

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, DC 20460



OFFICE OF CHEMICAL SAFETY  
AND POLLUTION PREVENTION

August 12, 2014

Laura Phelps  
Makhteshim Agan of North America, Inc.  
3120 Highwoods Blvd #100  
Raleigh, NC 27604

Subject: Label Notification per PRN 98-10 – Correction of a typographical error in cherry and apple use directions  
Product Name: Vulcan  
EPA Registration Number: 66222-233  
Application Date: July 29, 2014  
Decision Number: 493779

Dear Ms. Phelps:

The Agency is in receipt of your Application for Pesticide Notification under Pesticide Registration Notice (PRN) 98-10 for the above referenced product. The Registration Division (RD) has conducted a review of this request for its applicability under PRN 98-10 and finds that the action requested falls within the scope of PRN 98-10.

The label submitted with the application has been stamped “Notification” and will be placed in our records.

If you have any questions, you may contact Jennifer Urbanski at 703-347-0156 or via email at [urbanski.jennifer@epa.gov](mailto:urbanski.jennifer@epa.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Venus Eagle".

Venus Eagle, PM 01  
Insecticide-Rodenticide Branch  
Registration Division  
Date: August 12, 2014

**RESTRICTED USE PESTICIDE**

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

**GROUP 1B INSECTICIDE**

# VULCAN®

For control of listed insects infesting certain field, fruit, nut, and vegetable crops.

<b>ACTIVE INGREDIENT</b>	<b>% BY WT.</b>
Chlorpyrifos: 0,0-diethyl-0-(3,5,6-trichloro-2-pyridinyl) phosphorothioate .....	39.50%
<b>OTHER INGREDIENTS*</b> : .....	<u>60.50%</u>
	<b>TOTAL 100.0%</b>

Contains 3.76 pounds of Chlorpyrifos per gallon.

\* Contains petroleum distillates.



## KEEP OUT OF REACH OF CHILDREN CAUTION / PRECAUCIÓN

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

**Manufactured for:**  
Makhteshim Agan of North America, Inc.  
3120 Highwoods Blvd., Suite 100  
Raleigh, NC 27604

**How can we help? 1-866-406- 6262**

**NOTIFICATION**  
08/12/2014

Vulcan is an emulsifiable concentrate (EC) insecticide formulated as part of the Voxien family of products

EPA Reg. No. 66222-233

EPA Est. No. XXXXXXXXXX

### NET CONTENTS:

<b>FIRST AID</b> Organophosphate	
<b>IF SWALLOWED:</b>	<ul style="list-style-type: none"> <li>• Call a poison control center or doctor immediately for treatment advice.</li> <li>• Do not give any liquid to a person.</li> <li>• Do not induce vomiting unless told to do so by a poison control center or doctor.</li> <li>• Do not give anything by mouth to an unconscious person.</li> </ul>
<b>IF IN EYES:</b>	<ul style="list-style-type: none"> <li>• Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>• Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.</li> <li>• Call a poison control center or doctor for treatment advice.</li> </ul>
<b>IF ON SKIN OR CLOTHING:</b>	<ul style="list-style-type: none"> <li>• Take off contaminated clothing.</li> <li>• Rinse skin immediately with plenty of water for 15-20 minutes.</li> <li>• Call a poison control center or doctor for treatment advice.</li> </ul>
<b>IF INHALED:</b>	<ul style="list-style-type: none"> <li>• Move person to fresh air.</li> <li>• If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.</li> <li>• Call a poison control center or doctor for further treatment advice.</li> </ul>

**Note to Physician:** This product contains an organophosphate that inhibits cholinesterase. Treat symptomatically. If exposed, plasma and red blood cell cholinesterase tests may indicate significance of exposure (baseline data are useful). Atropine, only by injection, is the preferable antidote. Oximes, such as 2-PAM/protopam, may be therapeutic if used early; however, use only in conjunction with atropine. In case of severe acute poisoning, use antidote immediately after establishing an open airway and respiration. Contains petroleum distillate. Vomiting may induce aspiration pneumonia.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. For emergency medical treatment information, call Prozar 24 hours a day at 1-877-250-9291.

## PRECAUTIONARY STATEMENTS

### HAZARDS TO HUMANS AND DOMESTIC ANIMALS

#### CAUTION

Harmful if swallowed. Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

#### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Materials that are chemical resistant to this product are barrier laminate and viton  $\geq 14$  mils. Mixers and loaders using a mechanical transfer loading system and applicators using aerial application equipment must wear:

- Long-sleeved shirt and long pants
- Shoes and socks
- Protective eyewear

In addition to the above, mixers and loaders using a mechanical transfer loading system must wear:

- Chemical-resistant gloves
- Chemical-resistant apron
- A NIOSH-approved dust mist filtering respirator with MSHA/NIOSH approval number prefix TC-21 Cor a NIOSH-approved respirator with any R, P, or HE filter

See **Engineering Control Statement** for additional requirements.

All other mixers, loaders, applicators and handlers must wear:

- Coveralls over long-sleeved shirt and long pants
- Chemical-resistant gloves
- Chemical-resistant apron when mixing or loading or exposed to the concentrate
- Chemical-resistant footwear plus socks
- Chemical-resistant headgear for overhead exposure
- A NIOSH-approved dust mist filtering respirator with MSHA/NIOSH approval number prefix TC-21C or a NIOSH-approved respirator with any R, P, or HE filter.

#### User Safety Requirements

- 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 exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

#### ENGINEERING CONTROL STATEMENT

Mixers and loaders supporting aerial applications must use a mechanical transfer system that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4)] for dermal protection, and must:

- Wear the personal protective equipment required above for mixers/loaders
- Wear protective eyewear

Pilots must use an enclosed cockpit in a manner that meets the requirements listed in the WPS for agricultural pesticides [40 CFR 170.240(d)(6)]. Use of human flaggers is prohibited. Mechanical flagging equipment must be used.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the 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.

## USER SAFETY RECOMMENDATIONS

**Users should:**

- Wash hands thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

**ENVIRONMENTAL HAZARDS**

This pesticide is toxic to fish, aquatic invertebrates, small mammals, and birds. Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. Do not contaminate water when disposing of equipment washwater or rinsate.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Protective information may be obtained from your cooperative agricultural extension service.

**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. This label must be in the possession of the user at the time of pesticide application.

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 regulation.

**AGRICULTURAL USE REQUIREMENTS**

Use this product in accordance with its labeling and with the Worker Protection Standard, 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) 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:**

- **4 days for fruit trees**
- **5 days for citrus**
- **3 days for cauliflower**
- **24 hours for all other crops not listed above**

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 over short sleeved shirt and shirt pants
- Chemical resistant gloves made out of any waterproof material
- Chemical resistant footwear plus socks
- Chemical Resistant headgear for over head exposures.

Certified crop advisors or persons entering under their direct supervision under certain circumstances may be exempt from the early reentry requirement pursuant to 40 CFR Part 170.

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

**NON AGRICULTURAL USE REQUIREMENTS**

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides [40CFR Part 170]. The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses. Keep children, pets and other unprotected persons out of treated area until sprays have dried.

## PRODUCT INFORMATION

Part of the Voxien family of products. Vulcan insecticide forms an emulsion when diluted with water and is suitable for use in all conventional spray equipment. Consult your State Agricultural Experiment Station or State Extension Service for proper timing of applications.

When an adjuvant is to be used with this product, Makhteshim Agan of North America, Inc. suggests the use of a Chemical Producers and Distributors Association certified adjuvant.

## USE RESTRICTIONS

Do not formulate this product into other end use products. **Attention:** Do not cut or weld container.

## RESISTANCE MANAGEMENT

Vulcan contains a Group 1B insecticide. Insect/mite biotypes with acquired resistance to Group 1B may eventually dominate the insect/mite population if Group 1B insecticides/acaricides are used repeatedly in the same field or in successive years as the primary method of control for targeted species. This may result in partial or total loss of control of those species by Vulcan or other Group 1B.

To delay insecticide resistance consider:

- Avoiding the consecutive use of Vulcan or other group 1B insecticides/acaricides that have a similar target site of action, on the same insect/mite species.
- Using tank-mixtures or premixes with insecticides/acaricides from a different target site of action Group as long as the involved products are all registered for the same use and have different sites of action.
- Basing insecticide/acaricide use on a comprehensive IPM program.
- Monitoring treated insect/mite populations for loss of field efficacy.
- Contacting your local extension specialist, certified crop advisors, and/or manufacturer for insecticide/acaricide resistance management and/or IPM recommendations for the specific site and resistant pest problems.

## SPRAY DRIFT MANAGEMENT

Avoiding spray drift at the application site is the responsibility of the applicator and the grower. The interaction of many equipment-and weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions regarding spraying.

Apply only as a medium or coarser spray (ASABE standard 572.1) or a volume mean diameter of 300 microns or greater for spinning atomizer nozzles.

Apply only when the wind speed is 2 – 10 mph at the application site.

### For ground applications

- Wind speed must be measured adjacent to the application site on the upwind side, immediately prior to application.
- For ground boom applications, apply using a nozzle height of no more than 4 feet above the ground or crop canopy.
- For airblast applications, turn off outward pointing nozzles at row ends and when spraying the outer two rows. To minimize spray loss over the top in orchard applications, spray must be directed into the canopy.

### For aerial applications

- The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or 90% of the rotor blade diameter. Nozzles must always point backward parallel with the air stream and never be pointed downward more than 45°.

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

The applicator should be familiar with and take into account the information covered in the ***Spray Drift Management*** section.

To avoid spray drift, do not apply under windy conditions. Avoid spray overlap as crop injury may result.

### 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** sections).

### **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 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

### **Application Height**

Applications should be made at the lowest height consistent with efficacy and flight safety. Do not make at a height greater than 10 feet above the top of the largest plants unless a greater height is recommended 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 must 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.

### **BUFFER ZONES**

Do not allow spray to drift from the application site and contact people, structures people occupy at any time and the associated property, parks and recreation areas, nontarget crops, aquatic and wetland areas, woodlands, pastures, rangelands, or animals.

- For ground boom applications, do not apply within 25 feet of rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries, and commercial fish ponds. Apply with nozzle height no more than 4 feet above the ground or crop canopy and when wind speed is 10 mph or less at the application site as measured by an

anemometer. Use fine or coarser spray according to ASAE 572 definition for standard nozzles or VMD for spinning atomizer nozzles.

- For orchard/vineyard airblast applications, do not apply within 50 feet of rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries, and commercial fish ponds. Direct spray above trees/vines and turn off outward pointing nozzles at row ends and outer rows. Apply only when wind speed is 3-10 mph at the application site as measured by an anemometer outside of the orchard/vineyard on the upwind side.
- For aerial applications, do not apply within 150 feet of rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries, and commercial fish ponds. The boom width must not exceed 75% of the wingspan or 90% of the rotary blade. Use upwind swath displacement and apply only when wind speed is 3-10 mph as measured by an anemometer. Use fine or coarser spray according to ASAE 572 definition for standard nozzles or VMD for spinning atomizer nozzles. If application includes a no-spray zone, do not release spray at a height greater than 10 feet above the ground or the crop canopy.
- For overhead chemigation, do not apply within 25 feet of rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries, and commercial fish ponds. Apply only when wind speed is 10 mph or less.

The applicator also must use all other measures necessary to control drift.

The buffer distance specified in the buffer distance table are the distances in feet that must exist to separate sensitive sites from the targeted application site. Buffers are measured from the edge of the sensitive site to the edge of the application site.

Sensitive sites are areas frequented by non-occupational bystanders (especially children). These include residential lawns, pedestrian sidewalks, outdoor recreational areas such as school grounds, athletic fields, parks and all property associated with buildings occupied by humans for residential or commercial purposes. Sensitive sites include homes, farmworker housing, or other residential buildings, schools, daycare centers, nursing homes, and hospitals. Non-residential agricultural buildings, including barns, livestock facilities, sheds and outhouses are not included in this prohibition.

		Buffer Distance		
Application rate (lb ai/A)	Nozzle Droplet Type	Required Setback (Buffer Zones) (feet)		
		Aerial	Airblast	Ground
>0.5 - 1	Coarse or very coarse	10	10	10
>0.5 - 1	Medium	25	10	10
>1 - 2	Coarse or very coarse	50	10	10
>1 - 2	Medium	80	10	10
>2 - 3	Coarse or very coarse	80 <sup>1</sup>	10	10
>2 - 3	Medium	100 <sup>1</sup>	10	10
>3 - 4	Medium or coarse	NA <sup>2</sup>	25	10
>4	Medium or coarse	NA	50	10

<sup>1</sup>Aerial application of greater than 2 lb ai/A is only permitted for Asian Citrus Psylla control, up to 2.3 lb ai/A.  
<sup>2</sup>NA is not allowed.

Only pesticide handlers are permitted in the setback area during application of this product. Do not apply this product if anyone other than a mixer, loader, or applicator, is in the setback area. Exception: Vehicles and persons riding bicycles that are passing through the setback area on public or private roadways are permitted.

### SPRAY MIX DIRECTIONS

To prepare the spray, add a portion of the required amount of water to the spray tank and with agitation, add the Vulcan. Complete filling the tank with the balance of water needed. Maintain sufficient agitation during both mixing and application to ensure uniformity of the spray mixture.

Vulcan can also be used in tank mixtures with certain herbicides and/or with non-pressure fertilizer solutions as specified under specific crop use directions. Prepare tank mixtures in the same manner as specified above for use of Vulcan alone. When tank mixtures of Vulcan and herbicides are involved, add wettable powders first, flowables second and emulsifiable concentrates last. Where a fertilizer solution is involved, use a fertilizer pesticide compatibility agent such as Unite or Compex. Maintain constant agitation during both mixing and application to ensure uniformity of the spray mixture. Do not allow spray mixtures to stand overnight.

**Note:** Test compatibility of the intended tank mixture before adding Vulcan to the spray or tank mix. Add proportionate amounts of each ingredient to a pint or quart jar, cap, shake, and let set 15 minutes. Formation of precipitates that do not readily redisperse indicates an incompatible mixture that must not be used.

### SPRINKLER IRRIGATION

Vulcan can be applied by sprinkler irrigation for the following crop uses: alfalfa, almond (orchard floors only), citrus orchard floors, corn (field and sweet), cotton, cranberry, mint (peppermint and spearmint), pecan and walnut orchard floors, sorghum, soybeans, sugar beet, and wheat.

See the use sections for the individual crops for further application information. Do not apply this product to the above listed crops through any other type of irrigation system. Do not apply this product by chemigation to any other crop.

### SPRINKLER USE DIRECTIONS

The following use directions are to be followed when Vulcan is applied through sprinkler irrigation systems. Thoroughly clean the injection system and tank of any fertilizer or chemical residues, and dispose of the residues according to state and federal laws. Flush the injector with soap and water. Determine the amount of insecticide needed to cover the desired acreage. Pump the required Vulcan into a steel tank, start mechanical or hydraulic agitation, and add in order the non-emulsifiable oil and/or water. Continually agitate the mixture containing Vulcan. Set the sprinkler system to deliver the desired inches of water per acre. Start the water pump and sprinkler, and let the system achieve the desired pressure and speed before starting the injector. Start the injector and calibrate the injector system according to number 14 in **SPRINKLER USE PRECAUTIONS** section. The mixture containing Vulcan must be injected continuously and uniformly into the irrigation water line as the sprinkler is moving. This procedure is necessary to deliver the desired rate per acre in a uniform manner. When the application is finished, allow the entire irrigation and injector system to be thoroughly flushed clean before stopping the system.

### SPRINKLER USE PRECAUTIONS

The following use precautions will result in a safe and successful application of mixture containing Vulcan.

1. Apply this product only through sprinkler irrigation systems including center pivot, lateral move, end tow, side (wheel) roll, traveler, big gun, solid set, micro sprinkler, or hand move. Do not apply this product through any other type of irrigation system.
2. Crop injury, lack of effectiveness, or illegal pesticide residues in the crop can result from non-uniform distribution of treated water.



