

Nematode Management in Kansas: Chemical and Biological Control

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This publication provides information on the chemical and biological control of nematodes. It should be noted that other control methods are usually available and in many instances actually preferred.

Cultural Control

Fallow and crop rotation. Most species of nematodes prefer certain crops and only a few can reproduce well on many crops. Therefore, control of nematodes in field and row crops usually occurs naturally when crops are fallowed or rotated frequently.

Continuous planting of a single crop increases populations of problem nematodes. If nematodes currently are not at high populations, resumption of fallow or rotation can keep problems from developing. If damaging populations are present, guidelines can be given for extent and duration of rotation/fallow to effectively lower populations.

Resistant varieties. Resistance to cyst, root-knot and/or stem nematodes has been developed for beans, soybeans, cotton, and alfalfa. Differential responses also may occur among different nematode species or even among populations of the same species. Caution therefore must be used in selecting a variety resistant strictly based on resistance to nematodes.

Planting date. Depending on the nematode, early or late planting of a crop may coincide with low nematode activity. This will allow seedling establishment before the onset of parasitism and can be an effective control procedure. However, both the host crop and target nematodes as well as other production factors must be properly considered in the planning of this type of management system.

Sanitation. Destruction and exposure of root systems by cultivation soon after harvest can reduce the survival of endoparasitic nematodes and lower the potential for damage to the following crop. Similarly, the spread of damage due to plant parasitic nematodes can often be slowed or perhaps prevented by cleaning soil from equipment before entering a new field.

Chemical Control

Nematicides are chemicals used to control nematodes. Most are also powerful insecticides. **Fumigants** are more broad-spectrum biocides which produce penetrating fumes that kill nematodes, but also kill some soil fungi, insects and weeds. A biological control agent, **chitin**, can also be used. This material does not affect the nematode directly, but instead, stimulates the growth of normal soil microorganisms which produce chitinase and other enzymes which can destroy nematodes and their eggs.

Information on products contained in this bulletin does not imply these products should be used. Chemical control of nematodes in Kansas should only be used when based on a well-diagnosed need in specific instances where damage potential is great.

Restricted-Use. Most chemical nematicides are classified as **Restricted-use** products. Persons (private or commercial) must be certified by the Kansas Board of Agriculture before purchase or use of restricted products.

Using Nematicides Safely. Injury or death can result from swallowing, inhaling or prolonged skin contact with nematicides.

The risk of injury due to ingestion is greatest among pets, livestock, and

young children. The greatest risk among users is usually as a result of skin absorption and inhalation. Practice handling all pesticides with care and use them only when needed. Avoid spilling concentrates on the skin or clothing. **If a spill occurs**, remove contaminated clothing immediately and wash with soap and water. If in the eyes, flush with water for 15 minutes and seek prompt medical attention. If exposed and in need of medical treatment, take the pesticide label with you. **For poison control information call 1-800-332-6633.**

Wear protective equipment (respirators, clothing, eye protection, etc.) as specified on the label. Bathe and change clothing frequently. Launder contaminated clothing separately from other articles in the wash.

Protect fish, wildlife, and other non-target organisms. Do not dispose of unused pesticides where the run-off may contaminate streams, lakes, ponds, or drinking water supplies, or apply in a manner which could pollute such sites.

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Table 1. Nematicides registered for nematode control in Kansas, 1995.

