to nearby crops and thus should be avoided.

Do not plant another crop within 30 days after treatment.

Do not apply Cardinal through any type of irrigation system.

SPRAY DRIFT

AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR.

The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator is responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to avoid off-target movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses or to applications using dry formulations.

1. The distance of the outer most nozzles on the boom must not exceed $\frac{3}{4}$ the length of the fixed wingspan or rotor diameter.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they must be observed.

The applicator should be familiar with and take into account the information covered in the Aerial Drift Reduction Advisory below:

AERIAL DRIFT REDUCTION ADVISORY INFORMATION ON DROPLET SIZE

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (See Wind, Temperature and Humidity, and Temperature Inversions).

CONTROLLING DROPLET SIZE

Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.

Pressure - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.

Number of nozzles - Use the minimum number of nozzles that provide uniform coverage.

Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.

Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

BOOM LENGTH

For some use patterns, reducing the effective boom length to less than $\frac{3}{4}$ of the fixed wingspan or rotor diameter may further reduce drift without reducing swath width.

APPLICATION HEIGHT

Applications should not be made at a height greater than 10 feet above the top of the target plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

SWATH ADJUSTMENT

When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator should compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

WIND

Drift potential is lowest between wind speeds of 2 - 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

TEMPERATURE INVERSIONS

Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

SENSITIVE AREAS

The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas).

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard (WPS), 40 CFR Part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), notification to workers, and restricted-entry intervals. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours. The REI is 72 hours in areas where average rainfall is less than 25 inches per year.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated such as plants, soil or water is coveralls, chemical resistant gloves made of any waterproof material such as Nitrile or Butyl rubber, shoes plus socks, protective eyewear, and chemical-resistant headgear for overhead exposure.

Notify workers of the application by warning them orally and by posting warning signs at entrances to treated areas.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.

PESTICIDE STORAGE: Store pesticide in original container. If container is broken or contents have spilled, follow all precautions as outlined above and clean up immediately. Before starting clean up, put on the appropriate protective clothing such as long pants or coveralls, long-sleeved shirt, appropriate footwear and gloves, and face shield or goggles if needed. Soak up spilled product with an appropriate media such as sand, earth, or clay cat litter and dispose of waste at an approved waste disposal facility.

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental control Agency, or the Hazardous Waste representative at the nearest EPA Regional office for guidance.

CONTAINER DISPOSAL: Nonrefillable container. Do not reuse or refill this container. Triple rinse (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Offer for recycling, if available or puncture and dispose of in a sanitary landfill or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

This Product:

Eliminates leafy mistletoe from ORNAMENTAL DECIDUOUS TREES and dwarf mistletoe from ORNAMENTAL CONIFERS.

Removes unwanted fruit on APPLE, CRABAPPLE, CAROB, and OLIVE trees.

GENERAL INFORMATION

Contact your Extension Pomologist, Farm Advisor, Horticultural Specialist or Phoenix Environmental Care Representative for local requirements on product spray volume, spray equipment and rates of application for varying weather conditions.

APPLICATION VOLUMES AND SPRAY COVERAGE

For optimum product efficacy, thorough spray coverage is necessary. This can be influenced by type of spray equipment, spray boom setup, nozzle selection, plant size, canopy density and spray pressure. Depending on these choices, the necessary spray volume will vary. For applications by air in California and Arizona, more than 5 gallons per acre should be used.

USE PRECAUTIONS

THE MIXTURE OF THIS PRODUCT WITH AMMONIUM THIOSULFATE IS PROHIBITED AS IT MAY CREATE TOXIC FUMES. Other than permitted on this label, this product should not be used with additives.

Upon mixture, this product should be applied as soon as possible; in no case should the spray solution be stored overnight. Detrimental changes to plant growth, reduced yields, and plant injury may result from spray drift of this product to nearby crops and thus should be avoided. Do not plant another crop within 30 days after treatment.

This product is corrosive. Therefore, spills of concentrated product on the aircraft or other spray equipment should be avoided. Should such contact be made, immediately rinse with water.