3. If you have questions about calibration, contact state extension service specialist, equipment manufacturers, or other experts.
4. Do not connect an irrigation system (including greenhouse systems) used for pesticide application to a public water system.
5. A person knowledgeable of the chemigation system and responsible for its operation, or under the supervision of the responsible person, shall shut the system down and make necessary adjustments should the need arise.
6. The system must contain a functional check valve, vacuum relief valve, and a low-pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from backflow. Refer to the American Society of Agricultural Engineer's Engineering Practice 409 for more information.
7. The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
8. The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
9. The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.
10. The irrigation line or water pump must include a functional pressure switch which will stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected.
11. Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock. The metering pump must provide a greater pressure than that of the irrigation system at the point of injection. The pump must meet Section 675 for "Electrically Driven or Controlled Irrigation Machines" NEC 70 and must contain Viton or Teflon seals.
12. To insure uniform mixing of the insecticide into the water line, inject the mixture through a nozzle place in the fertilizer injection port or just ahead of an elbow or tee in the irrigation line so that the turbulence created at those points will assist in mixing. It is suggested that the injection point be higher than the insecticide tank to prevent siphoning.
13. The steel tank holding the insecticide mixture should be large enough to allow the system to complete a revolution with one filling. It should be free of rust, fertilizer sediment, and foreign material, and equipped with an in-line strainer situated between the tank and the injector pump.
14. In order to calibrate the irrigation system and injector to apply the mixture containing Vulcan, determine the following:
  - 1) Calculate the number of acres irrigated by the system; 2) Set the irrigation rate and determine the number of minutes for the system to cover the intended treatment area; 3) Calculate the total gallons of insecticide mixture needed to cover the desired acreage. Divide the total gallons of insecticide mixture needed by the number of minutes to cover the treatment area. This value equals the gallons per minute output that the injector must deliver. Convert the gallons per minute to milliliters or ounces per minute. Calibrate the injector pump with the system in operation at the desired irrigation rate. It is suggested that the injector pump be calibrated at least twice before operation, and monitor the system.
15. Do not apply when wind speed favors drift beyond the area intended for treatment. End guns must be turned off during the application if they irrigate nontarget areas.
16. Do not allow irrigation water to collect or runoff and pose a hazard to livestock, wells, or adjoining crops.
17. Allow foliage to dry before reentering the field.
18. Do not apply through sprinkler systems that deliver a low coefficient of uniformity such as certain water drive units.

## ALFALFA

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

Use Vulcan to control the following pests at the dosages indicated by application as a broadcast foliar spray:

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Alfalfa	Corn rootworm adults (spotted cucumber beetle), Grasshoppers, Leafhoppers	0.5 - 1 pint	Use a higher rate in the rate range for increased pest pressure.  For Egyptian alfalfa weevil control in California, apply the specified dosage in a minimum of 5 gallons of water per acre when larvae are actively feeding and populations reach 15 to 20 larvae per 180° sweep with a 15 inch diameter net. Use higher rates to control spotted alfalfa aphid in California and Nevada. Stubble spray can be applied to control leafhopper in the Northeast.
	Alfalfa blotch leafminer, Alfalfa caterpillar, Alfalfa looper, Alfalfa weevil larvae and adults, Armyworms, Blue alfalfa aphid, Chinch bug, Cowpea aphid, Crickets, Cutworms, Egyptian alfalfa weevil larvae and adults, Greenbugs, Green June beetle grubs, Leafhoppers, Mites (such as clover, Bermuda grant stunt, two-spotted, winter grain), Pea aphid, Plant bugs, Sod webworm, Sowbugs, Spittlebugs, Spotted alfalfa aphid	1 - 2 pints	Mix the required dosage with enough water to ensure thorough coverage of crop foliage and apply using aerial (fixed-wing or helicopter) or power-operated ground spray equipment. For aerial application, use 2 to 5 gallons of water per acre. For best coverage when using ground application, use a minimum of 20 gallons of water per acre with hollow cone nozzles. Control may be reduced at low spray volumes under high temperature and wind conditions. Treat when field counts or crop injury indicates that damaging pest populations are developing or present; however, do not apply more than once per crop cutting. Some reduction in insect control may be evident under excessively cool conditions  Vulcan can also be applied through sprinkler irrigation systems as a postemergence broadcast application to control the listed foliar pests. Use the listed rate of Vulcan per acre. Maintain vigorous tank agitation to assure uniformity of the application throughout the injection period. See <b>SPRINKLER IRRIGATION</b> section for further information.
	Alfalfa webworm	1.5 pints	Some phytotoxic symptoms may be observed on young, tender, rapidly growing alfalfa when treated with Vulcan. Alfalfa will outgrow the symptoms and no yield loss should be expected.

**Use Restrictions:**

- Do not cut or graze treated alfalfa within 7 days after application of 0.5 pint (0.24 lbs a.i.) of Vulcan per acre, within 14 days after application of 1 pint (0.47 lbs a.i.) per acre, or within 21 days after application of rates above 1 pint (0.47 lbs a.i.) per acre.
- Do not make more than 4 applications of Vulcan or other product containing chlorpyrifos per year or apply more than once per crop cutting. Do not make a second application of Vulcan within 10 days of the first application.
- To avoid contamination of irrigation floodwaters, do not flood irrigate within 24 hours following an application of Vulcan.
- The maximum single application rate is 0.94 lbs a.i. chlorpyrifos per acre (2 pints Vulcan).
- This product is highly toxic to bees exposed to direct treatment on alfalfa. Do not apply if nearby bees are clustered outside of hives and bees are foraging. Protective information may be obtained from your agricultural extension service.

Do not tank mix Vulcan with pesticides, surfactants, or fertilizer formulations unless prior use has shown the combination noninjurious under your current conditions of use.

**APPLE (TRUNK SPRAY)  
(Not for use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 days unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Apple Trunk	<del>American plum borer, apple bark borer, broad necked root borer, dogwood borer, flatheaded appletree borer, roundheaded apple tree borer and tilehorned prionus. Corn rootworm adults (spotted cucumber beetle), Grasshoppers, Leafhoppers</del>	<del>0.5 – 1 pint 1.5 qts.</del>	<del>Use Vulcan to control American plum borer, apple bark borer, broad necked root borer, dogwood borer, flatheaded appletree borer, roundheaded apple tree borer and tilehorned prionus. Mix 1.5 qts (1.4 lbs a.i.) of Vulcan with 100 gallons of water and using a low-volume handgun or shielded spray apply directly to the trunk from a distance no further than 4 ft.</del>

**Use Restrictions:**

- For use only in states East of the Rockies (except Mississippi).
- Do not allow spray to contact foliage or fruit.
- Do not apply within 28 days before harvest.
- Make no more than one application to the tree trunk per year as either a pre-bloom or post-bloom application. Do not apply if a pre-bloom application of any other product containing chlorpyrifos has been made during the year using any other chlorpyrifos product.
- Do not allow meat or dairy animals to graze in treated orchards.
- Treat the lower 4 feet of the trunk only.
- If wind speed is greater than 10 mph, do not apply.

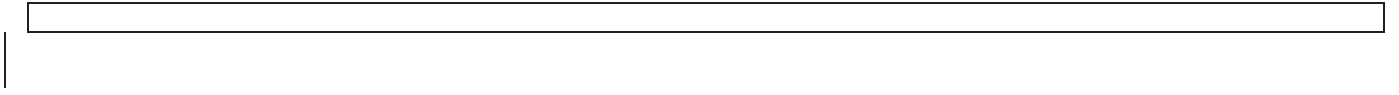
**ASPARAGUS**

**For use only in Arizona, California, Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oregon, South Dakota, Washington, and Wisconsin**  
**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Asparagus	armyworms, asparagus aphids, asparagus beetles, cutworms, grasshoppers	2 pints (0.94 lbs a.i.)	Mix the specified dosage in sufficient water to ensure thorough coverage of treated plants and apply a ground broadcast foliar spray. Use sufficient volume of finished spray to ensure thorough coverage of crop foliage. <b>Note:</b> Vulcan can be applied aerially or with ground equipment for control of armyworms and grasshoppers.  For cutworms, it is preferable to apply Vulcan when the soil is moist and worms are active on or near the soil surface. Applications can be made during the fern stage for control of asparagus beetles and asparagus aphids when field counts or crop injury indicates that damaging pest populations are developing or present. For symphytans, apply at least two weeks before harvest for optimum control.

**Use Restrictions:**

- Do not make more than one preharvest application per season or apply within one day of harvest. Do not make more than two postharvest applications during the fern stage. Do not make a second application of Vulcan within 10 days of the first application.
- Based on available residue data, the use of Vulcan on asparagus is limited to the Midwest and Pacific Northwest (AZ, CA, ID, IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, OR, SD, WA, WI).
- The maximum single application rate preharvest or postharvest is 0.94 lbs a.i. chlorpyrifos per acre.



**CHERRIES (Trunk Spray)  
(Not for use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 days unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Cherry (Trunk)	<del>lesser peach tree borer, greater peach tree borer, and American plum borer by application as a trunk spray</del> <del>Corn rootworm adults (spotted cucumber beetle);</del> <del>Grasshoppers;</del> <del>Leafhoppers</del>	<del>0.5 - 1 pint</del> <del>1.5 - 3 qts.</del>	<del>Use Vulcan for the control of lesser peach tree borer, greater peach tree borer, and American plum borer by application as a trunk spray. Mix 1.5 to 3 quarts (1.4 to 2.8 lbs a.i.) of Vulcan with 100 gallons of water and apply as a coarse, low-pressure spray to give uniform coverage of tree trunks and lower limbs. Make a second application two weeks after the first one and a third application after harvest. Avoid contact with foliage in sweet cherries as premature leaf drop may result. Consult your State Agricultural Experiment Station or State Extension Service Specialist for proper time to treat in your area.</del>  <del>In addition, one of the three allowable applications per year can be applied as a dormant spray for control of San Jose scale, peach twig borer, and climbing cutworm. For control of these pests, tank mix 0.5 to 1 pint (0.24 to 0.47 lbs a.i.) of Vulcan with 1 to 2 gallons of a petroleum oil specified for dormant use in 100 gallons of water and spray the entire tree by application to runoff using ground spray equipment. For low volume (concentrate) sprays (40 to 100 gallons of spray mixture per acre), use the same amounts of Vulcan and spray oil per acre required for application as a dilute spray and apply in a manner that will ensure thorough coverage of the trees. Use the higher dosage of Vulcan for severe infestations. Use oil as specified by your State Agricultural Experiment Station or State Extension Service Specialist.</del>
	<u>San Jose scale, peach twig borer, and climbing cutworm</u>	<u>0.5 to 1 pint</u>	<u>In addition, one of the three allowable applications per year can be applied as a dormant spray for control of San Jose scale, peach twig borer, and climbing cutworm. For control of these pests, tank mix 0.5 to 1 pint (0.24 to 0.47 lbs a.i.) of Vulcan with 1 to 2 gallons of a petroleum oil specified for dormant use in 100 gallons of water and spray the entire tree by application to runoff using ground spray equipment. For low volume (concentrate) sprays (40 to 100 gallons of spray mixture per acre), use the same amounts of Vulcan and spray oil per acre required for application as a dilute spray and apply in a manner that will ensure thorough coverage of the trees. Use the higher dosage of Vulcan for severe infestations. Use oil as specified by your State Agricultural Experiment Station or State Extension Service Specialist.</u>

**Use Restrictions:**

- Make only three applications per year of Vulcan or other products containing chlorpyrifos. Do not apply within 21 days before harvest.
- Do not allow meat or dairy animals to graze in treated orchards.
- Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 days unless PPE required for early entry is worn.

**CHRISTMAS TREE PLANTATIONS**

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours days unless PPE required for early entry is worn.

Use Vulcan at the rate indicated to control the following insects on the tree varieties listed.

TREE VARIETY	PEST	PRODUCT RATE PER ACRE	REMARKS
Balsam fir, Concolor fir, Douglas fir, Eastern white pine, Fraser fir, Grand fir, Noble fir, Scotch pine, White spruce	Ants (except fire ants, carpenter ants, harvester ants, and pharaoh ants), Aphids, Adelgids (Cooley, Eastern spruce gall), Douglas fir needle midge, European pine shoot moth, European pine sawfly, Grasshopper, Gypsy moth, Mites (European red spider, Two spotted spider)[except in WA & OR], Pales weevil (adult), Pine needle midge, Pine spittlebug, Plant bugs, Spittlebugs, Spruce budworm, Spruce needleminer, Scale (Pine needle, Pine tortoise, Spruce bud, Black pine, Striped pine)	1 quart	Do not treat plants under extreme heat and drought stress. Apply as a foliar spray using ground equipment. Thorough coverage of foliage is essential. Use a minimum 10 gpa of finished spray. Use higher volume of finished spray, 20 gpa or more, when foliage is dense and/or pest density is high and/or under high temperature and wind conditions. For effective control of adult spider mites if large numbers of eggs are present, apply a second spray 7 to 10 days after initial treatment to control newly hatched nymphs. Not for control of mites in Washington and Oregon.  For scale control, apply when scale crawlers are active.  To avoid injury, do not apply under conditions of extreme heat or drought stress. Environmental factors and varietal differences significantly influence potential phytotoxic expression. Before treating other conifer species, make application and observe for 7 to 10 days for symptoms of phytotoxicity. The user is responsible for determining if it is safe to treat other conifer species under commercial growing conditions.
	Pales weevil	3 quarts/100 gal	Apply as a cut stump drench.

**Use Restrictions:**

- Do not allow livestock to graze in treated areas.
- Do not make more than 3 applications of Vulcan or other product containing chlorpyrifos per season. Do not make a second application of Vulcan within 7 days of the first application.
- Do not apply by aerial application.

**CITRUS FRUITS**

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 5 days unless PPE required for early entry is worn.

Use Vulcan at the rates indicated according to the designated geographic area to control the following pests. Use the lower rates for light infestations and increase the dosage for heavier infestations. A petroleum spray oil specified for use on citrus trees can be added to dilute spray mixtures only at a rate of up to 1.8 gallons per 100 gallons of water to improve control of aphids, mealybugs, scale insects, and thrips. Treat when insects become a problem or in accordance with the local spray schedule specified by your state extension service specialist.

Read and carefully follow all applicable directions, restrictions, and precautions on labeling for products used in combination with Vulcan. See MIX DIRECTIONS for further instruction.

Observe local use directions for tank-mix combinations especially in regard to applications of Vulcan plus spray oil. Consult with a county farm advisor, county agency, extension service personnel, agricultural commissioner, or pest control advisor for such information regarding a given locality.

## CITRUS FRUITS

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 5 days unless PPE required for early entry is worn.

