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Inspection
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Plant Protection
and Quarantine

Cooperating State
Departments of
Agriculture

September 1984

ACTION PLAN

KHAPRA BEETLE

Trogoderma granarium Everts

This PPQ Action Plan or New Pest Response Guideline has not been updated since its publication date. The actions or guidelines recommended may not be appropriate now, new survey tools may be available, and chemical pesticides named may no longer be registered. This documents is posted until updated versions can be drafted and as such are only guidelines that represent the state of knowledge at the time they were written. Please consult PPQ and/or your State Plant Regulatory Official prior to implementing any recommendations listed herein.

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AUTHORIZATION

This Action Plan provides guidelines and actions for the eradication of a khapra beetle infestation. This Action Plan supplements information contained in the Khapra Beetle Program Manual, Plant Protection and Quarantine (PPQ) Treatment Manual, and Emergency Programs and Administrative Cadre Manuals.

It is to be used in conjunction with other manuals when conducting emergency program activities. The information and instructions contained in this Action Plan were developed with and approved by representatives of cooperating States, the U.S. Department of Agriculture's Agricultural Research and Cooperative State Research Services, and affected industry.

All program technology and methodology employed are determined through discussion, consultation, or agreement with the cooperating State officials.

NOTICE

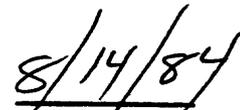
Recommendations in this Action Plan, which involve the use of pesticides, concern products which are registered or exempted under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended. Precautions on the pesticide label and all instructions in this Action Plan must be carefully followed.

Federal and/or State personnel may not make any warranty or representations, expressed or implied, concerning the use of these products and shall not be responsible for any loss, damage, or injury sustained as a result of the use of any product as specified in this Action Plan.

The use of trade names in this Action Plan does not imply an endorsement of those products or of the manufacturers thereof by Federal-State pest control programs. Equivalent formulations under different trade names are acceptable.



Deputy Administrator
Plant Protection and Quarantine



Date



Chairman
National Plant Board



Date

I. GENERAL INFORMATION

A. Action Statement

The information contained in this document is intended for use only when a khapra beetle infestation is known to exist. This Action Plan is to be used for guidance in implementing eradication procedures and in preventing spread to other locations. The Khapra Beetle Program Manual and this Action Plan provide technical and general information needed to implement any phase of a khapra beetle eradication program. Specific emergency program action is to be based on information available at that time.

B. Background Information

This dermestid beetle is native to the Indian Region but is now widespread throughout the Eastern Hemisphere.

Adults usually live only a few days to several weeks. Adults are winged but do not fly and do not need to feed to complete the life cycle.

Eggs are deposited in host material and hatch in 1 to 2 weeks. The larvae molt frequently depending on environmental conditions. Pupation takes place utilizing the last larval skin, usually in the host material. This stage usually lasts 2 to 23 days. After eclosion, the adult reaches sexual maturity in 2 days.

Khapra beetles are pests of some animal and stored grain products. It is considered a serious threat to our stored grain industry. Detection can be difficult, since cast skins and dead adults are eaten by the larvae which hide in cracks, crevices, and other dark places. Spread occurs chiefly by artificial means. All stages, especially larvae, may be carried about in commodities, bagging, clothing, vehicles, etc.

More detailed information may be found in the Khapra Beetle Program Manual.

II. SURVEY PROCEDURES

A. General Information

The Khapra Beetle Program Manual details several types of surveys employed to detect khapra beetle. The surveys rely on the inspection of properties used for storing, distributing, processing, or using host material.

B. Delimiting Survey

When an area, establishment, or premises has been determined to be infested with khapra beetle, it will be necessary to expand the inspection to determine the extent of infestation as an aid in determining the type of control measures to apply. If surrounding buildings pose a hazard because of their proximity or their use, they will be inspected to delimit the extent of the infestation in the area.

Secondary inspection lists should be developed to include distribution outlets supplied from the infested property and other similar or related businesses that may be infested. State cooperators will be notified of high risk khapra beetle premises in their respective States, based on the site inspection lists that have been prepared.

All inspections are to be carried out in accordance with the methods outlined in the survey procedure section of the Khapra Beetle Program Manual.