Product Names	Common Names	Chemical Name of Active Ingredients	Registrants	Signal Word and Restricted Use Information	Crops Listed
Counter 15 G	Terbufos	S-[[1,1-Dimethylethyl thio]methyl] O,O-diethyl phosphorodithioate	America Cyanamid Co.	Danger (restricted use)	corn (field, pop, sweet), grain sorghum
Counter Lock 'N Load	Terbufos	S-[[1,1-Dimethylethyl thio]methyl] O,O-diethyl phosphorodithioate	American Cyanamid Co.	Danger (restricted use)	corn (field, pop, sweet), grain sorghum
Counter 20CR	Terbufos	S-[[1,1-Dimethylethyl thio]methyl] O,O-diethyl phosphorodithioate	American Cyanamid Co.	Danger (restricted use)	field corn, grain sorghum
Furadan 4F	Carbofuran	2,3-Dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate	FMC Corp. Miles, Inc.	Danger (restricted use)	soybeans, grapes
Mocap 10G	Ethoprop	O-Ethyl S, S-dipropyl phosphorodithioate	Rhone-Poulenc Ag Comp.	Warning (not restricted)	corn (field, sweet), cucumbers, cabbage, potatoes, beans (snap, lima)
Chipco Mocap 10G GC (Turf Only)	Ethoprop	O-Ethyl S, S-dipropyl phosphorodithioate	Rhone-Poulenc Ag Comp.	Warning (not restricted)	golf courses
Nemacur 10% Turf and Ornamental	Fenamiphos	Ethyl 3-methyl-4-(methylthio)phenyl (1-methylethyl) phosphoramidate	Miles, Inc.	Danger (restricted use)	commercial turf (bentgrass, bermudagrass, bluegrass), various ornamental uses
Nemacur 3	Fenamiphos	Ethyl 3-methyl-4-(methylthio)phenyl (1-methylethyl) phosphoramidate	Miles, Inc.	Danger (restricted use)	cotton, various fruits
Temik 15G	Aldicarb	[2-methyl-2-(methylthio) propionaldehyde O-(methylcarbamoyl) oxime]	Rhone-Poulenc Ag Comp.	Danger (restricted use)	cotton, soybeans, dry beans, grain sorghum
Vydate L	Oxamyl	Methyl N'N'-dimethyl-N-[methylcarbamoyl oxy]-1-thiooxamimidate	DuPont de Nemours & Co.	Danger (restricted use)	soybeans, potatoes, carrots, bell peppers, cucurbits, eggplant, ornamentals, nursery stock, non-bearing fruit trees
Oxamyl 10%	Oxamyl	Methyl N'N'-dimethyl-N-[methylcarbamoyl oxy]-1-thiooxamimidate	Miller Chemical & Fertilizer Co.	Warning (not restricted) For professional use only	numerous ornamentals

Table 2. Soil Fumigants registered for nematode control in Kansas, 1995.

Product Names	Common Names	Chemical Name of Active Ingredients	Registrants	Signal Word and Restricted Use Information	Crops Listed
Bro-Mean C-2Pre	Methyl bromide 98%	bromomethane	Reddick Fumigants, Inc.	Danger (restricted use)	soil fumigant for numerous crops
Bro-Mean C-O	Methyl Bromide 100%	bromomethane	Reddick Fumigants, Inc.	Danger (restricted use)	soil fumigant for numerous crops
Brom-O-Gas	Methyl bromide 98% Chloropicrin .02%	bromomethane chloropicrin nitrotrichloromethane	Great Lakes Chemical Corp.	Danger (restricted use)	soil fumigant for numerous crops
Brom-O-Gas .25%	Methyl bromide 99.75% Chloropicrin .25%	bromomethane chloropicrin nitrotrichloromethane	Great Lakes Chemical Corp.	Danger (restricted use)	soil fumigant for numerous crops
Brom-O-Gas 2%	Methyl bromide 98% Chloropicrin 2%	bromomethane chloropicrin nitrotrichloromethane	Great Lakes Chemical Corp.	Danger (restricted use)	soil fumigant for numerous crops
Meth-O-Gas 100	Methyl bromide 100%	bromomethane	Great Lakes Chemical Corp.	Danger (restricted use)	soil fumigant for numerous crops
Terr-O-Gas 67	Methyl bromide 67% Chloropicrin 33%	bromomethane chloropicrin nitrochloromethane	Great Lakes Chemical Corp.	Danger (restricted use)	soil fumigant for numerous crops
Terr-O-Gas 98	Methyl Bromide 98% Chloropicrin 2%	bromomethane chloropicrin nitrotrichloromethane	Great Lakes Chemical Corp.	Danger (restricted use)	soil fumigant for numerous crops
Cloro-O-Pic	Chloropicrin 96.5%	chloropicrin nitrotrichloromethane	Great Lakes Chemical Corp.	Danger (restricted use)	soil fumigant for numerous crops
Vapam Soil Fumigant	Metam-sodium	Sodium N-methyl dithiocarbamate	ICI Americas Corp. (not restricted)	Warning	seed beds, plant beds
Vapam	Metam-sodium	Sodium N-methyl dithiocarbamate	Green Light Co.	Warning (not restricted)	seed beds, plant beds
Busan 1020	Metam-sodium	Sodium N-methyl dithiocarbamate	Buckman Laboratories, Inc.	Warning (not restricted)	seed beds, plant beds
Metam-Sodium	Metam-Sodium	Sodium N-methyl dithiocarbamate	AMVAC Chemical Corp.	Warning (not restricted)	seed beds, plant beds
Soil-Prep	Metam-Sodium	Sodium N-methyl dithiocarbamate	Wilbur-Ellis Corp. (not restricted)	Warning	seed beds, plant beds
Basamid Granular	Dazomet	Tetrahydro-3,5, -dimethyl-2H-1,3, 5-thiadiazine-2-thione	BASF	Warning (not restricted)	seedbeds, plant beds, lawns and turf renovation