CROP	GEOGRAPHIC LOCATION	PEST	DOSAGE PT/ACRE	SPRAY VOLUME GAL/ACRE	USE DIRECTIONS
Calamondin, Chironja, Citrus Citron, Citrus Hybrids, Grapefruit, Kumquat, Lemons, Limes, Mandarin (tangerine), Oranges, Pummelo, Satsuma mandarin, Tangelo, Tangor	California-Fresno, Tulare, Kern, Kings, and Madera Counties Only	Red scale	8-12	Ground: 100-2400	Do not use a spray concentration of Vulcan of less than 0.5 pt/100 gal of total volume. <b>Additional Precautions for California and Arizona:</b> Do not use Vulcan in combination with spray oil when temperatures are expected to exceed 95°F the day of application or for several consecutive days thereafter. Do not apply during the months of December, January, or February.
	California, Arizona	Aphids, glassywinged sharpshooter, Katydid, Lepidopterous larvae, Avocado leafroller, Cutworms, Fruit-tree leafroller, Orange tortrix, Western tussock moth	2-7	Ground: 100-750 Aerial: min. 15	Do not use a spray concentration of Vulcan of less than 0.5 pt/100 gal of total volume. <b>Additional Precautions for California and Arizona:</b> Do not use Vulcan in combination with spray oil when temperatures are expected to exceed 95°F the day of application or for several consecutive days thereafter. Do not apply during the months of December, January, or February.
		Scale insects (Black scale, Brown soft scale, California red scale)	8	100-2400	
		Thrips (suppression) Mealybugs	6-12	100-750	
	Florida	Aphids, Grasshoppers, Orangedogs, Mealybugs, Scale insects (Snow scale, Florida red scale, Purple scale, Long scale, Chaff scale, Black scale, Brown soft scale)	2-4	Ground: 100-1400 Aerial: min. 20	Do not use a spray concentrate of Vulcan of less than 0.5 pt/100 gal of water per acre. Lubber grasshoppers must be controlled when they are small (less than 1 inch in length) by direct contact with spray.
		Citrus psylla	5	100-700	Add citrus spray oil at 2% v/v in a tank mix with Vulcan.
		Citrus rust mites	4-7	100-700	Do not use a spray concentration of Vulcan of less than 1 pt/100 gal of water per acre.
	Texas	Aphids, Cutworms, Katydid, Mealybugs, Scale insects (Brown soft scale, California red scale, Chaff scale)	4-7	200-700	Do not use less than 0.5 pt of Vulcan per 100 gallons of water in dilute applications.
		Citrus rust mites (suppression)	4-7	200-700	
	Small Transplanted Grapefruit,	Texas	Aphids, Cutworms, Katydid, Mealybugs, Scale insects (Brown	Max of 7	

Orange, and other listed citrus trees		soft scale, California red scale, Chaff scale)			runoff.
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications (does not include citrus orchard floor) or more than 16 pints (7.52 lbs a.i.) of Vulcan or other chlorpyrifos product per acre per year. Do not make second foliar application within 30 days of the first application. Do not treat within 21 days of harvest for applications up to 7 pints (3.3 lbs a.i.) of Vulcan per acre or within 35 days for application of rates above 7 pints (3.3 lbs a.i.) per acre.</li> <li>Do not allow livestock to graze in treated areas.</li> <li>The use of application rates greater than 8.5 pints (4 lbs a.i.) per acre are allowed only in the following California counties: Fresno, Tulare, Kern, Kings, Madera. Do not allow meat or dairy animals to graze in treated areas.</li> <li>Do not apply when trees are stressed by drought or high temperatures.</li> <li>Do not tank mix Vulcan with penetrating surfactants as crop injury may occur.</li> <li>Vulcan is highly toxic to bees exposed to direct treatment. Do not apply when bees are actively visiting the area. During the bloom period in California, apply from one hour after sunset until two hours before sunrise.</li> </ul>					

**CITRUS ORCHARD (FLOORS)  
(Not for use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 5 days unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Citrus Orchard (Floors)	ant species (except fire ants, carpenter ants, harvester ants, and pharaoh ants),	0.75 to 1 quart (0.71 to 0.94 lb a.i.)	<p>Apply the specified dose in 25 or more gallons of water with ground application equipment that will uniformly apply the spray to the orchard floor.</p> <p>For best insect control, uniform coverage of the orchard floor is necessary.</p> <p>Foliar applications of Vulcan can be made in addition to the orchard floor, but must comply with the 10 day retreatment interval.</p> <p>Vulcan can also be applied to citrus orchard floors through sprinkler irrigation systems only if the system uniformly covers the soil surface at the base of the tree. Use the listed amount of Vulcan per acre. See <b>SPRINKLER IRRIGATION</b> section for further information.</p> <p>Application with Dry Bulk Fertilizer: Most dry fertilizers can be used for impregnation with Vulcan. Apply Vulcan at the equivalent broadcast rate using a minimum of 200 lbs per acre of dry bulk fertilizer.</p> <p>Impregnation of Dry Bulk Fertilizer: Use of a closed rotary drum mixer suitable for blending of dry bulk fertilizer equipped with an internal spray nozzle. Add the dry fertilizer to the mixer followed by the appropriate amount of Vulcan. After mixing the dry ingredients to ensure uniformity, add water through the spray nozzle in an amount sufficient to just dampen the mixture (4 to 8 pints of water per ton of fertilizer). Position the spray nozzle within the mixer to provide uniform coverage of the tumbling mixture of fertilizer and Vulcan. Addition of water will cause Vulcan to uniformly adhere to the dry bulk fertilizer. Bulk fertilizers impregnated with Vulcan must be applied immediately, not stored. Foliar applications of Vulcan can be made in addition to the orchard floor treatments.</p>
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>Do not apply where weed growth or other obstructions would impede uniform coverage of the orchard floor.</li> <li>Do not apply in tank mixtures with Evik herbicide.</li> <li>Do not apply last treatment within 28 days before harvest.</li> <li>Do not allow livestock or dairy animals to graze in treated areas.</li> <li>Do not allow spray to contact foliage or fruit.</li> <li>Do not apply more than 3 quarts (2.82 lbs a.i.) per acre per year. Do not make more than 3 applications of Vulcan or other product containing chlorpyrifos per year (does not include foliar applications to citrus trees). Do not make a second application of Vulcan or other product containing chlorpyrifos within 10 days of the first application.</li> </ul>			



- The maximum single application rate is 0.94 lbs a.i. chlorpyrifos per acre.

Compliance with any and all federal and state laws and regulations relating to the Vulcan and fertilizer mixture is the responsibility of the person offering such mixture for sale or distribution.

### CORN (FIELD), CORN (SWEET) (INCLUDING CORN GROWN FOR SEED)

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

#### Conservation Tillage: Preplant, At-Plant, or Preemergence Applications

Apply as a broadcast spray to surface trash and exposed soil using power-operated ground spray equipment. Use a total spray volume of 20 gpa or more. Use a higher rate in the rate range to extend residual control.

**Tank-Mixing:** Vulcan can also be applied in tank mixtures with paraquat or glyphosate and/or liquid fertilizer solutions. See **MIX DIRECTIONS** section in this label for tank mixing instructions. Read and carefully follow all applicable directions, restrictions, and precautions on labeling for each product used in combination with Vulcan.

CROPS	PESTS	PRODUCT RATE PER ACRE	REMARKS
Corn (field and sweet) (Including corn grown for seed) Conservation Tillage: Preplant, At-Plant, or Preemergence Applications	Armyworms, Cutworms	1-2 pints	Apply as a broadcast spray to surface trash and exposed soil using power-operated ground spray equipment. Use a total spray volume of 20 gpa or more. Use a higher rate in the rate range to extend residual control.
Postemergence Application			Apply as a postemergence broadcast spray using sufficient spray volume to ensure thorough coverage of treated plants, but no less than 15 gallons per acre (gpa) for ground spray equipment or 2 to 5 gpa for aircraft equipment. Control may be reduced at low spray volumes under high temperature and wind conditions. Vulcan can be tank-mixed with glyphosate products such as Glyphomax® XRT herbicide or Durango™ herbicide when application is to be made to glyphosate-tolerant corn
Chemigation	Grasshoppers	0.5 - 1 pint	Vulcan can be broadcast applied postemergence through sprinkler irrigation systems at listed application rates to control listed foliar pests. For best results, tank mix Vulcan with 2 pints of non-emulsifiable oil. See <b>SPRINKLER IRRIGATION</b> section of this product label for application instructions.
	Aphids, Armyworms, Chinch bugs <sup>(1)</sup> , Corn rootworm adults <sup>(2)</sup> , Cutworms <sup>(3)</sup> , European corn borer <sup>(5)</sup> , Flea beetle adults <sup>(1)</sup> , Southern corn leaf beetle, Webworms <sup>(4)</sup> , Western bean cutworm	1 - 2 pints	
	Corn earworm, Southwestern corn borer <sup>(6)</sup>	1.5 - 2 pints	
	Billbugs <sup>(1)</sup> , Common stalk borer <sup>(9)</sup> , Corn rootworm larvae <sup>(7)</sup> , <sup>(8)</sup> , Lesser cornstalk borer Brown marmorated stink bug	2 pints	

**Use Restrictions:**

- Do not apply within 21 days before harvest of grain, ear, forage or fodder.

- Do not apply more than 3 lbs a.i. chlorpyrifos (6.4 pints of Vulcan) per acre per season. Do not make more than 3 applications per season of any product containing chlorpyrifos including the maximum allowed of 2 granular applications at the 1 lbs a.i. chlorpyrifos rate. Do not make a second application of Vulcan or other product containing chlorpyrifos within 10 days of the first application.
- The maximum single application rate is 1 lb. a.i. chlorpyrifos (2.13 pints of Vulcan) per acre. Do not apply in tank mixes with Steadfast or Lightning herbicides.
- If more than 1 lb. a.i. granular chlorpyrifos per acre is applied at-plant (for a maximum of 1.3 lb. a.i. per acre per season) only 1 additional application of a liquid product containing chlorpyrifos at 1 lb. a.i. per acre is allowed per season, for a total of 2.3 lb. a.i. chlorpyrifos per acre per season.
- Do not aerially apply this product in Mississippi.

**Pest Specific Use Directions:**

- (1.) For best billbug, chinch bug, or flea beetle control, ground apply in a minimum spray volume of 20 to 40 gpa at 40 psi. If corn is less than 6 inches tall, apply in a 9 to 12 inch wide band over the row. For corn greater than 6 inches tall, apply using drop nozzles directed to the base of the plant. Do not reduce the application rate for banded or directed applications. Concentrate the full labeled dosage rate in the treated zone. When chinch bugs continue to immigrate to corn over a prolonged period or under extreme pest pressure, a second application may be needed.
- (2.) The listed dosage will control silk clipping by corn rootworm adults.
- (3.) For cutworms, it is preferable to apply Vulcan when soil is moist and worms are active on or near the soil surface. If ground is dry, cloddy, or crusted at time of treatment, worms may be protected from the spray and effectiveness will be reduced. Shallow incorporation using a rotary hoe or other suitable equipment immediately before or soon after treatment may improve control. A second application may be required if damage or density levels exceed economic thresholds established for your area.
- (4.) For webworm control, shallow incorporation using a rotary hoe or other suitable equipment immediately before or soon after treatment is necessary.
- (5.) For European corn borer control, use 1.5 to 2 pints per acre when application is made with power-operated ground or aerial equipment or 1 to 2 pints per acre when application is made through a sprinkler irrigation system. University research indicates that achieving greater than 50% control of first-generation European borer with a single liquid insecticide treatment is highly dependent upon timing, insecticide placement, and weather conditions.
- (6.) For southwestern corn borer, a second application can be applied 21 days later if needed due to reinfestation.
- (7.) For postemergence control of corn rootworm larvae apply at cultivation. Direct the spray to both sides of the row at the base of the plants just ahead of the cultivator shovels. Cover the insecticide with soil around the brace roots. A cultivation application of Vulcan may be made in addition to an at-planting application of Chlorpyrifos 15G.
- (8.) Vulcan can also be applied through sprinkler irrigation systems at the rate of 2 pints per acre to control corn rootworm larvae. Time the application to coincide with the appearance of the second instar larvae. Apply with enough water to wet the root zone to the depth control needed. If soils are wet, allow enough soil drying to occur such that an application using a minimum amount of water will not produce surface runoff. See **SPRINKLER IRRIGATION** section of this label for application instructions.
- (9.) Do not use Vulcan in combination with a burndown herbicide for control of common stalk borer. For common stalk borer control, treat approximately 11 days after application of glyphosate or after burndown with paraquat herbicide is complete (3 to 5 days).

**COTTON**

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Cotton	Cotton fleahopper, Plant bugs (Lygus, Mirids)	3/8-1 pint	The listed dosage rate of 3/8 pint per acre will not achieve the high degree of control of the highest label rate but will minimize the damage done by plant bugs and cotton fleahopper and allow the beneficial insects to survive, build up, and be available to aid in the control of bollworms infesting cotton. For infestations of cotton aphids that are difficult to control, use a higher dosage within the indicated rate range.
	Fall armyworm, Grasshopper, Thrips, Yellowstriped armyworm	0.5 - 1 pint	
	Cotton aphid	0.5 - 2 pints	
	Spider mites	1 pint	For infestations of spider mites, when large numbers of eggs are present, scout the treated area in 3 to 5 days. If newly hatched nymphs are present, make a follow-up application of a non-chlorpyrifos product that is effective against mites. For best results against bollworms and budworms, scout fields twice per week and make applications when worms are 1/4 inch or less in length.
	Beet armyworm, Cotton bollworm, Tobacco budworm, Cutworms, Pink bollworm, Salt marsh caterpillar, Brown marmorated stink bug	1.5 - 2 pints	
	<b>In California and</b>	1 - 2 pints	
			The 2-pint rate will aid in the suppression of cotton leaf

	<p><b>Arizona:</b> Armyworms, Cotton Aphid, Cotton fleahopper, Lygus, Salt marsh caterpillar, silverleaf whitefly, Thrips</p>		<p>perforator and spider mites.</p> <p>Mix the required dosage with sufficient water to ensure thorough coverage of plants and apply using aerial or power-operated ground spray equipment. For aerial application, use at least 2 gallons of spray per acre. For ground application, use sufficient spray volume to ensure thorough coverage of treated plants but not less than 10 gallons of spray per acre. Increase spray volume when foliage is dense and/or when pests populations are high, and/or under high temperature and wind conditions. Treat when field counts indicate damaging insect populations are developing or present. Retreat as necessary to maintain control.</p>
	<p><b>In California and Arizona:</b> Cotton bollworm, Cotton leaf perforator (suppression), Tobacco budworm, Boll weevil, Cutworms, Pink bollworm, spider mites (suppression), brown marmorated stink bug</p>	<p>2 pints</p>	<p>Vulcan can also be applied through sprinkler irrigation systems as a postemergence broadcast application to control the above listed foliar pests. For best results, use the listed rate of Vulcan per acre. Maintain vigorous tank agitation to assure uniformity of the application throughout the injection period. See <b>SPRINKLER IRRIGATION</b> section for further information. For effective control of spider mites when large numbers of eggs are present, apply a second spray 3 to 5 days after initial treatment to control newly hatched nymphs.</p> <p>For silverleaf whitefly, apply in tank mix combination with the specified rate of a pyrethroid insecticide labeled for control or suppression.</p> <p>For best results on bollworms and budworms, it is suggested that fields be scouted twice per week and treatments made when worms are 1/4 inch or less in length.</p>

Use Restrictions:

- Do not apply within 14 days before harvest or make more than 3 applications of Vulcan or other product containing chlorpyrifos per crop per season.
- Do not apply more than 6 pints (2.82 lbs a.i.) Vulcan per acre per season. Do not make a second application within 10 days of the first application.
- Do not allow meat or dairy animals to graze in treated areas. Do not feed gin trash or treated forage to meat or dairy animals.
- The maximum single application rate is 0.94 lbs a.i. Vulcan per acre.