When notification is received from any source that a premises or area is infested with khapra beetle, the following actions will be carried out in an attempt to identify any additional infestations.

1. When the presence of khapra beetle is confirmed, a survey will be carried out in the local area. The "local area" is usually defined as the immediate practical political division, such as a town, city, or county. Specific targets in order of priority are:

a. All establishments and premises within the local area considered to be a high hazard risk. Inspections should be carried out in the order of the potential risk of the property.

b. Other likely establishments, premises, or areas as may be identified.

c. Retail establishments that handle, store, distribute, or market the potentially infested material.

2. Any location, which can be determined to have served as a possible source of khapra beetle infested material or to which infested material may have been sent, will be inspected.

3. In addition to the movement of khapra beetle in an infested commercial commodity, there are a number of less obvious ways in which the insect may be spread. Any locations that may have become infested through the following pathways will be inspected.

- a. Movement of raw materials/equipment into and out of the area.
- b. Trash movement and dump and fill sites are to be investigated. Inspectors should be aware that people may carry khapra beetle infested trash away from such sites.
- c. Employee movement (if applicable). Khapra beetle can be carried out by employees in any number of ways, such as vehicles, clothing, containers of any kind.
- d. Adjacent structures sharing a common wall. Khapra beetle can move in and through walls constructed of porous materials.

**C. Monitoring/
Evaluation
Survey**

A monitoring/evaluation survey will be conducted in any area where eradication treatments are applied. An inspection is carried out following treatment and will be repeated at prescribed intervals. See PPQ Treatment Manual, Section III, Part 12, for specific survey procedures at treated facilities.

**D. Detection
Survey**

Detection surveys are conducted utilizing traps or visual inspections on commodities, premises, conveyances and containers that are exposed to susceptible commodities. See the Khapra Beetle Program Manual for specific instructions.

**E. Orientation
of Survey
Personnel**

New personnel will be trained, on the job, by experienced personnel. Three working days will be necessary to teach the many important facets of khapra beetle survey.

**F. Survey
Records**

Records noting the establishments, sites trapped, dates, locations, and host materials of all detections will be maintained. See Khapra Beetle Program Manual for specific instructions.

III. REGULATORY PROCEDURES

A. Instructions to Officers

Regulatory actions will be required until the pest is eradicated. Officers must follow instructions for regulatory treatments or other procedures when authorizing the movement of regulated articles. Understanding the instructions and procedures will serve as a basis for explaining such procedures to persons interested in moving articles affected by the quarantine and regulations. Only authorized treatment procedures may be used.

General instructions that are to be followed in regulatory treatments are found in the PPQ Treatment Manual.

Officers may aid shippers in selecting the authorized treatment or procedure that is most practical for the shippers. They should advise the shipper to apply selected treatments to small quantities of material prior to treating larger quantities to determine reaction or effects of treatment procedure. When treating commodities, which are particularly sensitive to the treatments selected, treat more of the commodity than is needed to allow for possible losses.

B. Regulated Articles

1. All grains and grain products including, but not limited to, barley, corn, oats, rye, and wheat, whether moved as such or as an ingredient in other products.
2. Dried seeds and seed products of field and vegetable crops (including, but not limited to, alfalfa seed, cottonseed, cottonseed meal and cake, flaxseed, sorghum seed, soybean meal, pinto beans, and black-eyed peas).
3. Used bags and bagging (including, but not limited to, those made of burlap or cotton).
4. Dried milk, dried blood, fish meal, meat and bone meal, and dried animal hides.
5. Any other product, article, or means of conveyance, of any character whatsoever, when it is determined by an inspector that they present a hazard of spread of khapra beetle and the person in possession thereof has been so notified.

C. Quarantine Actions

When necessary, implement the following in sequence:

1. Issue emergency action notifications requiring treatment or other approved handling procedures. The Emergency Action Notifications (PPQ Form 523) and/or comparable State notifica-

tions are issued by field personnel to the property owners or managers of all establishments handling, moving, or processing articles capable of spreading khapra beetle. A notification may be issued pending authoritative confirmation and/or further instruction from the Deputy Administrator.