Table 3. Biological agents registered for nematode control in Kansas, 1995.

Product Names	Common Names	Chemical Name of Active Ingredients	Registrants	Signal Word and Restricted Use Information	Crops Listed
ClandoSan	chitin	Poly-N-acetyl-D-glucosamine	Igene Biotechnology, Inc.	Caution (not restricted)	various fruits, vegetables and ornamentals
Root Guard	chitin	Poly-N-acetyl-D-glucosamine	Ford's Chemical & Service, Inc.	Caution (not restricted)	various fruits, vegetables and ornamentals

Table 4. Nematicides for use on corn.

Product and Usage	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Counter 15G Counter Lock 'N Load (field, pop, sweet)	lesion, lance, root knot, spiral, stunt, sting, stubby-root, dagger	Apply at planting 8 oz per 1000 linear feet of row in a 7-inch band or in-furrow.	Do not exceed 8.7 pounds per acre.
Counter 20CR Counter 20CR Lock 'N Load	stubby-root, dagger, sting, spiral, lance, lesion, stunt, root-knot	Apply at planting 6 oz per 1000 linear feet of row in a 7-inch band or in-furrow.	Do not exceed 6.5 pounds per acre.
Mocap 10G (field, sweet)	dagger, lesion, root-knot, lance, spiral, sting, ring, reniform, stunt, stubby-root	Apply at planting 12 oz per 1000 linear feet of row in a 6- to 7-inch band on the row over a closed seed furrow.	Incorporate with the top 1/2 inch of soil with drag chains, spring-tooth incorporator, or similar equipment.

Table 5. Nematicides for use on grain sorghum.

Product	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Counter 15G Counter Lock 'N Load	nematodes	Apply at planting 8 oz per 1000 linear feet of row in a 5- to 7-inch band directly behind the planter shoe in front of the presswheel.	Do not exceed 13.1 pounds per acre.
Counter 20CR Counter 20CR Lock 'N Load	nematodes	Apply at planting 6 oz per 1000 linear feet of row in a 5- to 7-inch band directly behind the planter shoe in front of the presswheel.	Do not exceed 9.8 pounds per acre.
Temik 15G	nematodes	Apply at planting 6.4 oz per 1000 linear feet of row in the seed furrow and cover with soil.	Do not exceed 7 pounds per acre. Do not harvest within 90 days of application. Do not feed green forage to livestock. Special restrictions apply for loamy sand or sand surface soils and subsoils with an average O.M. in the upper 12 inches of less than 2% by weight. See label for specific restrictions.

Table 6. Nematicides for use on soybeans.

Product	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Furadan 4F	cyst, root-knot, stunt, ring, sting, spiral, lesion, lance, dagger, stubby-root	Apply at planting 3.75 to 5 fl. oz per 1000 linear feet of row in a 12-inch surface band.	
Temik 15G	nematodes	Apply at planting 11 to 22 oz per 1000 linear feet of row in a 6- to 8-inch band and cover with soil. Plant seed in treated zone.	Do not harvest within 90 days of application. Do not feed green forage, hay, or straw to livestock.
Vydate L	cyst, root-knot, lesion, ring, stunt, lance	Apply at planting 1.8 to 3.6 fl. oz per 1000 linear feet of row a 7- to 10-inch band or in-furrow and incorporate with soil.	Do not cut for hay or feed treated forage to livestock. Vydate L will not control severe infestations of nematodes.

Table 7. Nematicides for use on cotton.