**CRANBERRIES**

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Cranberries	brown spanworm, cranberry fruitworm, cranberry weevil, cutworms, fireworms, and <i>Sparganothis</i> fruitworm	3 pints (1.41 lbs a.i.)	<p>Mix the specified dosage in enough water to ensure thorough coverage and apply no less than 5 gallons of spray per acre when using aerial equipment or no less than 15 gallons of spray per acre when using ground equipment. For weevil control, apply once at flower bud development (late May, early June) and, if weevils are present, once after 100% bloom (early to mid-July). For other insects, treat when field counts indicate damaging insect populations are developing or present. Apply only after the winter flood has been removed. To avoid pesticide contamination of flood water, make no applications while bogs are flooded.</p> <p>Vulcan can also be applied through sprinkler irrigation systems to control the above listed pests. Use the listed rate of Vulcan per acre. Maintain vigorous tank agitation to assure uniformity of the application throughout the injection period. See <b>SPRINKLER IRRIGATION</b> section for further</p>

			information.
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>Do not make more than two applications of Vulcan or other product containing chlorpyrifos per year or apply within 60 days before harvest. Do not make a second application within 10 days of the first application.</li> <li>The maximum single application rate is 1.41 lb a.i. chlorpyrifos (3 pints Vulcan) per acre.</li> </ul>			

**FIGS**  
**(For Use only in California)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 days unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Figs	dried fruit beetle	2 quarts (1.88 lbs a.i.)	Apply in sufficient water to the soil surface followed by incorporation into the top 3 inches of soil. Apply to fig orchard soil as a dormant application in late winter prior to beetle emergence and prior to leaf formation. Use a spray volume of 10 gallons per acre or more and apply as a broadcast spray to the soil surface using ground equipment. On the day of treatment incorporate into the top 3 inches of soil using suitable equipment.
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>Make only one application per year of Vulcan or other product containing chlorpyrifos.</li> <li>Do not apply within 7 months (217 days) of harvest.</li> <li>Based on available residue data, use of Vulcan on figs is restricted to California.</li> <li>The maximum single application rate is 1.88 lb a.i. chlorpyrifos (2 quarts Vulcan) per acre.</li> </ul>			

**GRAPES**

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Grapes	grape root borer	4½ pints (2.12 lbs a.i.)	<b>Soil Surface Application (For use in areas east of the Continental Divide Only):</b> Use Vulcan as a soil surface application by application just before the pest emerges from the soil. Mix with 100 gallons of water and apply 2 quarts of the diluted spray mixture to the soil surface on a 15 square foot area around the base of each vine. Do not allow spray to contact fruit or foliage.
	climbing cutworm grape mealybug	1 quart (0.94 lb a.i.)	<b>Prebloom Application (For use only in areas east of the Continental Divide):</b> For climbing cutworm, apply one quart per acre as a spray drench ground application using a minimum spray volume of 25 gallons per acre. For grape mealybug control, apply one quart per acre as a spray drench ground applications using a minimum of 50 gallons per acre prior to late budbreak. Applications after budbreak may result in transient leaf yellowing (Concords). Do not use prebloom applications in conjunction with soil surface application for grape borer control.
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>Do not make more than one application per season or apply within 35 days before harvest.</li> <li>Based upon available residue data, the use of Vulcan in grapes is restricted to states east of the Rocky Mountains/Continental Divide.</li> <li>Do not make more than one application per season of Vulcan or other product containing chlorpyrifos.</li> <li>The maximum single application rate for soil surface application is 2.12 lbs a.i. chlorpyrifos (4.5 pints Vulcan) per 100 gallons. The maximum single application rate for prebloom application is 0.94 lbs a.i. chlorpyrifos (2 pints Vulcan) per acre.</li> </ul>			

- Not for use in Mississippi.

**LEGUME VEGETABLES (Succulent or Dried) (except soybean)  
(Not For Use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Legume Vegetables including adzuki bean, asparagus bean, bean, blackeyed pea, broad bean (dry and succulent), catjang, chickpea, Chinese longbean, cowpea, crowder pea, dwarf pea, edible pod pea, English pea, fava bean, field bean, field pea, garbanzo bean, garden pea, grain lupin, grean pea, guar, gyacinth bean, jackbean, kidney bean, lablab bean, lentil, lima bean, moth bean, mung bean, navy bean, pea, pigeon pea, pinto bean, rice bean, runner bean, snap bean snow pea, southern pea, sugar snap pea, sweet lupin, sword bean, tepary bean, urd bean, wax bean, white lupin, white sweet lupin, yardlong bean	seed maggots	2 pints	<p>Apply Vulcan in a minimum of 10 gpa of spray to the soil surface using suitable ground equipment. Vulcan must be incorporated in the top 1 to 3 inches of soil to improve the activity against seed maggots.</p> <p>To apply an At Plant T-Band Application, apply 1.8 fl oz of Vulcan per 1000 feet of row at 30 inch row spacing. To achieve shallow incorporation, apply the spray in a 3 to 5 inch wide band over the row behind the planter shoe and in front of the press wheel to achieve shallow incorporation. Mix the specified dosage in the table below in a minimum of 10 gpa of spray and apply to the soil surface as a ground spray. Equivalent rates of insecticide spray required per 100 feet of row for listed row spacing are given in the table below. Incorporate Vulcan into the top 0.5 to 1 inch of soil to improve activity against seed maggots.</p> <p>Insecticides, including Vulcan, may contribute to the stress of plants under certain environmental conditions. This stress may reduce plant stand or interfere with normal plant development. Herbicides used preplant incorporated may interact with insecticides and enhance this stress.</p>

**Use Restrictions:**

- Do not make more than one application of Vulcan per year. Do not apply Vulcan at-plant if the field was treated with a preplant incorporated treatment of Vulcan.
- Do not apply more than 2 pints of Vulcan (0.94 lbs a.i.) per acre.
- Not for use in Mississippi.

**Soil Treatment: Fluid Ounces of Spray Required Per 100 Feet of Row for Various Row Spacing**

Spray volume Per Acre (Gallons)	30 inch	28 inch	24 inch	22 inch

10	7.3	6.9	5.9	5.4
15	11	10.3	8.8	8.1
20	14.7	13.7	11.8	10.8

**MINT (Peppermint and Spearmint)**

**(Not For Use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Mint	cutworms	2 to 4 pints (0.94 to 1.88 lbs a.i.)	Mix the specified dosage in water to give no less than 10 gallons of spray per acre and apply using ground spray equipment. For cutworm control, treat during May and June when field counts indicate damaging insect populations are developing or present. When larvae are less than 3/4 inch in length, use the 2 pint rate. When larvae are 3/4 inch or more in length, use the higher rate. For garden symphylans, apply preplant to the soil surface. On the same day of treatment, incorporate the insecticide into the top 2 to 4 inches of soil using a disc, field cultivator, or equivalent equipment. For mint root borer control, apply postharvest when field counts indicate damaging insect populations are developing or present. Follow treatment with approximately 1 acre inch of sprinkler irrigation immediately after application to incorporate the insecticide into the soil.  Vulcan can also be applied through sprinkler irrigation systems as a postemergence broadcast application to control the above listed pests. For best results, use the listed rate of Vulcan per acre. Maintain vigorous tank agitation to assure uniformity of the application throughout the injection period. See <b>SPRINKLER IRRIGATION</b> for further information.
	garden symphylans mint root borer	4 pints (1.88 lbs a.i.)	

Use Restrictions:

- Do not apply within 90 days before harvest.
- Make only one application of Vulcan or other product containing chlorpyrifos during the growing season. Do not make more than one preplant incorporated application in the spring.
- Do not use in conjunction with a broadcast foliar application for cutworm control. Make only one postharvest application per season. The maximum single application rate is 1.88 lb a.i. chlorpyrifos (2 quarts Vulcan) per acre.
- Not for use in Mississippi.

**NECTARINES, PEACHES, ALMONDS (Trunk Spray or Preplant Dip)  
(Not For Use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 days for nectarines and peaches and 24 hours for almond unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Nectarines Peaches Almonds (Trunk or Preplant dip)	peach tree borers	3 quarts (2.82 lbs a.i.)	Apply with 100 gallons of water. Apply as a coarse, low-pressure spray to give uniform coverage of tree trunks. Thoroughly wet all bark areas from ground level to scaffold limbs. Do not allow spray to contact fruit. Use a higher rate in the rate range when there is increased pest pressure. Consult your State Agricultural Experiment Station or State Extension Service Specialist's written specifications for proper time to treat in your area.  Vulcan can also be used as a preplant dip application for non-bearing peach and nectarine trees (only) at the equivalent application rate of 3 quarts (2.82 lbs a.i.) per 100

			gallons of water for control of peach tree borer. Dip trees several inches above the grafting bud scar and plant immediately or allow to dry before returning to storage. Do not allow peach trees to remain in contact with the dip solution.  For control of peach tree borer in established trees, apply before newly hatched borers enter the tree.
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Use Restrictions:

- Make only one application per season in almonds, peaches and nectarines. Do not apply within 14 days before harvest in almonds, peaches and nectarines.
- Do not allow meat or dairy animals to graze in treated orchards.

**ONIONS (DRY BULB)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT USE RATE	REMARKS
Onions (dry bulb)	onion maggot	32 fl oz (0.94 lb. a.i.)/acre	<b>At Plant Soil Drench Application:</b> Banded Application: Apply in a 2 to 4 inch wide band over the row at planting time in a minimum of 40 gpa. Shallow incorporation is necessary.  In-furrow Application: Apply Vulcan at the rate of 1.1 fluid ounce per 1000 linear feet of row at 18 inch row spacing. Use a minimum of 40 gallons of total drench per acre. Incorporate to a depth of 1 to 2 inches.
		1.1 fluid ounce per 1000 linear feet of row	
	onion maggot seedcorn maggot	1 quart (0.94 lb a.i.)/acre	<b>Post Plant Soil Drench Application:</b> Apply as an early season directed spray to the base of onion seedlings or transplants during peak onion maggot and seedcorn maggot egg-laying. Use a minimum of 100 gallons per acre for thorough wetting.

Use Restrictions:

- Do not make more than two applications per year (at plant plus post plant).
- The maximum single application rate is 0.03 lb a.i. chlorpyrifos per 1000 feet of row.
- Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.
- Do not harvest within 60 days of application

**PEANUTS**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Peanut	wireworm suppression	4 pints (1.88 lbs a.i.)	Apply as a preplant broadcast spray to the soil surface followed by immediate soil incorporation to a depth of 3 to 4 inches. Use a minimum of 10 gallons of total spray per acre.

Use Restrictions:

- Do not make more than one application per season. The maximum single application rate is 1.88 lbs a.i. chlorpyrifos (4 pints Vulcan) per acre. The combined total of preplant and postplant applications of Vulcan or other product containing chlorpyrifos must not exceed 4 lbs a.i. chlorpyrifos per acre per season.
- Do not harvest within 21 days after treatment.
- Do not feed treated peanut forage or hay to meat or dairy animals.
- Aerial application to peanuts is prohibited in Mississippi.
- Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

**PEARS  
(California, Oregon and Washington)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Pears	codling moth	4 pints (1.88 lbs a.i.)	Apply in 100 to 400 gallons of spray per acre. Apply using an airblast speed sprayer or other suitable ground equipment.

Use Restrictions:

- Do not make more than one post harvest application prior to dormancy per year.
- Do not harvest or use treated fruit for food or feed.
- Do not allow meat or dairy animals to graze in treated orchards.
- If unauthorized entry into a treated orchard cannot be prevented, then the orchard shall be posted with appropriate signs according to the Worker Protection Standard while treated, unharvested fruit remains on the tree.

### SORGHUM-GRAIN SORGHUM (MILO)

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Sorghum	Sorghum midge	0.5 pint Apply when 30 to 50% of the seed heads are in bloom. Repeat at 3 day intervals if necessary.	<p>Mix the specified dosage in enough water to ensure thorough coverage and apply using suitable aerial or ground spray equipment. To minimize chemical injury, do not apply Vulcan to drought stressed grain sorghum within 3 days following irrigation or rain except where the product is applied in irrigation water.</p> <p>Vulcan can also be applied through sprinkler irrigation systems as a postemergence broadcast application to control the above listed foliar pests. For best results, use the listed rate of Vulcan per acre. Maintain vigorous tank agitation to assure uniformity of the application throughout the injection period. See <b>SPRINKLER IRRIGATION</b> section for further information.</p> <p><b>Note:</b> Sorghum lines used in seed production fields may be more susceptible to chemical injury. Susceptible inbred lines or hybrids are likely to be at greater risk of yield-reducing chemical injury when treated at the higher application rates. User should not apply more than 1 pint of Vulcan Insecticide per acre to seed sorghum if the additional risk of crop injury is unacceptable.</p>
	Grasshoppers, Yellow sugar cane aphid and other aphids	0.5 - 1 pint	
	Greenbug	0.5 - 2 pints For infestations of greenbug that are difficult to control, use a higher dosage within the indicated rate range.	
	Chinch bugs, Lesser cornstalk borer	1 - 2 pints Apply as a directed spray toward the base of the plant using power-operated ground spray equipment with sufficient water to ensure coverage of an 8-12 inch band centered on the row. On plants less than 6 inches high, apply an 8 to 12 inch band over the row. Do not reduce the dosage for banded or directed applications. Concentrate the full labeled dosage rate in the treated zone.	
	Webworms	1 pint	
	Corn earworm	2 pints	
	Armyworms, Cutworms	1 - 2 pints	
	European and Southwestern corn borer,	1.5 - 2 pints	



	Brown marmorated stink bug		
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>The treated crop is not to be used for grain, forage, fodder, hay, or silage within 30 days after application of 1 pint (0.47 lbs a.i.) of Vulcan per acre or within 60 days after application of rates above 1 pint (0.47 lbs a.i.) per acre.</li> <li>Do not treat sweet varieties of sorghum.</li> <li>Do not apply more than 3 pints (1.41 lbs a.i.) of Vulcan per acre per season. Do not make more than 3 applications of Vulcan Insecticide or other product containing chlorpyrifos per season. Do not make a second application within 10 days of the first application.</li> <li>Do not apply by air in Mississippi.</li> </ul>			

**SOYBEANS**  
**(Not For Use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Soybeans	cutworms lesser cornstalk borer	1 to 2 pints (0.47 to 0.94 lbs a.i.)	<b>Soil Treatment:</b> Mix the specified dosage in a minimum of 10 gallons of spray per acre and apply to the soil surface using suitable ground spray equipment. Equivalent rates of insecticide spray required per 100 feet of row for various row spacing are given in the accompanying table. For at-plant treatments, apply the insecticide over the row in a 4 to 6 inch band in front of the planter shoe or press wheel or after the press wheel followed by a drag chain for light incorporation. Do not apply as an in-furrow treatment. For postemergence rescue treatments, apply as a directed spray in a 9 to 12 inch band at the base of the plant. To plants under 6 inches high, apply over-the-top in a 6 to 12 inch band. Treat when field counts or conditions indicate that pests are or may become a problem.
	European corn borer, Southern green stink bug, Brown marmorated stink bug	2 pints	<b>Foliar Treatment:</b> Use in sufficient water to ensure thorough coverage of treated plants:
	Bean leaf beetle, Cutworms, Corn earworm, Saltmarsh caterpillar and other woollybears, soybean aphid, potato leafhopper, thistle caterpillar (painted lady butterfly)	1 - 2 pints	Apply as a broadcast spray using either aerial or ground equipment when field counts indicate damaging insect populations are developing or present; retreat as necessary to maintain control. Mix the specified dosage in a minimum of 15 gallons of spray per acre for ground spray equipment or 5 gallons of spray per acre for aircraft equipment. For effective control of spider mites when large numbers of eggs are present, apply a second spray 3 to 5 days after initial treatment to control newly-hatched nymphs. On determinate soybeans, do not apply more than one application after pod set.
	Mexican bean beetle, Armyworms	1 - 1.5 pints	
	Velvetbean caterpillar, Grasshoppers, Green cloverworm, Spider mites	0.5 - 1 pint	Vulcan insecticide can also be applied through sprinkler irrigation systems as a postemergence broadcast application to control the above listed foliar pests. For best results, use the listed rate of Vulcan per acre. Maintain vigorous tank agitation to assure uniformity of the application throughout the injection period. See <b>SPRINKLER IRRIGATION</b> section for further information.

Use Restrictions:

- Do not apply more than 6 pints (2.82 lbs a.i.) of Vulcan per acre per season. Do not make more than 3 applications per season of Vulcan insecticide or other product containing chlorpyrifos.
- Do not apply last treatment within 28 days before harvest nor apply last two treatments closer than 10 days apart.

- Do not allow livestock to graze in treated areas or otherwise feed treated soybean forage, hay, and straw to meat or dairy animals.
- Not for use in Mississippi.