2. If necessary, the Deputy Administrator will issue a letter directing PPQ field offices to initiate specific emergency action under the Federal Plant Pest Act (7 U.S.C. 150dd) until emergency regulations can be published in the Federal Register.

The Federal Plant Pest Act of 1957 provides for authority for emergency quarantine action. This provision is for interstate regulatory action only; intrastate regulatory action is provided under State authority. However, if the Secretary of Agriculture determines that an extraordinary emergency exists and that the measures taken by the State are inadequate, USDA can take intrastate regulatory action provided that the Governor of the State has been consulted and a notice has been published in the Federal Register.

The Organic Act of 1944, as amended, provides the Federal Government, either independently or in cooperation with States or political subdivisions thereof, farmers' associations and similar organizations, and individuals, the authority to carry out operations or measures to detect, eradicate, suppress, control, or to prevent or retard the spread of plant pests. This Act does not provide for trespassing on private property, but relies upon State authority and willingness to use State right-of-entry authority.

All program technology and methodology employed is determined through discussion, consultation, or agreement with the cooperating State officials.

3. The Deputy Administrator, through the National Regional Directors, will notify State cooperators of the khapra beetle detection, actions taken, and actions contemplated.

A narrative description of the regulated area with support documents will be developed by USDA and cooperators and provided to the Regulatory Services Staff, National Program Planning Staff (NPPS). The regulated area will also be defined by the Universal Transverse Mercator grid marking system for use by the Project Manager.

4. APHIS Regulatory Coordination Staff will publish in the Federal Register emergency regulations under the Federal Plant Pest Act.

5. After a reasonable time, taking into consideration such factors as the biology of the pest, climatic conditions, and infestation spread, a proposal to promulgate a quarantine under the Plant Quarantine Act will be published. The proposal will announce a date for submitting written comments, which shall be approximately 60 days after publication.

6. After receipt of written comments, a final determination specifying the action decided upon will be published in the Federal Register. If after consideration of the comments a quarantine is warranted, it will be invoked under the Plant Quarantine Act.

D. Use of
Authorized
Chemicals

The PPQ Treatment and Khapra Beetle Program Manuals contain the authorized chemicals, methods of application, rates, and any special application instructions. Concurrence by the Survey and Emergency Response Staff, NPPS, is necessary for the use of any other chemical or procedure for regulatory purposes.

E. Approved
Regulatory
Treatments

Fumigation is the only approved regulatory treatment procedure to permit movement of regulated articles. The PPQ Treatment Manual is to be used for obtaining specific details on fumigation materials, schedules, and procedures.

F. Principal
Activities

The following identifies principal activities necessary for conducting a regulatory program to prevent the spread of khapra beetle. The extent of regulatory activity required is dependent on the degree of infestation.

1. Advising regulated industry of required treatment procedures.
2. Supervising, monitoring, and certifying commodity treatments.
3. Contacting:
 - a. Grain elevators.
 - b. Feed/seed outlets.
 - c. Brokers/importers of host materials.
 - d. Grain/spice processing establishments.
 - e. Commercial haulers of regulated articles.
4. Monitoring the movement of regulated articles through major channels of commerce and other transportation centers.

G. Orientation
of Regulatory
Personnel

Only trained or experienced personnel will be used initially. Replacement personnel will be trained by the individual being replaced. A training period of 3 working days is necessary for the orderly transfer of these functions.

H. Regulatory
Records

Records will be maintained, as necessary, to carry out an effective, efficient, and responsible regulatory program. See regulatory section of the Khapra Beetle Program Manual for detailed instructions.

IV. ERADICATION PROCEDURES

Survey and Emergency Response Staff, in consultation with methods and research agencies, outlines treatments to be used and must be notified of all treatment plans. If treatments selected or proposed are not in conformance with current pesticide labels, an emergency exemption can be provided under Section 18 of the FIFRA, as amended. For further instructions, see Emergency Programs Manual, Section V, B.

Eradication of a khapra beetle infestation is essential. The following provides approved procedures available for use in most situations. These procedures include fumigation and crack and crevice and full coverage pesticide applications. Supplemental procedures that can be used are cleaning and sanitation. Local conditions will determine the most acceptable procedure to achieve eradication.