Product	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Nemacur 3	nematodes	Apply at planting 3.3 to 7.1 fl. oz per 1000 linear feet of row in a 6- to 12- inch band or in-furrow.	Use the highest recommended rates in fields with a history of nematode problems.
Temik 15G	nematodes	Apply at planting 4.5 to 12 fl. oz per 1000 linear feet of row in-furrow. Plant seed in or above treated zone.	If the rate exceeds 7 pounds per acre, apply granules in a 4- to 6-inch band and cover with soil.

Table 8. Nematicides for use on dry beans.

Product	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Temik 15G	nematodes	Apply at planting 7.5 to 15 oz per 1000 linear feet of row in a 6-inch band and cover with soil. Plant seed in the treated zone.	Where furrow irrigation is used soon after planting, drill granules 3 to 4 inches deep and 3 inches from seed row on water furrow side. Do not harvest within 90 days of application. Do not feed green forage, hay or straw to livestock. Do not use green pods as food for humans. Do not exceed a total of 14 lbs. per acre.

Table 9. Nematicides for use on commercial turf.

Product	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Chipco Mocap 10G GC (For use on golf course turf grass only)	lesion, pin, ring, root-knot, spiral, sting, stubby-root, stunt, suppression of lance	Apply 4 to 6 pounds of formulated product per 1000 square feet with a fertilizer spreader or similar equipment. Use 2.3 pounds per 1000 square feet on turf cut to a height of less than 0.375 inch.	Do not apply more than 400 pounds formulated product per acre per year. The product may be phytotoxic to bentgrass and ryegrass. Avoid applying to newly seeded areas. Avoid application to wet foliage.
Nemacur 10% Turf and Ornamental (For use only on golf courses, cemeteries, sod farms and industrial grounds)	nematodes	Apply 2.3 pounds per 1000 square feet or 100 pounds per acre.	Irrigate immediately with a minimum 1/2 inch of water following treatment. Do not treat newly seeded areas until the plants have developed good root systems. Do not use on residential lawns or public recreational areas other than golf courses.
Nemacur 3 (For use on golf courses and sod farms)	nematodes	Apply 9.7 fl. ozs. per 1000 square feet or 3.3 gallons per acre.	Apply dosage in a minimum of 1/2 gallon of water per 1000 square feet (20 gallons per acre). Irrigate immediately with a minimum 1/2 inch of water following treatment. Do not treat newly seeded areas until the plants have developed good root systems. Do not use on residential lawns or recreational areas other than golf courses.

Table 10. Nematicides for use on fruits and vegetables.

Product and Usage	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Mocap 10G (cabbage, cucumbers, potatoes, snap beans, lima beans)	cyst, lesion, root-knot, spiral, sting, ring, stunt, stubby-root	Bean (snap and lima): Apply at planting 1.4 to 2 pounds per 1000 linear feet of row in a band 12 to 15 inches wide.	Do not use as a seed furrow treatment or allow granules to contact seed.
	suppression of lance	Cabbage, cucumber: Apply at planting 1.4 pounds per 1000 linear feet of row in a band 15 inches wide.	Do not use as a seed furrow treatment or allow granules to contact seed.
		Potatoes: Apply at planting 2.1 pounds per 1000 linear feet of row in a band 12 inches wide. Mix with the top 2 to 4 inches of soil.	
Nemacur 3 (apple, cherry, peach, grapes, raspberry, strawberry, non-bearing fruit trees)	nematodes	Apple, cherry, peach: Apply 1.6 to 3.3 gallons per acre in not less than 10 gallons of water and incorporate immediately.	Do not apply within 72 days of harvest for apples nor within 45 days of harvest for cherries and peaches.
		Grapes: Apply 3 gallons per acre in not less than 10 gallons of water and incorporate immediately.	On bearing grapes, the last application may be made up to 2 days of harvest.
		Raspberry: Apply 1 to 2 gallons per acre in not less than 10 gallons of water and incorporate immediately.	Do not apply within 6 months of harvest. Do not apply more than once per year.
		Strawberry: Apply prior to transplanting 5.9 to 8.8 fl oz per 1000 linear feet of row in a 12- to 18-inch band over the row and incorporate immediately.	Do not apply within 110 days of harvest. Do not apply more than once per year.
		Non-bearing fruit trees: Apply 1.5 to 3 gallons per acre in not less than 10 gallons of water and incorporate immediately.	Non-bearing trees are those that will not bear for one year after application, including newly planted and established trees. Any fruit forming during this one year period must be destroyed.
Vydate L (potatoes, carrots, bell peppers, eggplant, cucurbits, non-bearing fruit trees)	root-knot, lesion, sting, spiral, stunt	Carrots: Apply within one week of planting, 2 to 4 gallons per acre in a minimum of 20 gallons water per acre as a broadcast treatment of the soil and incorporate to a depth of 4 to 6 inches in the soil.	
		Cucurbits: Apply 1 to 2 gallons per acre preplant and incorporate 2 to 4 inches into the soil or apply 2 to 4 pints in sufficient water to cover the foliage. Make the first application 2 to 4 weeks after planting and repeat 2 to 3 weeks later.	For best results, use as a soil treatment.