**Soil Treatment: Fluid Ounces of Spray Required Per 100 Feet of Row for Various Row Spacing**

Volume of Spray Per Acre	36 inch	32 inch	28 inch	24 inch
10 gallons	8.8	7.9	6.9	5.9
15 gallons	13.2	11.8	10.3	8.8
20 gallons	17.6	15.7	13.7	11.8

**STRAWBERRIES  
(Not For Use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Strawberries	Garden symphylans, grub	4 pints	<b>Preplant Incorporation Treatment:</b> Apply in sufficient water to the soil surface and incorporate into the soil in the spring for protection of strawberries during the following year.
	strawberry bud weevil (clipper)	1 quart (0.94 lbs a.i.)	<b>Foliar Application:</b> Apply as a broadcast foliar spray in a minimum of 40 gallons of spray per acre when buds first appear and 10 to 14 days later. Do not apply after berries start to form or when berries are present. Do not tank mix Vulcan with pesticides, surfactants, or fertilizer formulations unless prior use has shown the combination noninjurious under your current conditions of use. Phytotoxicity may occur when Vulcan is applied to strawberries experiencing high temperature and drought stress.
	strawberry crown moth	1 quart (0.94 lbs a.i.)	<b>Post Harvest Application:</b> Apply as a directed spray to crown of strawberry plants immediately after harvest and after plants are topped. Use a minimum spray volume of 100 gallons per acre and repeat application if required 14 to 18 days later. Do not sprinkle irrigate for one week following application.

**Use Restrictions:**

- For prebloom use only, do not apply after berries start to form or when berries are present.
- Do not apply within 21 days before harvest.
- For preplant application, do not make more than one application of Vulcan or other product containing chlorpyrifos per year. For foliar and post harvest applications, do not make more than two applications per year. Do not make a second application within 10 days of the first foliar application and within 14 days for post harvest application.
- The maximum single application rate is 1.88 lbs a.i. chlorpyrifos (2 quarts Vulcan) per acre for foliar application and 0.94 lbs a.i. chlorpyrifos (1 quart Vulcan) per acre for postharvest application.
- Not for use in Mississippi.

## SUGAR BEETS

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE		REMARKS	
Sugar beets	Grasshoppers	1 pint (0.47 lbs a.i.)		<p><b>Soil Treatment (At Planting or Preplant Incorporated):</b> To reduce feeding damage from early season insects such as cutworms, apply at planting or as a preplant treatment and incorporate to a depth of 1 to 2 inches. Do not apply as an in-furrow treatment. Apply 1 pint (0.47 lbs a.i.) of Vulcan per planted acre to a 10 inch wide band centered over the row for furrows 30 inches apart. (For rows 30 inches apart, this is equivalent to 9.2 fl oz of Vulcan per 10,000 feet of row). For other row widths, adjust the spray volume per planted acre in proportion to the length of row actually treated.</p> <p><b>Postemergence Treatment:</b> Treat when field counts indicate that damaging insect populations are developing or present.</p> <p><b>Broadcast Application:</b> Apply the specified dosage in water using 2 to 5 gallons per acre of finished spray when using aerial spray equipment or 10 to 30 gallons per acre when using ground spray equipment. Vulcan can also be applied through sprinkler irrigation systems as a postemergence broadcast application to control the listed foliar pests. Use the listed rate of Vulcan per acre. Maintain vigorous tank agitation to assure uniformity of the application throughout the injection period. See <b>SPRINKLER IRRIGATION</b> section for further information.</p> <p><b>Banded Foliar Spray:</b> Apply the specified rate within the band using a minimum of 7 gallons of spray volume in a 5- to 7 inch wide band centered over the row. Do not reduce the rate for band applications. Concentrate the full labeled dosage rate (see band rates in table below) in the treated zone. For best results, lightly incorporate band-applied treatments, either mechanically or with irrigation.</p> <p>For grasshopper control, the low rate will control small nymphs (1<sup>st</sup> through 3<sup>rd</sup> instar). For sugarbeet root maggot adults, apply anytime from 7 days before until 3 days after peak adult emergence in order to target adults present at time of application based on local field trap monitoring. For sugarbeet root maggot larvae, use as primary treatment to control root maggot larvae. Base application timing on local field trap monitoring. Apply anytime from 7 days before until 3 days after peak adult emergence. Use as a supplemental postemergence treatment following an at-plant insecticide application for control of root maggot larvae. Base application timing on local field trap monitoring. Apply anytime from 7 days before until 3 days after peak adult emergence. To prevent potential development of insecticide resistance in sugarbeet root maggot, producers are encouraged to take the following steps: (1) avoid making more than 2 applications of Vulcan per season when adults are active; (2) If an organophosphate insecticide was applied at planting, make no more than one postemergence application of Vulcan when adults are active.</p>	
		Broadcast (pint/acre)	Band (pint/acre)		
		1/2 - 1	---		
		Leafminers, Spider mites	1	2/3	
		Tarnished plant (Lygus)	1	---	
		Fall armyworms, yellowstriped armyworm, webworms	1 - 2	2/3-1 1/3	
		Beet armyworm	1 1/2 - 2	1 - 1 1/3	
		Cutworms, flea beetle adults	2	1 1/3	
		Sugarbeet root maggot adults	1/2 - 1	---	
		Sugarbeet root maggot larvae	---	1 1/3 - 2	
		Sugarbeet root maggot larvae	2	1 1/3 - 2	
		Aphids	1 - 2	---	

**Use Restrictions:**

- Do not apply within 30 days before harvest of beet roots and tops.
- Do not make more than 3 applications of Vulcan or other product containing chlorpyrifos per season. Do not apply more than a total of 6 pints (2.82 lbs a.i.) per acre per season.
- The maximum single application rate is 0.94 lb. a.i. chlorpyrifos (2 pints Vulcan) per acre. Do not make a second

application within 10 days of the first application.

- Do not allow livestock to graze in treated areas nor harvest treated beet tops as feed for meat or dairy animals within 30 days after last treatment.
- Not for use in Mississippi. To avoid unacceptable crop injury, do not tank mix Vulcan with Quadris® or Headline® with any EC formulation or any tank mix containing an oil adjuvant.

**SUNFLOWERS  
(Not For Use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Sunflowers	Cutworms	2 - 4 pints	<b>Preplant Incorporation Treatment:</b> Use listed rate in not less than 10 gallons of water per acre and apply as a broadcast spray to the soil surface using suitable power-operated ground spray equipment. On the same day of treatment, incorporate the insecticide into the top 2 to 4 inches of soil using a disc, field cultivator, or equivalent equipment. Use a higher rate in the rate range when there is increased pest pressure.
	Cutworms	2 - 3 pints	<b>Postemergence Treatment:</b>
	Sunflower beetle larvae and adults, Stem weevil, Sunflower moth, Banded sunflower moth, Woollybears, Seed weevil	1 – 1.5 pints	Use Vulcan for control of the following pests at the dosage indicated by application in sufficient water to ensure thorough coverage of treated plants, but no less than 15 gallons of water per acre for ground equipment or 2 to 5 gallons of water per acre for aircraft equipment. Use a higher rate in the rate range when there is increased pest pressure.
	Grasshoppers	1 pint	Apply as a broadcast spray using either aerial (fixed-wing or helicopter) or power-operated ground spray equipment when field counts indicate that pests are or may become a problem. For cutworm control, a second treatment can be made 7 to 10 days later if needed. For stem weevil control, optimal treatment time is within 5 to 7 days after adult weevils begin to appear. For sunflower moth control, make first application during early 1 to 5 percent bloom stage. A second treatment can be made 10 days later if needed. For seed weevil control, treat when field counts indicate there are 10 to 12 adults per plant for oil crops and 1 to 3 adults per plant on confectionery crops.
	Tarnished plant bug (Lygus), brown marmorated stink bug	1 - 2 pints	Make additional treatments at successive 10 day intervals if field counts indicate need to retreat. For sunflower beetle larvae or adult control, treat when field counts indicate there are 10 larvae or 1 to 2 adults per seedling. Additional treatments can be made at successive 10 day intervals if field counts indicate need to retreat. For tarnished plant bug control, apply at the onset of pollen spread or approximately 10% bloom (R-5 growth stage). For best control, make a second application 10 days later. Use sufficient water to ensure thorough coverage of treated plots.

**Use Restrictions:**

- Do not apply more than 6 pints (2.82 lbs a.i.) of Vulcan per acre per season. Do not make more than 3 applications of Vulcan or other product containing chlorpyrifos per season.
- Do not apply within 42 days before harvest. Do not make a second application within 10 days of the first application.
- Do not allow livestock to graze in treated areas.
- The maximum single application rate is 1.88 lbs a.i. chlorpyrifos (4 pints Vulcan) per acre for preplant incorporation and 0.94 lbs a.i. chlorpyrifos (2 pints Vulcan) per acre for postemergence broadcast treatment.
- Not for use in Mississippi.

## SWEET POTATOES

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PESTS	PRODUCT RATE PER ACRE	REMARKS
Sweet Potatoes	<i>Conderus</i> wireworm <i>Systema</i> flea beetle Sweet potato flea beetle	4 pints (1.88 lbs a.i.)	<p>Use Vulcan to reduce the feeding damage caused by populations of the pests listed in this table.</p> <p>Apply as a broadcast (overall) spray to the soil surface followed by incorporation. Mix the specified dosage with enough water to obtain uniform coverage and apply as a coarse spray using suitable ground spray equipment.</p> <p>Incorporate the insecticide to a depth of 4 to 6 inches as soon as possible after application by using a rotary hoe, disc cultivator, or other suitable incorporation equipment.</p> <p>Plant the crop in the usual manner no later than 14 days after treatment (any delay in planting will reduce the length of time that Vulcan will protect against feeding damage).</p> <p>Vulcan will not control false wireworms or whitefringed beetle or other grubs that attack sweet potatoes.</p>

**Use Restrictions:**

- Do not apply more than 4 pints/A (1.88 lbs a.i./A) of Vulcan per application.
- Do not make more than one application of Vulcan or any other product containing chlorpyrifos per cropping season.
- Do not harvest within 125 days of treatment.
- Do not apply by aerial application equipment in the State of Mississippi.

## TOBACCO\*

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PESTS	PRODUCT RATE PER ACRE	REMARKS
Tobacco	Cutworms larvae Flea beetles Mole crickets Root maggots Wireworms	2 pints (0.94 lbs ai)	<p>Use Vulcan for preplant treatment to control the pests listed in this section of the table.</p> <p>Apply this product rate per acre in not less than 10 gallons of water as a broadcast (overall) spray to the soil surface one week before transplanting.</p> <p>Immediately following application, incorporate the insecticide into the soil to a depth of 2 to 4 inches using suitable equipment.</p>
	Cutworms larvae Flea beetles Mole crickets Root maggots Wireworms Rootknot nematodes (low to moderate populations)	2 pints (0.94 lbs ai)	To control the pests listed in this section of the table and in all tobacco growing regions, use Vulcan at the application rate in this section of the table.
	Cutworms larvae Flea beetles Mole crickets Root maggots Wireworms Rootknot nematodes	Tank Mix with NemaCur® 3 2 quarts (1.88 lbs ai) of Vulcan PLUS 4 quarts of NemaCur 3	To control the pests listed in this section of the table and in all tobacco growing regions, use the tank mix rates in this section of the table. Read and carefully follow all applicable directions, restrictions, and precautions on labeling for NemaCur 3 used in combination with Vulcan.

	(moderate populations)	nematicide	
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>Do not apply more than 2 pints/A (0.94 lbs a.i./A) of Vulcan per application.</li> <li>Do not make more than one application of Vulcan or any other product containing chlorpyrifos per cropping season.</li> <li>Do not apply more than 2 pints/A (0.94 lbs a.i./A) of Vulcan per cropping season.</li> <li>Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.</li> <li>Do not apply by aerial application equipment in the State of Mississippi.</li> </ul> <p>* For all sections of this table:</p> <p>Apply the specified dosage in not less than 10 gallons of water as a broadcast (overall) spray to the soil surface 24 to 48 hours before bedding and transplanting.</p> <p>Immediately following application, incorporate into the soil surface 24 to 48 hours before bedding and transplanting.</p> <p>Immediately following application, incorporate into the soil to a depth of at least 4 inches using suitable equipment.</p> <p>Where the nematode species <i>Meloidogyne arenaria</i> or <i>M. Javanica</i> are present or high populations of <i>M. incognita</i>, apply Telone* II soil fumigant at the listed label rate.</p>			

**TREE FRUITS, ALMOND, AND WALNUT (Dormant/Delayed Dormant Sprays)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 days for tree fruits and 24 hours for almond and walnut unless PPE required for early entry is worn.

CROP	PESTS	PRODUCT RATE PER 100 GALLONS of SPRAY (Based on 200 to 600 gallons/A as a dilute spray)	REMARKS
Apples	Rosy apple aphid San Jose scale Lygus <i>Pandemis</i> leafroller Climbing cutworms Obliquebanded leafroller	0.5 - 1 pint (Use a minimum of 1.5 pints/acre)	For Apple: Only one application of any chlorpyrifos-containing product can be made per year.  The application can either be a prebloom dormant/dormant delayed spray to the canopy or the trunk, OR a post-bloom application to the lower 4 feet of the trunk.  For postbloom application instructions and restrictions for apple, see the Apple Tree Trunk crop section.
Almond, Cherry, Nectarine, Peach, Pear, Plum, Prune, Walnut	American plum borer Brown almond mite Climbing cutworms European red mite Greater peach tree borer Mealy plum aphid Peach twig borer Pear psylla adults San Jose scale		In orchards with high overwintering populations of European red mite or brown almond mite, use higher sprayer volumes that allow for the use of higher per acre rates of oil.  For Apple, Almond, Cherry, Nectarine, Peach, Pear, Plum, Prune, and Walnut:  Use Vulcan as a dormant or delayed dormant spray at the rates indicated to control the pests listed in this table. While Vulcan can be used without oil, use oil to control additional pests such as European red mite and brown almond mite. Applications can be made on pears after harvest. See specific use directions in this table.  Dormant or Delayed Dormant Spray: For control of additional pest such as European red mite, mix Vulcan with oil, although it can be used without oil. Using conventional, power-operated spray equipment, apply as a concentrate or dilute spray. For dilute sprays (greater than 200 gpa), use sufficient spray volume to saturate tree foliage, but not to point of runoff. For concentrate sprays (less than 200 gpa), evenly distribute an equivalent amount of product per acre.  For dilute spray, tank mix the specified dosage with 1 to 2 gallons of a petroleum spray oil specified for dormant use in 100 gallons of water and spray the entire tree by application to run off using suitable ground spray equipment. For low volume (concentrate) sprays (less than 200 gallons of spray mixture per acre), use the same amount of Vulcan as for a

			dilute spray and apply in a manner that will ensure thorough coverage of the trees. Use the higher dosage of Vulcan for severe infestations. Use oil as specified by your State Agricultural Experiment Station or State Extension Service Specialist.
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**Use Restrictions:**

- Do not apply more than 4 pints/A (1.88 lbs a.i./A) of Vulcan.
- Do not apply Vulcan until winter rains or irrigation has replenished soil moisture such that bark and twigs are not desiccated since cold or dry conditions can cause Vulcan plus oil sprays to infuse trees resulting in bud damage or drop.
- Make only one application during the dormant/delayed dormant season, applying no more than 4 pints/A (1.88 lbs a.i./A) per cropping season.
- Do not make more than one application of any chlorpyrifos-containing product per year.
- The application can either be a prebloom dormant/dormant delayed spray to the canopy or the trunk, OR a post-bloom application to the lower 4 feet of the trunk. For postbloom application instructions and restrictions for apple, See the Apple (Tree Trunk) section.
- Do not make a soil or foliar application within 10 days of a dormant/delayed dormant application of chlorpyrifos to the orchard.
- Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 days for tree fruits and 24 hours for almond and walnut unless PPE required for early entry is worn.
- Do not allow meat or dairy animals to graze in treated orchards.

**Use Restrictions Specific to California:**

- Use a minimum of 100 gallons of total spray volume per acre.
- Do not apply more than 4 gallons of spray oil per acre on almonds.
- Do not apply more than 6 gallons per acre on peaches and nectarines.
- Do not use any adjuvants or surfactants in addition to or as a substitute for a petroleum spray oil in a tank mix with Vulcan.
- Do not apply on almonds in the following counties in California: Butte, Colusa, Glenn, Solano, Sutter, Tehama, Yolo, and Yuba.
- Do not use more than 1% dormant oil in almond orchards less than 4 years old.