A. Recommended Pesticides

1. Malathion
2. Methyl Bromide (MB)
3. Dichlorvos
4. Pyrethroids
5. Ethylene Oxide (ETO)

B. Approved Eradication Treatments

1. Fumigation

a. Structures and Equipment: Fumigations of infested structures can be accomplished with MB. Treatments are made in accordance with provisions of Section III of the PPQ Treatment Manual.

Fumigation will be carried out after all openings in a structure are sealed with masking tape, putty, polyethylene, or other materials as needs indicate.

Shipping or storage containers may be tarped and fumigated separately when required.

Stationary equipment will be tarped and fumigated separately.

b. Commodities: Commodities (foam rubber, electrical equipment, etc.) which are not tolerant to MB may be removed and subjected to an alternate treatment.

2. Surface Pesticide Treatment

a. Crack and Crevice Treatment: The application of a malathion treatment or other approved pesticide will be required on the interior and/or exterior surfaces of an infested

structure, giving particular attention to areas where cracks, crevices, and other khapra beetle habitats exist or may exist. This treatment is to be applied only after sanitation measures have been carried out.

b. Broadcast Pesticide Application: The application of a full coverage pesticide treatment (spray or fog) will be applied throughout the inside and/or outside of an infested structure. This treatment is to be applied only after sanitation measures have been carried out.

3. Supplemental Actions

a. Extensive Trapping: In addition to regular detection trapping, extensive trapping with adult and/or larval traps baited with attractant and approved pesticide may be carried out. Trap density and frequency of servicing will depend on individual judgement. See Khapra Beetle Program Manual for general trapping information.

b. Cleaning and Sanitation: The structure will be thoroughly cleaned out prior to fumigation and all rubbish, dirt, debris, etc., will be fumigated with MB and dumped or otherwise destroyed.

The surrounding grounds of the premises will be likewise cleaned and all trash disposed of in an approved manner.

c. Outside Surface Treatment: Upon removal of any debris present, the grounds surrounding the structure and applicable building surfaces will be given two or three pesticide applications of malathion at 3- to 7-day intervals. The last application is to be made after the structure is covered for fumigation or after the crack and crevice or broadcast applications are completed.

C. Eradication/ Control Method Selection

The type of treatment to be applied to any infested premises or commodity depends on the following considerations: Type of structure, size, location, condition of structure, degree of infestation, and host material.

The following parameters or criteria will determine the minimum treatments to be used in achieving eradication. Expanded or additional treatment actions can be applied if mutually agreed upon with cooperating agencies. Control measures will be conducted only as long as necessary to achieve eradication. Posttreatment inspections will be conducted as specified in the PPQ Treatment Manual, Section III, Part 12.

1. If khapra beetle is confirmed in a structure that can be made gastight, MB fumigation, outside surface treatment, commodity fumigation or treatment, and sanitation measures will be carried out.
2. If some structures on the property are not confirmed infested, these may be excluded from treatment unless post inspection indicates fumigation is necessary.
3. Structures that cannot be fumigated will be subject to eradication measures utilizing full coverage pesticide application and a sanitation program.

- D. Orientation of Eradication/Control Personnel Only trained and experienced personnel will be utilized initially. Replacement personnel will be trained by the individual being replaced. A training period of 3 working days is necessary for the orderly transfer of these functions.
- E. Eradication/Control Records Records noting the location of detections, dates, number and type of treatments, and materials and formulations used will be maintained for all areas treated. See control section of the Khapra Beetle Program Manual for detailed instructions.
- F. Monitoring An effective monitoring program will be implemented to aid in the evaluation of program efforts and environmental impact. The application and use of pesticides and other controlled substances will be assessed through the use of appropriate monitoring program criteria. The evaluation must effectively address Agency, cooperator, and public concerns.
- The monitoring program will include at the minimum the following elements:
- a. Determine efficacy of the pesticide against the target pest.
 - b. Water sampling to detect insecticide levels through direct application, absorption, leaching, and runoff.

c. Soil sampling to determine insecticide levels and residues.

d. Commodity sampling to identify residue levels (if applicable).

e. Biological organism sampling during applications and post-treatments to determine impact of insecticides.

f. Air sampling to determine the continuing presence of pesticide in respirable air.