EQUIPMENT CLEANING

This product is corrosive. As a result, spray deposit exposure will, over a period of time, damage metal, some paints and acrylic plastics. No more than one hour after exposure to spray deposits, these materials should be carefully rinsed with water and detergent.

MISTLETOE REMOVAL

DWARF AND LEAFY MISTLETOE REMOVAL: A foliar spray of Cardinal will remove dwarf mistletoe shoots in ornamental conifers and leafy mistletoe from ornamental deciduous trees.

CROP CONDITION	CARDINAL (PINTS/ACRE)	INSTRUCTIONS	COMMENTS
Dwarf Mistletoe on Ornamental Conifers	2 pints per 20 gallons	Apply as a foliar spray to dwarf mistletoe shoots before mistletoe seed dispersal. For effective removal, all mistletoe shoots must be sprayed to wet. Use of a nonionic surfactant at permitted rates may increase effectiveness. Treat any mistletoe regrowth before seed dispersal.	Applications made in conjunction with silvicultural mistletoe management will prevent spread of the mistletoe parasite to other parts of the tree and other trees.
Douglas Fir, Ornamentals	1 pint per 20 gallons	Apply as a foliar spray to dwarf mistletoe shoots before mistletoe seed dispersal. For effective removal, all mistletoe shoots must be sprayed to wet. Use of a nonionic surfactant at permitted rates may increase effectiveness. Treat any mistletoe regrowth before seed dispersal.	Mature needle drop, that normally occurs in the fall, may be hastened by the use of Cardinal. Applications of higher rates on Douglas fir may result in excessive needle drop.
Leafy Mistletoe on Ornamental Deciduous Trees	2 quarts per 20 gallons	Make applications after fall leaf drop through mid-winter. For effective removal, all mistletoe shoots must be sprayed to wet. Use of a nonionic surfactant at permitted rates may increase effectiveness. Any mistletoe regrowth should be treated during the labeled application window.	Large mistletoe infections and mistletoe found in mesquite may be difficult to control with a single application and retreatment may be necessary.

FRUIT ELIMINATION (Ornamental Use Only)

UNDESIRABLE FRUIT ELIMINATION: A foliar spray of Cardinal will reduce or eliminate undesirable fruit development on apple, crabapple, carob and olive trees.

CROP CONDITION	CARDINAL (PINTS/ACRE)	INSTRUCTIONS	COMMENTS
Apples, Crabapples	8 to 12 ounces per 20 gallons	Apply as a foliar spray at the flower bud to full bloom stage, prior to fruit set. Wet foliage thoroughly. Over application of Cardinal can result in excessive leaf drop and/or tree defoliation. Use higher rates when temperatures are cool.	Application must be made before fruit set for best results. Do not treat weak trees or trees under stress (drought, insect or disease damaged trees) as excessive leaf drop or twig drop can result. Some leaf drop or temporary leaf yellowing may occur after treatment.
Carob (Ceratonja siliqua)	6 ounces per 20 gallons	Apply as a foliar spray. Wet all foliage thoroughly.	Do not use on small red fruited varieties of crabapple as fruit elimination will not be satisfactory.
Olive (Olea europaea)	12 ounces per 20 gallons	Amount of spray will depend on tree size.	

TURF

Growth suppression of turf

Cardinal when applied will slow turfgrass growth thus reducing mowing frequency required as well as the volume of clippings accumulated. Apply Cardinal when daytime air temperatures are 65°F or above for optimum results. Cardinal must only be applied when turfgrass mowing height has been established for the season. Multiple applications should be avoided where thatch has accumulated.

TREATMENT AREA	APPLICATION RATE	APPLICATION	SPRAY VOLUME
Golf Course turf including Fairways, Roughs, Greens* and Tees* Commercial Turfgrasses, including Bentgrass (Fairway cut), Kentucky Bluegrass, Perennial Ryegrass, Tall & Fine Fescue	5 fl. oz. per 1,000 sq.ft.	Apply to actively growing turf. It will require 7-10 days for Cardinal to act. Reapplication intervals: Kentucky Bluegrass-7 wks. Perennial Ryegrass-7 wks. Tall/Fine Fescue-4 wks. Bentgrass-4 wks.	1.0 – 2.0 gallons per 1,000 sq. ft.