**TREE NUTS  
ALMONDS, FILBERTS, PECANS, WALNUTS**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Almonds	Leaf footed plant bug, Navel orangeworm, Peach twig borer, San Jose scale	4 pints	Foliar Spray: Use Vulcan at the dosage indicated by application as a foliar spray to control pests listed in the table. Mix the required dosage in sufficient water to ensure thorough and complete coverage of the foliage and crop, and apply as a concentrate or dilute spray using conventional, power-operated spray equipment. For dilute sprays applied to tree nut crops, mix the required dosage in sufficient water to allow for spray to runoff. For concentrate sprays, apply an equivalent amount of Vulcan per acre. Treat when pests appear or in accordance with local conditions. Insect control by aerial application may be less than control by ground application because of less coverage. Consult your state agricultural experiment station, certified pest control advisor, or extension service specialist for specific use information in your area. To avoid contamination of irrigation floodwaters, do not flood irrigate within 24 hours following an application of Vulcan.
Filberts	Eye-spotted bud moth, Filbert aphid, Filbert leafroller, Filbert worm, Obliquebanded leafroller, Omnivorous leaf-tier, Winter moth	3 - 4 pints	
Walnuts	Codling moth, Walnut scale, Walnut husk fly	4 pints	
Pecans	Pecan nut casebearer, Fall webworm	1.5 - 4 pints	

	<p><i>Phylloxera</i> spp., Black pecan aphid, Hickory shuckworm , Pecan leaf scorch mite (suppression) , Ant species (except fire ants, carpenter ants, harvester ants, and pharaoh ants)</p>	<p>2 - 4 pints</p> <p>For best <i>Phylloxera</i> spp. control, make 2 applications at 10 day interval using a minimum of 1.0 pint (0.94 lbs a.i.) of Vulcan per acre starting at bud swell.</p> <p>For Black pecan aphid and Hickory shuckworm make 2 applications, 10-14 days apart for best results</p> <p>To suppress pecan leaf scorch mite, use a preventative program.</p> <p>For ant control, apply as an orchard floor spray. Do not apply where weed growth or other obstructions prevent uniform coverage of the orchard floor.</p>	
	<p>Yellow pecan aphid, Black margined aphid<sup>5</sup>, Spittlebugs</p>	<p>1 - 4 pints/acre</p> <p>For control of yellow pecan aphid and black margined aphid, apply in tank mix combination with the listed rate of a pyrethroid insecticide labeled for control or suppression of these aphids.</p> <p>For control of spittlebug, use a dosage of 2 to 4 pints (0.94 – 1.88 lbs a.i.) per acre for concentrate sprays.</p>	

Use Restrictions:

- Cold or dry conditions can cause this product and oil mixtures to infuse into trees, resulting in bud damage or bud drop. Do not apply until winter rains or irrigation has replenished soil moisture so that bark and twigs are not desiccated. Do not flood irrigate within 24 hours of application of this product to avoid contamination of irrigation tail waters.
- Vulcan is highly toxic to bees exposed to direct treatment. Do not apply when bees are actively foraging in the treated area.
- Make no more than 3 foliar applications of Vulcan or other product containing chlorpyrifos per season on almonds, filberts, and pecans and no more than 2 applications per season on walnuts.
- Make no more than one application of chlorpyrifos during the dormant season. Do not make a soil or foliar application of Vulcan or products containing chlorpyrifos within 10 days of a dormant/delayed dormant application.
- Do not apply within 14 days of harvest of almonds, filberts, and walnuts, or 28 days of harvest of pecans. Do not allow livestock to graze in treated orchards. Do not apply more than 8 pints (3.76 lbs a.i.) of Vulcan per acre per season as a foliar spray. Do not make a second application within 10 days of the first application. Do not apply more than 4 pints of Vulcan (1.88 lbs a.i.) per acre per season as a dormant/delayed dormant application.
- Do not use on almond, filbert or walnut in Mississippi.  
Do not aerially apply this product in Mississippi.



**ALMOND, PECAN, WALNUT ORCHARD FLOORS  
(Not For Use in Mississippi)**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

CROP	PEST	PRODUCT RATE PER ACRE	REMARKS
Almond, Pecan, Walnut Orchard Floors	ants (except fire ants, carpenter ants, harvester ants, and pharaoh ants), pavement ants	4 to 8 pints (1.88 – 3.76 lbs a.i.)	<p>Apply the specified dose with ground application equipment that will uniformly apply the spray to the orchard floor. Use when ant activity becomes evident within the orchard. Worker ants cease most of their foraging activity at temperatures above 90°F, best results will be achieved with applications made at temperatures below 90°F at the time of application.</p> <p>Sprinkler- or Drip-irrigated Orchards</p> <p>Apply in 25 or more gallons of water. Use the high rate for heavy infestations and the low rate for light infestations. In orchards where ant activity is concentrated around the irrigation emitters, apply the high rate to a 6- to 8-foot band along the drip-irrigation line and the low rate to the rest of the orchard.</p> <p>Flood-irrigated Orchards</p> <p>Apply in 25 or more gallons of water to the entire orchard floor using ground spray equipment. Apply the high rate to heavily infested areas and the low rate to lightly infested areas. Where ant colonies are abundant only in the berm areas, apply Vulcan at 8 pints (3.76 lbs a.i.) per treated acre in 50 or more gallons of water to a 6- to 10-foot band along the treeline (berm).</p>

**Use Restrictions:**

- Do not make more than 2 applications of Vulcan or other product containing chlorpyrifos per season to the orchard floor. Do not apply more than 8 pints (3.76 lbs a.i.) per acre per season to the orchard floor. If the 8 pint rate is used, then a second application is not permitted.
- Do not apply the last treatment within 14 days of harvest.
- Do not allow livestock to graze in treated orchards. Do not allow spray to contact fruit or foliage.
- Do not make a second application within 10 days of the first application.
- Do not apply where weed growth or other obstructions would impede uniform coverage of the orchard floor. Mow or chemically control weeds before the application.

**TURF GRASS GROWN FOR COMMERCIAL SOD**

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

For best results, turf should be moist at time of treatment.

PEST	PRODUCT RATE		REMARKS
	1000 sq ft	Acre	
Ants (except fire ants, carpenter ants, harvester ants, and pharaoh ants), armyworms (such as: beet, fall, yellowstriped), centipedes, chiggers, chinch bugs, crickets, cutworms, deer ticks, earwigs, European crane fly larvae, fiery skipper, fleas, gnats, grasshoppers, greenbug aphids, green June beetle grubs, leafhoppers, Lucerne moth, millipedes, mites (such as: clover, Bermudagrass stunt, winter grain), mosquitoes, pillbugs, springtails, sod webworms (lawn moths) <sup>(1)</sup> , sowbugs, ticks	0.75 fl oz	1 qt	For sod webworms, watering or mowing of the treated area must be delayed for 12 to 24 hours after treatment.
Billbug adults (such as: bluegrass, Denver, hunting) <sup>(2)</sup>	0.75 – 1.5 fl oz	1 - 2 qt	For billbugs, spray early in the season just prior to or coinciding with first appearance of adults as specified by your local Agricultural Extension Service Specialist.
Annual bluegrass weevil ( <i>Hyperodes</i> ) <sup>(3)</sup> , black turfgrass ataeinus adults <sup>(4)</sup> , mole crickets <sup>(5)</sup>	1.5 fl oz	2 qt	To control annual bluegrass weevil, spray suspected problem areas in mid-April and again in mid May, or as specified by your local Agricultural Extension Service Specialist.  For black turfgrass ataeinus adults, spray early in the season as specified by your local Agricultural Extension Service Specialist. A repeat application may be needed 1 to 2 weeks later.  To control mole crickets in turfgrass, apply Vulcan through high-pressure injection or other suitable subsurface placement application equipment. Depending on the application equipment used, follow the manufacturer's specification for calibration and the volume of spray per acre needed to provide control or as specified by your local Agricultural Extension Service Specialist. For best results, apply when young nymphs are active.
White grubs (such as: black turfgrass ataeinus, European chafer, Japanese beetle larvae, and northern and southern masked chafers) <sup>(6)</sup>	1.5 - 3 fl oz	2 - 4 qt	For white grubs, spray when grubs are young and actively feeding near the soil surface, usually during late July and August or as specified by your local Agricultural Extension Service Specialist. For best results, soil should be moist prior to treatment. For best results, immediately after spraying, irrigate the treated area with 0.5 to 1 inch or water to wash the insecticide into the thatch and underlying soil.

**VEGETABLES - Brassica (Cole) Leafy Vegetables<sup>1</sup> and Radish, Rutabaga, and Turnip**

**(Not for use in Mississippi) Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 3 days for cauliflower and 24 hours for all other vegetables unless PPE required for early entry is worn.

<sup>1</sup> Brassica (cole) leafy vegetables include broccoli, broccoli raab, Brussels sprout, cabbage, cauliflower, cavalo broccoli, Chinese broccoli, Chinese cabbage, collards, kale, kohlrabi, mizuna, mustard greens, mustard spinach, rape greens.

**Preplant Incorporation Application for Direct Seeded or Transplanted Crops**

CROP	PEST	DOSAGE VULCAN	USE DIRECTIONS
Cauliflower	Billbugs, Cutworms, Grubs, Root Maggots, Symphylans, and Wireworms	4 pints (1.88 lbs a.i.) per acre	Use as a broadcast spray to the soil surface using power-operated ground spray equipment. Use a total spray volume of 10 gallons of water per acre or more. On the day of treatment, incorporate Vulcan into the top 2 to 4 inches of soil using a disc, field cultivator, or equivalent equipment.  Insecticides may contribute to the stress of plants under certain environmental conditions. This stress may reduce plant stand or interfere with normal plant development. Herbicides used preplant incorporated may interact with insecticides and enhance this stress.
Broccoli, Brussels Sprouts, Cabbage, Chinese Cabbage, Collards, Kale, Kohlrabi, Rutabaga, Turnips		4.5 pints (2.12 lbs a.i.) per acre	
Radish		5.5 pints (2.6 lbs a.i.) per acre	

**At-Plant, Post Plant Soil Application and Foliar Application**

CROP	PEST	DOSAGE VULCAN	USE DIRECTIONS	RESTRICTIONS
Cauliflower-soil application	Root maggot	1.6-2.4 fl oz/1000 linear ft of row	For direct-seeded crops, apply the specified dosage in a water-based spray as a 4 inch wide band over the row at planting time. Shallow incorporation is necessary. Placement behind the planter shoe and in front of the press wheel is recommended. For transplanted crops, apply Vulcan as a water-based spray directed to the base of the plants immediately after setting. Use a minimum of 40 gallons of total spray per acre. Do not add any additional adjuvants, surfactants, or spreader stickers. Do not apply as a foliage application.	Do not apply more than 2 pints of Vulcan to cauliflower planted in 40 inch rows. Use proportional amounts for other row spacings not to exceed 4 pints of Vulcan per acre. Do not apply more than 2.6 pints (1.22 lbs a.i.) of Vulcan per acre to broccoli, Brussels sprouts, cabbage, Chinese cabbage, collards, kale, kohlrabi, and turnips planted in 40 inch rows. Do not apply more than 4.5 pints (2.12 lbs a.i.) of Vulcan per acre to these crops in 20 inch rows (or two rows per bed). Use proportional amounts for other row spacings not to exceed 4½ pints (2.12 lbs a.i.) of Vulcan per acre. Do not make more than one application per season within 30 days before harvest on broccoli, Brussels sprouts, cabbage, Chinese cabbage, collards, kale, kohlrabi, and turnips. Do not make more than one soil application per crop. Do not make a foliar application within 10 days of a soil application.
Broccoli, Brussels Sprouts, Cabbage, Chinese Cabbage, Collards, Kale, Kohlrabi, Turnips-soil application		1.6-2.75 fl oz/1000 linear ft of row		
Broccoli, Cabbage-soil application	Root aphid	1.2 fl. oz/1000 ft of row for single row plantings, and 2.4 fl oz/1000 linear ft of row for double row plantings		

Brussels sprouts-foliar application	Armyworms, Cabbage aphid, Cutworms. Imported cabbage worm, Striped flea beetle (adult)	1 - 2 pints/acre	Apply Vulcan with conventional power-operated equipment in 20 to 150 gallons of water per acre. Apply when insects appear on foliage and at 10 to 14 day intervals or thereafter as needed. Consult your state agricultural station, extension service specialist, or integrated pest control advisor for proper time to treat in your area.	Do not make more than 3 applications of Vulcan or other products containing chlorpyrifos per season. Do not apply within 21 days before harvest. Do not make a second application within 10 days of the first application. Do not make a foliar application within 10 days of a soil application. Do not aerially apply this product in Mississippi.
Radishes-soil application	Root maggot	1.0 fl oz/1000 linear ft of row	Apply the specified dosage as a water-based drench in the seed furrows with the seed at planting time. Use a minimum of 40 gallons of total drench per acre.	Do not apply more than 5.5 pints (2.6 lbs a.i.) of Vulcan per acre or make more than one soil application per season. Do not make a foliar application within 10 days of a soil application. Do not apply within 30 days of harvest.
Rutabagas-soil application	Root maggot	1.6-3.3 fl oz/1000 linear ft of row	Apply the specified dosage in a water-based spray as a 4 inch wide band over the row at planting time, behind the planter shoe and in front of the press wheel to achieve shallow incorporation. Use a minimum of 40 gallons of total spray volume per acre.	Do not apply more than 4.5 pints (2.12 lb a.i.) of Vulcan per acre or make more than one soil application per season. Do not use rutabaga tops for food or feed purposes. Do not make a foliar application within 10 days of a soil application. Do not apply within 30 days of harvest.
<p>Use Restrictions:</p> <ul style="list-style-type: none"> <li>• If a preplant incorporation application for direct seeded or transplanted crops is made, do not apply this product as an at-plant or post plant soil application. If an at-plant or post plant soil application is made, do not apply this product as a preplant incorporation applications for direct seeded or transplanted crops.</li> <li>• For At-Plant, Post Plant Soil Application and Foliar Applications, to avoid phytotoxicity in vegetables (except Brussels sprouts) do not mix with other pesticide products or treat plants that are under extreme heat and drought stress.</li> </ul>				

**WHEAT**

**Worker Restricted Entry Interval:** Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours unless PPE required for early entry is worn.

For use only in Arizona, California, Colorado, Idaho, Kansas, Minnesota, Montana, Nebraska, New Mexico, Nevada, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming.

CROPS	PEST	PRODUCT RATE PER ACRE	REMARKS
Wheat	Aphids (including Russian wheat aphid, Greenbug, English grain aphid), Brown wheat mite, Grasshoppers, brown marmorated stink bug	0.5 to 1 pint	From emergence to flowering, treat when 15-20% of tillers are infested. From flowering to early milk stage, treat when 20% or more of tillers are infested.
	Wheat midge (orange wheat blossom midge)	1 pint/acre	Make treatment when 75% of the wheat heads have emerged from the boot and when midge adults are found in the crop (1 midge per 4-5 heads). Application timing is critical to ensure good control. If possible, apply in the late afternoon or early evening when temperatures exceed 50° F and wind speed is less than 7 mph.
	Army cutworms, other cutworm species (suppression only)	1 pint/acre	Control may be reduced under high temperature conditions (greater than 80°F), under dry soil conditions, or if larvae are more than 0.5 inch long. Treat when field counts or crop injury indicates that damaging pest populations are developing or present. A second application of 1 pint/acre can be made for additional control.

**Use Restrictions:**

- Do not make more than 2 applications of Vulcan or other products containing chlorpyrifos per season.
- Do not apply within 14 days of harvest for forage and hay and within 28 days of harvest for grain and straw. Do not allow livestock to graze or otherwise feed on treated forage within 14 days of application.
- Do not feed straw from treated wheat within 28 days of application.

Mix the required dosage with water and apply in a minimum of 2 gallons per acre finished spray volume. Apply using aerial (fixed wing or helicopter) or power-operated ground spray equipment.