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Table 10. Nematicides for use on fruits and vegetables *(Continued)*

Products and Usage	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Vydate L (Continued)		Eggplant: Apply 1 gallon per acre as a band treatment 2 to 3 weeks after transplanting and again 4 weeks later. Two to 4 weeks following these soil treatments, make 2 foliar applications of 2 quarts per acre by ground equipment at 1 to 2 week intervals.	Do not apply within 1 day of harvest when using only foliar applications or within 7 days of harvest using soil with foliar applications.
		Pepper (Bell): Apply 2 pints per acre to the transplant water in a minimum 200 gallons of water.	Under severe pressure, foliar treatments may be used following transplant treatments. See the label.
		Potatoes: Apply 1 to 2 gallons per acre in a minimum of 20 gallons of water per acre in the seed furrow or apply 2 to 4 gallons per acre in a minimum of 20 gallons of water per acre as a band or broadcast treatment of the soil within one week of planting. Incorporate to a depth of 4 to 6 inches.	
		Non-bearing fruit stock: Apply 3 to 4 gallons in a minimum of 20 gallons of water to the soil prior to planting. Incorporate to a depth of 4 to 8 inches.	
		As a foliar treatment, mix 2 to 4 pints per 100 gallons of water and apply a dilute spray, not to exceed 8 pints per acre. Apply on a 2 to 3 week schedule for 4 applications.	Do not apply to plants under water stress or to plants not actively growing. Apply first spray at first full leaf. Include a spreader sticker.

Table 11. Nematicides for use on ornamentals.

Product and Usage	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Oxamyl 10% (numerous uses/see label for specific crops)	sting, lesion, burrowing, root-knot	Phlox and numerous ornamentals (see label): Preplant Soil Incorporation: Apply at rate of 1.4 to 1.9 pounds per 1000 square feet (6 to 8 grams per 10 square feet). Incorporate with a rotary tiller 4 to 6 inches deep immediately after application.	
		Soil Mix: Apply 2 to 3 oz per cubic yard of soil while tumbling in a soil mixer.	
		Post-plant followed with irrigation: Apply at a rate of 1.4 to 1.9 pounds per 1000 square feet (6 to 8 grams per 10 square feet). Immediately after, apply 1 inch of overhead irrigation to thoroughly wash granules off of foliage and into the soil.	
		Greenhouse tomatoes: Apply at a rate of 1.4 to 1.9 pounds per 1000 square feet (6 to 8 grams per 10 square feet).	
		Greenhouse cucumbers: Apply at a rate of .48 to .95 pounds per 1000 square feet (2 to 4 grams per 10 square feet).	
Nemacur 10% Turf and Ornamental	nematodes	Nursery stock (see label) and leather leaf fern: Apply at a rate of 100 pounds per acre.	Apply specified dosage uniformly to the area. Irrigate immediately after treatment with a minimum of 1/2 inch of water.
		Iris, lily and narcissus bulbs: Apply at a rate of 4.8 to 8 pounds per 1000 feet of row in a 10- to 12-inch band and incorporate into the covering soil or use in-furrow.	Tolerance of bulbs to Nemacur may vary with varieties. Do not apply to green foliage.
		Anthurium: Apply at a rate of 18.3 to 36.7 oz per 1000 square feet or 50 to 100 pounds per acre.	

Table 12. Soil fumigants for use on all crops.