*Not for use in California unless accompanied by supplemental labeling.

PRECAUTIONS AND RESTRICTIONS

Do not allow entry to treated area until sprays have dried.

For best results, apply with sprayer in sufficient volume of water to provide uniform coverage. Cardinal is foliarly absorbed. Apply only to actively growing turf, under favorable growing conditions, that is not going into a dormancy period.

Do not treat turfgrass with poor root systems or growing under stress due to poor soil conditions, drought, disease or insect damage.

Scalping may occur on creeping bentgrass after more than 2 applications of Cardinal for *Poa annua* suppression.

Cardinal has been successfully used on many bentgrass cultivars. Tolerance testing should be conducted in new cultivars before extensive use.

Do not exceed a maximum of 30 fl. oz. of Cardinal per 1,000 sq. ft. per year.

Use of spreader/stickers with Cardinal is not necessary.

Cardinal is an acidic product and prolonged exposure to spray deposits will damage acrylic plastics, certain paints and metals. Rinse thoroughly all exposed acrylic plastic materials and painted surfaces with a detergent and water within one hour after exposure to spray deposits.

Test tank mixes with other products on a small area before using widely.

Do not tank mix with ammonium thiosulfate as it can result in the formation of toxic fumes.

Do not use Cardinal where excessive thatch has accumulated.

Tank Mixtures with products containing the active ingredient Trinexapac-ethyl, such as GoldWing®

Cardinal may be tank mixed with GoldWing or other products containing the active ingredient, trinexapac ethyl. Tank mix 5 fl. oz./1,000 square feet of Cardinal with 0.125 or 0.25 fl. oz./1,000 square feet of GoldWing to aid in seedhead suppression and improve the quality of the turf. Repeat applications may be required for optimum performance. Always follow the product label directions for use and application rates. Use the most restrictive application interval for each turfgrass. Applying this tank mixture during frost may temporarily discolor turf.

Seedhead Suppression

When applied as a foliar application Cardinal will suppress *Poa annua* and white clover seedheads. Apply before the emergence of new seedheads. Application may be repeated after two weeks for better suppression of *Poa annua* and white clover seedheads.

TREATMENT AREA	APPLICATION RATE	APPLICATION	SPRAY VOLUME
Golf Course turf including Fairways, Roughs, Greens* and Tees* Commercial Turfgrasses, including Bentgrass (Fairway cut), Kentucky Bluegrass, Perennial Ryegrass, Tall & Fine Fescue, and Bermudagrass*	5 fl. oz. per 1,000 sq.ft.	<i>Poa annua</i> and White Clover Seedheads Reapplication intervals for suppression can be made every 2 weeks or more for all labeled grasses but not less than 2 weeks after the previous application.	1.0 – 2.0 gallons per 1,000 sq. ft.

*Not for use in California unless accompanied by supplemental labeling.

CONDITIONS OF SALE AND WARRANTY

The DIRECTIONS FOR USE of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness, or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of Phoenix Environmental Care, LLC, its Supplemental Distributors, or the Seller. All such risks shall be assumed by the Buyer.

Phoenix Environmental Care, LLC, its Supplemental Distributors, and the Seller warrant that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the Directions for Use subject to the inherent risks referred to above. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, NEITHER PHOENIX ENVIRONMENTAL CARE, LLC NOR ITS SUPPLEMENTAL DISTRIBUTOR MAKE ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE OR OF MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY. THIS WARRANTY DOES NOT EXTEND TO, AND THE BUYER SHALL BE SOLELY RESPONSIBLE FOR, ANY AND ALL LOSS OR DAMAGE WHICH RESULTS FROM THE USE OF THIS PRODUCT IN ANY MANNER WHICH IS INCONSISTENT WITH THE LABEL DIRECTIONS.

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