## NONRESIDENTIAL TURF AND OTHER NONRESIDENTIAL OUTDOOR USES

Vulcan is an emulsifiable concentrate for control of pests located around industrial buildings (turf and ornamental), road medians (turf and ornamentals), and golf course turf only. Pests controlled by Vulcan are listed in the following tables. Vulcan is compatible with fungicides, insecticides, and miticides commonly specified except for alkaline materials such as Bordeaux mixtures and lime. Always conduct a small jar compatibility test using proper proportions of chemicals and water to check for physical compatibility prior to tank mixing.

**Restrictions:** Use on residential turf is prohibited. Keep out of fish pools and other bodies of water. Do not treat vegetable gardens. Do not allow livestock to graze in treated areas. Do not feed treated grass cuttings (hay) or seed screenings to livestock or use hay for livestock bedding. Do not use Vulcan in poultry houses.

## ORNAMENTALS AROUND INDUSTRIAL BUILDINGS AND ROAD MEDIANS

Vulcan can be used to treat evergreens, vines, flowers, shrubs, shade and flowering trees, non-bearing fruit, nut and citrus trees found around industrial buildings and road medians infested with pests listed in the following table. Dilute Vulcan with water according to the directions given in the table and apply using suitable hand- or power-operated spray equipment. Ensure complete and uniform coverage. Uniform coverage is critical for effective insect and mite control. Apply a coarse spray to thoroughly wet both upper and lower leaf surfaces and infested limb and trunk areas. Attempt to penetrate dense foliage but avoid over-spraying to the point of excessive runoff. Treat when pests appear and repeat at 7 to 10 day intervals, if needed. For application timing and other specific use information, consult your State Agricultural Experiment Station or Extension Service Specialist.

**Note:** Environmental factors have significant effects on phytotoxic expression. Vulcan has been tested on numerous ornamental plants without causing serious phytotoxicity at listed use rates. Some varieties of azaleas, camellias, poinsettias, rose bushes, or variegated ivy have shown varying degrees of phytotoxicity following treatment with Vulcan. Before treating large numbers of plants (especially those previously listed), treat a small block of plants and observe for 7 to 10 days to determine phytotoxic potential.

Note: The user assumes responsibility for determining if Vulcan is safe to treated plants under commercial growing conditions.

PEST*	AMOUNT OF VULCAN IN WATER TO MAKE		REMARKS
	Per Acre	100 Gallons	
Adelgids: (Cooley, Eastern spruce galls, Pine bark), Ants (except fire ants, carpenter ants, harvester ants, and pharaoh ants), Aphids: (Apple, Chrysanthemum, Cottonwood, Elm leaf, Peach, Rose, Spirea, Woolly), Armyworms: (Fall, Yellowstriped), Bagworms <sup>1</sup> , Boxelder bugs, Cankerworms, Catalpa sphinx, Chiggers (for control of chiggers in golf courses, road medians, and industrial sites only), mealy bugs, Elm spanworms, Fall webworms <sup>2</sup> , Grasshoppers, Green fruitworms, Hornworms, Jackpine budworms, Juniper webworms, Katydid, Lace bugs, Leafhoppers, Leafrollers <sup>3</sup> , Maple leafcutters <sup>4</sup> , Mites <sup>5</sup> : (Clover, Red spider, Southern red, Spruce spider, Twospotted spider), Oleander caterpillars, Orange tortrix, Periodical cicada, Plant bugs, Poplar tentmaker, Psyllids, Puss caterpillars, Rose chafers, Sawflies, exposed: (Pin oak, Pine, Redheaded), Sowbugs, Spittlebugs, Spring elm caterpillars, Springtails, Spruce budworms:(Eastern, Western), Tent caterpillars: (Eastern, Western, Forest), Thornbug, Walnut caterpillars, Whiteflies, Yellownecked caterpillars, brown marmorated stink bug	1 pt – 1 qt	8-16 fl oz	<sup>1</sup> Treat when bagworm larvae are small and actively feeding. <sup>2</sup> Direct spray into web and immediately adjacent foliage for control of fall webworms. <sup>3</sup> For effective control of leafrollers, spray before leaves are tightly rolled. <sup>4</sup> Apply spray to maple leafcutter larvae as cases are being formed for effective control. Do not treat sugar maple trees intended for maple syrup production. <sup>5</sup> For effective control of spider mites when large numbers of eggs are present, apply a 2 <sup>nd</sup> spray 3-5 days in the South or 7-10 days in the North after initial treatment to control newly hatched nymphs.
Armyworms: (Beet), Beetles: (Fuller rose, Native elm bark <sup>1</sup> ), Browntail moth, Cutworms, Leafhoppers, Mahogany webworms, Mealbugs, Mimosa webworms, Moths:	1 qt	1 pt	<sup>1</sup> Make applications in the spring or early summer to reduce twig and branch feeding by bark beetles. <sup>2</sup> To kill migrating and invading gypsy moth

(Browntail, Cypress tip, Douglas fir tussock, European pine shoot, Gypsy <sup>2</sup> , Holly bud, Nantucket pine tip, Pandora, Pitch pine tip, Subtropical pine tip, Tussock, Oakworms: (California, Orangestriped, Redhumped), Redhumped caterpillars, Thrips: (Exposed), Weevils: (Blackvine <sup>3</sup> , Pine production, Yellow poplar)			larvae, treat trunks and foliage. <sup>3</sup> Blackvine weevils are night feeders. Late afternoon spraying will maximize control.
Foliar feeding beetles: (Blister leaf, Cottonwood leaf <sup>1</sup> , Elm leaf, Flea, Fuller rose, Japanese, June, Willow leaf)	1 qt	1 pt	<sup>1</sup> Use Vulcan in water to control cottonwood leaf beetle larvae and adults infesting cottonwoods. Make the treatment when field counts indicate damaging beetle populations are developing or present.
Borers <sup>1</sup> , Clearwing moths: (Ash, Dogwood, Lesser peachtree, Lilac, Oak, Rhododendron), Metallic wood: (Bronze birch, Flathead apple tree, Twolined chestnut), Longhorned beetles: (Locust, Red oak), Cranberry girdler larvae <sup>2</sup> , Leafminers, Needleminers: (Jeffrey pine, Lodgepole pine, Spruce), Scale insects <sup>3</sup> : (Cottony cushion, Cottony maple, Euonymus, Fletcher, Florida wax, Golden oak, Hemispherical, Lecanium, Magnolia, Oak kermes, Oak lacanium, Oystershell, Pine needle, San Jose, Tea, White birch, White peach)	1 qt	1 qt	<sup>1</sup> For borers, apply Vulcan to the trunks and lower limbs of trees and shrubs when the adults begin to emerge. Consult your State Agricultural Experiment Station or Extension Service Specialist for proper time to treat. Apply uniformly a coarse low-pressure spray. Pheromone traps can aid in detection of adult clearwing moths. <sup>2</sup> Apply 1 qt of Vulcan for cranberry girdler larvae. Direct spray at the base of tree using 50 gallons of water per acre. Irrigate immediately after applications for soil penetration of 1-2 inches. Treat after egg laying during the summer. <sup>3</sup> Time applications for control of scale insects when crawlers or first two stages of settled nymphs are present.
Borers: (Cottonwood, Peachtree <sup>1</sup> )	1 qt	3 qts **	<sup>1</sup> For peachtree borers, apply Vulcan in water to flowering trees and shrubs of the genus <i>Prunus</i> as a trunk spray before newly-hatched larvae enter the trees. Apply as a coarse, low-pressure spray. Thoroughly wet all bark areas from ground level to scaffold limbs. ** When using the 3 qt per 100 gallon dilution, do not exceed 1 qt of Vulcan per acre.

PEST*	AMOUNT OF VULCAN IN WATER TO MAKE		REMARKS
	Per Acre	100 gallons	
Beetles <sup>1</sup> : (Includes wood infesting, Ambrosia, Anobiidae, Black turpentine, Cottonwood leaf, Elm leaf, European elm bark, Flea, Fuller rose, Japanese, June, Native elm bark <sup>2</sup> , Southern pine, Willow leaf)	1 qt	2 gals***	<sup>1</sup> For preventative treatment, apply the spray to the main trunk of trees in the early spring or when threat of attack exists from nearby infested trees. For remedial treatment, apply the spray to the main trunk of infested trees when damage occurs but before adult beetles begin to emerge. <sup>2</sup> To prevent native elm bark beetles from overwintering in uninfested trees, apply Vulcan in water to the bottom 9 ft of the trunk. Wet the trunk thoroughly but do not spray to runoff. Take care to apply the spray right to the base of the root flare. Application can be made with either a backpack mistblower or a hydraulic pressure sprayer from spring through early fall. *** When using the 2-gallon per 100-gallon dilution, do not exceed 1 qt of Vulcan per acre.

\*Superscripts refer to specific directions

**FOR COMMERCIAL ORNAMENTALS IN NURSERIES AND GREENHOUSES FOR USDA QUARANTINE USE ONLY AND FOR DIRECT MOUND AND/OR DRENCH APPLICATION ONLY**

Vulcan can be used for USDA quarantine use only to treat containerized, potted, or balled and burlapped nursery stock to control the insects in the soil attached to the roots of these plants. Completely submerge the container with drain holes or root ball stabilized by burlap in a tank containing diluted Vulcan. Do not remove burlap wrap or plastic containers with drain holes prior to submerging. Keep the container or root ball submerged until complete soil saturation has occurred, normally about 30 seconds.

**Note:** During all operations (submerging, drenching, injecting), wear a chemical-resistant apron in addition to other PPE listed for applicators and other handlers. Make applications in a well-ventilated area.

**Note:** Environmental factors have significant effects on phytotoxic expression. Vulcan has been tested on numerous ornamental plants without causing serious phytotoxicity at listed use rates. However, because of the numerous varieties grown, treat a small group of plants at the listed rate under the anticipated growing conditions and observe for at least 7 days to determine phytotoxic potential before treating a larger number of plants.

**Note:** The professional user assumes responsibility for determining if Vulcan is safe to treated plants under commercial growing conditions.

PEST*	AMOUNT OF VULCAN IN WATER TO MAKE		REMARKS
	1 Gallon	100 Gallons	
Fire Ants <sup>1</sup>	1/25 fl oz	4 fl oz	<sup>1</sup> As an alternative to submerging potted plants, dilute 4 oz. of Vulcan in 100 gallons of water. Apply this dilution to the point of runoff twice daily for 3 consecutive days. Do not remove burlap wrap or container from plants prior to treatment.
White Grubs <sup>2</sup> Weevils <sup>3</sup> (such as Blackvine)	2/3 fl oz	2 qts**	<sup>2</sup> An alternative treatment to submerging containerized plants is to drench the container with the diluted insecticide solution applying approximately 10 to 12 fl oz of diluted insecticide solution per gallon of container size (4-5 fl oz/100 cubic inches of container). Pre-moisten the container media by irrigation or rainfall before drenching. Do not remove container from plants prior to treatment. <sup>3</sup> An alternate treatment to submerging balled and burlapped plants is to inject Vulcan into the root ball. Equally distribute 1 to 3 quarts of the dilute Vulcan solution per cubic foot of soil volume through an injection rod inserted into the soil ball surrounding the plant roots. Uniform distribution of the insecticide throughout the soil of the root ball is critical for effective control. Insert the injection rod in at least 4 equally spaced locations around the stem of the plant at a 30-45 degree angle from the plant between the stem and the upper, outer perimeter of the ball. This technique has been shown to be most effective with small root balls (up to 1.5 ft in diameter). Larger root balls may require more injection points to ensure thorough soil distribution of the insecticide. Couple the injection rod to a flow meter to monitor the correct volume applied per root ball using an injection pressure of at least 30 psi. The application must be made such that splash-back and runoff are minimized. **Do not exceed more than 1 quart (0.94 lbs a.i.) of Vulcan per acre.
Coffee root mealybug <sup>2</sup>	1/6 fl oz	1 pt	

\*Superscripts refer to specific directions.



**ORNAMENTALS IN INDUSTRIAL PLANT SITES AND ROAD MEDIANS  
(DORMANT SPRAY OF TREE PESTS)**

Vulcan can be used as a dormant or delayed dormant spray at the rates indicated to control the listed insects. Vulcan can be used without oil; however, use oil to control additional pests such as the European red mite.

For high volume (dilute) sprays (200 to 600 gallons of spray mixture per acre), tank mix the specified dosage with 1 to 2 gallons of a petroleum spray oil specified for dormant use in 100 gallons of water. Spray the entire tree to runoff using suitable ground spray equipment.

For low volume (concentrate) sprays (less than 200 gallons of spray mixture per acre), use the same amount of Vulcan as for a dilute spray and apply in a manner that will ensure thorough coverage of the trees. Use oil as specified by your State Agricultural Experiment Station or Extension Service Specialist.

PEST	AMOUNT OF VULCAN IN WATER TO MAKE			REMARKS
	1 Gallon	3 Gallons	100 Gallons	
Aphids: (Mealy plum, Rosy Apple, Woolly apple), Borers: (Peach twig), Cutworms: (Climbing), Leafrollers: (Pandemis), Pear psylla adults, Plant bugs, Scale: (San Jose)	1/12 – 1/6 fl oz	¼ - ½ fl oz	½ - 1 pt	Tank mix with 1-2 gallons of a petroleum spray oil specified for dormant use in 100 gallons of water.
Apple ermine moth	1/12 fl oz	¼ fl oz	½ pt	For control on <i>Malus</i> species make 2 applications at a 7 to 14 day interval in combination with a petroleum spray oil at the rate of 2 to 4% (v/v) in a spray to wet application to ensure thorough coverage of all stems and branches. When using tank mixtures, follow all label directions for the mixing partner (oil). Use appropriate application equipment and spray volumes to ensure complete coverage of the plant(s) or control will be compromised.
<b>Use Restrictions:</b>				
<ul style="list-style-type: none"> <li>Do not apply until rain or irrigation have replenished soil moisture such that bark and twigs are not desiccated since cold dry conditions can cause Vulcan plus oil to infuse trees resulting in bud damage or drop.</li> <li>Make only one application during the dormant season except for the control of the apple ermine moth. Do not allow meat or dairy animals to graze in treated areas.</li> </ul>				

**TREE PESTS IN GREENHOUSES AND PLANTATIONS**

Vulcan can be used to treat shade and flowering trees, and evergreens infested with pests listed in the following table. Dilute Vulcan with water according to the directions given in the table and apply using suitable hand-or power operated spray equipment in a manner to provide complete and uniform coverage. Apply a coarse spray to thoroughly wet both the upper and lower leaf surfaces and to infested limb and trunk areas. Attempt to penetrate dense foliage, but avoid overspraying to the point of excessive runoff. Treat when pests appear and repeat application at 7 to 10 day intervals, if needed. Consult your State Agricultural Experiment Station or Extension Service Specialist for application timing and other specific use information applicable to your area.

PEST*	AMOUNT OF VULCAN IN WATER TO MAKE			REMARKS
	1 Gallon	3 Gallons	100 Gallons	
Adelgids: (Cooley, Eastern spruce gall, Pine bark), Aphids: (Apple, Chrysanthemum, Cottonwood, Elm leaf, Peach, Rose, Spirea, Woolly), Bagworms <sup>1</sup> , Boxelder bugs, Cankerworms, Catalpa sphinx, Citrus mealybugs, Elm spanworms, Fall webworms <sup>2</sup> , Greenstriped mapleworms, Jackpine budworms, Juniper webworms, Katydid, Lace bugs, Leafhoppers, Leafrollers <sup>3</sup> , Maple leafcutters <sup>4</sup> , Mites <sup>5</sup> : (Clover,	1/12 fl oz.	¼ fl oz	8 fl oz	<sup>1</sup> Treat when bagworm larvae are small and actively feeding. <sup>2</sup> For effective control of fall webworms, direct spray into web and immediately surrounding foliage. <sup>3</sup> For control of leafrollers, apply spray before leaves are tightly rolled. <sup>4</sup> Apply spray to maple leafcutter larvae as cases are being formed. Do not treat sugar maple trees intended for maple syrup production.