Products and Usage	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Vapam Busan 1020 Metam-Sodium Soil-Preo (all crops)	nematodes	Sprinkling can method: Use 1 pt (1.5 pt on heavy soils) in a sprinkling can, fill with water, and sprinkle uniformly over 50 square feet of well-prepared soil. Sprinkle immediately with water until soil is sealed or tarp for 48 hours. Soil Injection: Space injectors 5 inches apart and inject 4 inches deep in well prepared soil. Follow immediately with a roller. Light watering or tarping improves fumigation. Use 50 to 100 gallons per acre. Sprinkler system: Use 75-100 gallons per acre (see remarks). Flood irrigation: Use 50 to 100 gallons per acre in 3 to 18 inches of water.	Soil must be in the range of 60° to 90°F at a 3 inch depth. Planting may take place 14 days after treatment on well drained soils of light-medium texture under optimum conditions. In heavier soils or wet and/or cold conditions, a minimum of 30 days is required. Do not apply through sprinkler system when low humidity or high winds would cause loss of product before it can be drenched into soil with additional water. Use systems producing large water droplets to prevent excessive loss.
Chlor-O-Pic (all crops)	nematodes	Greenhouse, nursery and outside beds: Space injectors 10 to 12 inches apart and inject 6 to 8 inches deep in well prepared soil. Seal soil by rolling. Use 485 to 1075 pounds per acre. If plastic tarping, rates may be reduced to 150 to 200 pounds per acre. Fumigation of small volumes of soil for potting soil or seed flats may be made by injecting 6 to 8 inches deep in a grid pattern not to exceed 12-inch spacing. Keep soil tarped for 24 hours. Use 3 to 4 cc per cubic foot of soil.	Soil should be tilled to a fine loose condition with the soil temperature at the depth of application preferably between 60° and 85°F. Soil should contain adequate moisture to support good seed germination.

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Table 12. Soil fumigants for use on all crops. (Continued)

Products and Usage	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
Meth-O-Gas Bro-Mean C-O Brom-O-Gas Brom-O-Gas 2% Brom-O-Gas .25% Bro-Mean C-2PRE Terr-O-Gas 98	nematodes	Apply with chisels spaced 12 inches immediately with polyethylene or other gas confining cover by means of an automatic tarp layer or seal with a drag or cultipacker immediately behind chisels and cover within 20 minutes. Expose to fumigant 24 to 48 hours. Aerate 2 weeks before planting. Tomato and strawberries: Use 180 to 240 pounds per acre. Deciduous fruits and nuts: Use 400-870 pounds per acre. Nursery soils (turf, ornamental, forest tree seedlings, strawberry), greenhouse soils (non-food crops), seed or transplant beds: Use 180 to 435 pounds per acre. Potting mix: One pound per cubic yard.	
Terr-O-Gas 67	nematodes	Apply with chisels spaced 12 inches apart to a depth of 6 to 8 inches. Seal immediately with polyethylene or other gas confining cover by means of an automatic tarp layer or seal with a drag or cultipacker immediately behind chisels and cover with a gas confining cover within 20 minutes. Expose to fumigant 24 to 48 hours. Aerate 2 weeks before planting. Strawberries, tomatoes, eggplant, muskmelon, broccoli, cauliflower and peppers: 225 to 350 pounds per acre. Floral crops, ornamental nursery, field grown ornamentals and seedbeds (for production or transplants only): 300 to 450 pounds per acre.	Fumigation may reduce nitrification and raise ammonium levels to phytotoxic levels. Apply only fertilizer containing at least 30% nitrate until the crop is well established and soil temperature is above 65°F, then fertilize according to soil test. To reduce possible ammonium toxicity, lime acidic soils before fumigation.

Table 13. Biological agents for use on all crops.

Products and Usage	Nematodes Listed on Product Label	Nematicidal Rate of Application	Remarks
ClandoSan Root Guard (all crops)	nematodes	Pre-plant broadcast application: Apply one ton per acre 2 to 4 weeks before planting and till to a depth of 6 to 8 inches. Pre-plant band application: For 30 inch rows, apply at 55 pounds per 1000 linear feet of row in a 15-inch band centered directly over the centerline of the intended planting row. Homeowner use: Apply 50 pounds per 1000 square feet or 1.5 oz per cubic foot of soil (2.5 pounds per cubic yard).	Do not use on crops which may be adversely affected by high rates of urea nitrogen.



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