Red spider, Southern red), Oak skeletonizers, Poplar Tentmakers, Puss caterpillars, Sawflies, exposed: (Pin oak, Pine), Spring elm caterpillars, Spruce budworms, Tent caterpillars: (Eastern, Forest, Western), Walnut caterpillars, Western spruce budworms, Yellownecked caterpillars				
Beetles: (Fuller rose, Native elm bark <sup>1</sup> ), Leafhoppers, Mahogany webworms, Mealybugs, Mimosa webworms, Moths: (Browntail, Cypress tip, Douglas fir tussock, European pine shoot, Gypsy <sup>2</sup> , Holly bud, Nantucket pine tip, Pandora, Pitch pine tip, Subtropical pine tip, Tussock), Oakworms: (California, Orangestriped, Redhumped), Redhumped caterpillars, Thrips-exposed, Weevils: (Blackvine <sup>3</sup> , Pine reproduction, Yellow poplar)	1/6 fl oz	½ fl.oz.	1 pt	<sup>1</sup> To reduce foliar feeding on twigs and branches by beetles, apply in the spring or early summer. <sup>2</sup> To kill migrating and invading gypsy moth larvae, treat trunk and foliage. <sup>3</sup> Blackvine weevils are night feeders. Late afternoon spraying will maximize control.
Beetles: (Cottonwood leaf <sup>1</sup> , Elm leaf, Flea, Willow leaf)	1/6-1/3 fl oz	½ - 1 fl oz	1 pt – 1 qt	<sup>1</sup> For cottonwood leaf beetles, use Vulcan in water to control larvae and adults infesting cottonwoods. Apply when field counts indicate damaging beetle populations are developing or are present. For seedlings, use 8-20 gallons of spray volume per acre.
Borers <sup>1</sup> , Clearwing moths: (Ash, Dogwood, Lesser peachtree, Lilac, Oak, Rhododendron), Metallic wood: (Bronze birch, Flatheaded apple tree, Twolined chestnut, Longhorned beetles: (Locust, Red oak), Cranberry girdler larvae <sup>2</sup> , Leafminers, Needleminers: (Jeffery pine, Lodgepole pine, Spruce), Scale insects <sup>3</sup> : (Cottony cushion, Cottony maple, Euonymus, Fletcher, Florida wax, Golden oak, Hemispherical, Lecanium, Magnolia, Oak kermes, Oystershell, Pine needle, San Jose, Tea, White birch)	1/3 fl oz	1 fl oz	1 qt	<sup>1</sup> For borers, apply Vulcan to the trunks and lower limbs of trees and shrubs when the adults begin to emerge. Consult your State Agricultural Experiment Station or Extension Service Specialist for proper time to treat in your area. Apply uniformly as a coarse low-pressure spray. Pheromone traps can aid in detection of adult clearwing moths. <sup>2</sup> Apply 1 quart (0.94 lbs a.i.) of Vulcan per acre to cranberry girdler larvae infesting Douglas fir seedlings. Direct spray at the lower crown and stems using 50 gals of water per acre. Irrigate immediately after application for soil penetration of 1-2 inches. Treat after egg laying during the summer. <sup>3</sup> Time applications for control of scale insects when crawlers or first two stages of settled nymphs are present.
Northern pine weevil, Pales weevil	1 fl oz	3 fl oz	3 qts**	Apply as a cut stump spray or drench in winter or early spring. ** Do not exceed 1 quart (0.94 lbs a.i.) of Vulcan per acre.
Borers: (Cottonwood, Peachtree) <sup>1</sup>	1 fl oz	3 fl oz	3 qts**	<sup>1</sup> For peachtree borers, apply Vulcan in water to flowering trees and shrubs of the genus <i>Prunus</i> as a trunk spray before newly hatched larvae enter the trees. Apply as a coarse low-pressure spray. Thoroughly wet all bark areas from ground level to scaffold limbs. ** Do not exceed more than 1 quart (0.94 lbs a.i.) of Vulcan per acre.
Beetles <sup>1</sup> : (Cottonwood leaf, Elm leaf, Flea, Fuller rose, Native elm bark <sup>2</sup> , Willow leaf)	1 ½ fl oz	4 fl oz	1 gal **	<sup>1</sup> For preventative treatment, apply spray to the main trunk of trees in the early spring or when threat of attack exists from nearby infested trees. For remedial treatment, apply the spray to the main trunk of infested trees or logs when damage occurs but before adult beetles begin to emerge.

				<sup>2</sup> To prevent native elm bark beetles from overwintering in uninfested trees, apply a dilution of 1 gallon per 100 gals of water (1 1/3 fl oz per gallon) as a spray to the bottom 9 ft. of the trunk. Wet the trunk thoroughly but do not spray to runoff. Take care to apply the spray to the base of the root flare. Applications can be made from spring to early fall. To reduce twig and branch feeding on trees deemed to be of high value, apply as spray to the tree crown using a dilution of 1 gallon per 100 gals of water (1 1/3 fl oz per gallon). Make applications in the spring or early summer using a sprayer that will give thorough coverage to the tree crown. ** Do not exceed more than 1 quart (0.94 lbs a.i.) of Vulcan per acre.
Weevils: (such as Northern pine, Pitch eating, Twig)	5 1/3 fl oz	16 fl oz	---	Treat pine seedlings immediately after transplanting. Treat each seedling with enough spray to thoroughly wet the foliage and stem to the point of runoff.

\*Superscripts refer to specific directions.

### NON-RESIDENTIAL TURF ON GOLF COURSES, AROUND INDUSTRIAL PLANTS AND ON ROAD MEDIANS

Apply Vulcan to control the pests listed in the following table at the listed dosages and in accordance with the directions given below or as specified by your local Agricultural Extension Service specialist. Dilute Vulcan in water and apply as a coarse, low-pressure spray using suitable application equipment. Except as noted, thoroughly water immediately after treatment to wash the insecticide into the turf. The area to be treated should be moist at the time of treatment. Spray when pests first appear.

PEST*	AMOUNT OF VULCAN PER		REMARKS
	1,000 Sq Ft	Acre	
Ticks <sup>1</sup> : (American dog, Cattle fever, Gulf coast, Lone star)(for control of ticks in golf courses, road medians, and industrial plant sites only)	1/4 fl oz	1 1/2 pts	<sup>1</sup> For control of ticks, treat soil and other areas likely to serve as harborage sites for ticks that have removed themselves from their host. Spray surfaces to be treated until wet but do not create excessive runoff. Note: This application is intended as a premise spray only. Do not use as a direct spray on livestock or any sites that may come in contact with livestock.
Ants (except fire ants, carpenter ants, harvester ants, and pharaoh ants), Armyworms: (Beet, Fall, Yellowstriped), Chiggers <sup>1</sup> (for control of chiggers in golf courses, road medians and industrial plant sites only), Chinch bugs, Clover mites, Cutworms, Crickets, Deer ticks <sup>2</sup> (for control of ticks in golf courses, road medians, and industrial sites only), Earwigs, Fiery skipper, Gnats, Grasshoppers, Greenbug aphids, June beetles, Leafhoppers, Lucerne moths, Millipedes, Mites: (Clover, Bermudagrass stunt, Formula grass, Winter grain), Pillbugs, Sod webworms <sup>3</sup> : (Lawn moths), Sowbugs, Ticks <sup>1</sup> (for control of ticks in golf courses, road medians and industrial plant sites only), brown marmorated stink bug	3/4 fl oz	1 qt	<sup>1</sup> Apply Vulcan for area control of ticks and chiggers infesting golf course turf, turf in road medians, and industrial plant sites where these pests are present and create a nuisance or a possible public health problem. Do not allow public use of treated areas during application or until spray has dried. Apply Vulcan in water at the rate of 1/2 pint/acre (equivalent to 1/6 fl oz per 1,000 sq. ft) using a hydraulic sprayer, mist applicator, knap sack sprayer, or other suitable hand or power-operated spray equipment. Treat low underbrush, grassy areas, weeds, and ground surface and debris using enough spray volume to obtain thorough coverage, usually 40-100 gals/acre. <sup>2</sup> Apply Vulcan in water at the rate of 1 quart per acre or 3/4 fl oz per 1,000 sq ft for control of deer ticks. Treat low underbrush, turf, grassy areas, weeds, and ground surface and debris, using enough spray volume to obtain thorough coverage. <sup>3</sup> For sod webworms, delay watering or mowing of the treated area for 24 hours after treatment.
European crane fly	1 fl oz	1 qt	
Turfgrass weevil ( <i>Hyperodes</i> ) <sup>1</sup>	1 1/2 fl oz	1 qt	<sup>1</sup> Make application to problem areas in mid-April and again in mid-May or as specified by your local Agricultural Extension Service specialist.

White grubs <sup>1</sup> : (Black turfgrass ataenius, European chafer, Japanese beetle larvae, Southern and Northernmasked chafer)	1 ½ - 3 fl oz	1 qt	<sup>1</sup> Spray when white grubs are young and actively feeding near the soil surface, usually during late July and August or as specified by your local Agricultural Extension Service specialist. Immediately after spraying, irrigate the treated area with ½ to 1 inch of water to wash the insecticide deep into the thatch or into the underlying soil.
Billbug adults, such as: (Bluegrass, Denver, Hunting)	¾ - 3 fl oz	1 qt	Spray early in the season when adult billbugs first appear.
Mole Crickets	1 ½ fl oz	1 qt	For mole crickets in golf course turf, turf in road medians, and industrial plant site turfgrass, apply through high-pressure injection or other suitable subsurface placement application equipment. Depending on the application equipment used, follow the manufacturer's specification for calibration and the volume of spray per acre needed to provide control or as specified by your local Agricultural Extension Service specialist. Apply when young nymphs are active.

\*Superscripts refer to Specific Directions.

### OUTSIDE SURFACES AND AROUND INDUSTRIAL PLANT SITES (SUCH AS AROUND WAREHOUSES, FOOD PROCESSING AND FOOD MANUFACTURING SITES)

Vulcan can be applied as a residual spray to and around outside surfaces of nonresidential buildings and structures. Permitted areas of use include fences, pre-construction foundations, refuse dumps, outside of walls, and other areas where pests congregate or have been seen. Do not allow adults, children, or pets to contact treated surfaces until sprays have dried. Keep out of fish pools and other bodies of water. Do not feed treated grass cuttings (hay) or seed screenings to livestock, or use treated hay for livestock bedding. Do not treat vegetable gardens. Repeat treatment as needed to maintain effectiveness. Unless prohibited by a products' label, users, at their own discretion, can tank mix pesticides currently labeled for similar use patterns. Always perform a small jar compatibility test using proper proportions to check for physical compatibility prior to tank mixing. Do not tank mix this product with products containing dichlorvos (DDVP).

PEST*	AMOUNT OF VULCAN IN WATER TO MAKE			REMARKS
	1 Gallon	10 Gallons	50 Gallons	
	For Band Treatment <sup>1</sup>			
Ants (except fire ants, carpenter ants, harvester ants, and pharaoh ants), Beetles, Boxelder bugs (for other true bugs), Clover mites, Crickets, Earwigs, Elf leaf beetles (adults), Firebrats, Millipedes, Pillbugs, Silverfish, Sowbugs, Spiders (excluding black widow and brown recluse spiders), Springtails, Ticks (for control of ticks in golf courses, road medians and industrial plant sites only, brown marmorated stink bug)	¼ tsp	¾ fl oz	4 fl oz	<sup>1</sup> To help prevent infestation of non-residential buildings, treat a band of soil 6-10 ft. wide around and adjacent to buildings including the building foundation to a height of 2-3 ft. where pests are active and may find entrance. Use 4 fl oz of Vulcan per 50 gals of water and apply as a coarse spray at the rate of about 10 gals of spray mixture per 1,000 sq. ft. to thoroughly and uniformly wet the band area.
	For Outside Surfaces			
	1 ⅓ fl oz	13 ⅓ fl oz	2 qts**	**Do not exceed 1 qt (0.94 lbs a.i.) of Vulcan per acre.

\*Superscripts refer to Specific Directions.

## STORAGE AND DISPOSAL

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

### PESTICIDE STORAGE:

Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children, preferably in a locked storage area.

Do not store above 100°F for extended periods of time. Storage below 20°F can result in formation of crystals. If product crystallizes, store at 50°F to 70°F and agitate to redissolve crystals. If container is damaged or spill occurs, use product immediately or dispose of product and damaged container as indicated below.

### PESTICIDE DISPOSAL:

Open dumping is prohibited. Pesticide wastes are toxic. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility. 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 HANDLING:

#### NONREFILLABLE CONTAINERS:

##### **Rigid, Nonrefillable containers small enough to shake (i.e. with capacities equal to less than five gallons).**

Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 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. Then offer for recycling or reconditioning if available, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or a mix tank or collect rinsate at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip. Once container is rinsed, offer for recycling if available, or puncture and dispose of in a sanitary landfill.

##### **Rigid, Nonrefillable containers that are too large to shake (i.e. with capacities greater than 5 gallons or 50 lbs).**

Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Offer for recycling or reconditioning if available, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or a mix tank or collect rinsate at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip. Once container is rinsed, offer for recycling if available, or puncture and dispose of in a sanitary landfill.

#### REFILLABLE CONTAINERS:

Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller.

#### REFILLING OR RETURNING CONTAINERS:

If refilling or returning container is planned, end users are not authorized to remove tamper evident cables, one way valves or clean container.

#### RECYCLE OR DISPOSAL OF CONTAINERS:

End users are authorized to remove tamper evident cable as required to remove the product from the container unless the container is equipped with one way valves and refilling or returning is planned. Instructions for container rinsing and either recycling or disposal are as follows:

**Bottom Discharge IBC (e.g. Schuetz Caged IBC or Snyder Square Stackable).**

Pressure rinsing the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To pressure rinse the container before final disposal, empty the remaining contents from the IBC into application equipment or mix tank. Raise the bottom of the IBC by 1.5 inches on the side which is opposite of the bottom discharge valve to promote more complete product removal. Completely pump or drain rinsate into application equipment or rinsate collection system while pressure rinsing. Continue pressure rinsing for 2 minutes or until rinsate becomes clear. Replace the lid and close bottom valve.

**Top Discharge IBC, Drums, Kegs (e.g. Snyder 120 Next Gen, Bonar B120, Drums and Kegs).**

Triple rinsing the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To triple rinse the container before final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Rinse all interior surfaces. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

### **LIMITATION OF WARRANTY AND LIABILITY**

Read the entire directions for use, conditions of warranties and limitations of liability before using this product. If terms are not acceptable, return the unopened product container at once.

By using this product, user or buyer accepts the following **CONDITIONS, DISCLAIMER OF WARRANTIES, and LIMITATIONS OF LIABILITY.**

**CONDITIONS:** The directions for use of this product are believed to be adequate and must be followed carefully. However, it is impossible to eliminate all risks associated with the 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 Makhteshim Agan of North America, Inc. All such risks shall be assumed by the user or buyer.

**DISCLAIMER OF WARRANTIES:** To the extent consistent with applicable law, Makhteshim Agan of North America, Inc. makes no other warranties, express or implied, of merchantability or of fitness for a particular purpose or otherwise, that extend beyond the statements made on this label. No agent of Makhteshim Agan of North America, Inc. is authorized to make any warranties beyond those contained herein or to modify the warranties contained herein. To the extent consistent with applicable law, Makhteshim Agan of North America, Inc. disclaims any liability whatsoever for special, incidental or consequential damages resulting from the use or handling of this product.

**LIMITATIONS OF LIABILITY:** To the extent consistent with applicable law, the exclusive remedy of the user or buyer for any and all losses, injuries or damages resulting from the use or handling of this product, whether in contract, warranty, tort, negligence, strict liability or otherwise, shall not exceed the purchase price paid or at Makhteshim Agan of North America, Inc.'s election, the replacement of product.

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