The monitoring program is to be a combined effort between the State in which the emergency program is being conducted and PPQ. If specific plans need to be developed for monitoring activities, the Survey and Emergency Response Staff will request assistance and guidelines from other NPPS staffs.

V. CONTACTS

When a khapra beetle eradication program has been implemented, its success will depend on the voluntary cooperation, assistance, and understanding from other involved groups. The following is a list of groups which either are involved or must be kept informed of operational phases of an emergency program.

- A. Other Federal, State, county, and municipal agricultural officials
- B. Grower groups, trade groups, shipping companies, etc.
- C. Commercial interests
- D. Universities
- E. State and local law enforcement officials
- F. Food and Drug Administration officials. If food products are involved, local FDA officials must be advised.
- G. Local fire and health officials
- H. Foreign agricultural interests
- I. National, State, and local news media
- J. General public

VI. ADDENDA

Addendum A--Definitions

Attractant: (Bait/Lure)	A food and/or sex pheromone used as an attractant for detecting khapra beetles.
Confirmed Detection:	A positive identification by a recognized expert of a submitted specimen as khapra beetle.
Delimiting Survey:	Determining the extent of the infestation in an area where khapra beetle has been detected. It will include adjacent structures and those establishments, conveyances, and containers that might have received infested material or been the source of infested material.
Detection Survey: not	An activity conducted in a susceptible area known to be infested with khapra beetle.
Epicenter/Focal Point:	The initial site of an infestation.
Eradication:	The elimination of khapra beetle through the application of approved treatments.
Fumigation:	The application of an approved fumigant as a treatment.
Host Range:	Plant or animal products or byproducts that provide for the reproduction of the khapra beetle and any commodity or article with which it is found commonly associated.
Infestation:	The collection of one or more live specimens in any stage of development, when collected or trapped under such circumstances that the specimen obviously originated in the area.
Infested Area:	The area so declared by program officials.
Khapra Beetle:	The common name of <u>Trogoderma granarium</u> Everts.
Generation: (Life Cycle)	The period for the pest to complete all stages of development.

Monitoring/Evaluation
Survey:

Using interdependent visual survey in an area where an insecticide treatment has been applied to evaluate the effectiveness of the applicator.

PPQ-APHIS-USDA:

Plant Protection and Quarantine, Animal and Plant Health Inspection Service, United States Department of Agriculture.

Regulated Area:

Any designated area to which regulations apply.

Surface Pesticide Application:

The application of a pesticide to the surfaces of a structure or to the surface of the ground surrounding an infested structure.

Addendum B--Safety

1. GENERAL INFORMATION

Personnel and public safety must be prime considerations at all times. Safety practices should be stressed in preprogram planning and through the duration of actual program operations. Supervisors must enforce on-the-job safety procedures. For complete instructions, see V, D, in the Emergency Programs Manual.

Khapra beetle activities are conducted in an unique environment and caution should be exercised in the following situations:

1. Bags of cargo stacked on pallets three or more tiers high.
2. Rows between cargo stacked on pallets three or more tiers high, particularly bag cargo.
3. Dimly lit areas in warehouses.
4. Milling and processing rooms (debris, dust, etc.).
5. Electrical outlets and extension cords.
6. Pesticides being used to control insects and rodents in warehouses and other buildings.
7. Forklift movement in processing areas, storage rooms, loading docks, etc.
8. Storage warehouses with elevator shaft. If inspecting elevator shaft, be sure elevator is turned off and access to elevator is closed.
9. Old flooring in storage facilities.
10. Grain elevators which may pose many hazards such as dust explosions or toxic gases..
11. Platform areas and loading docks.

Two or more officers should normally work together as a team for inspection of buildings, warehouses, etc.

2. SAFETY PRECAUTIONS BEFORE AND DURING FUMIGATION

a. Prior to starting fumigation, the contractor should notify local hospital authorities that methyl bromide fumigation will be conducted so that they can be ready for any emergency. Local police, fire, and health officials

should be notified of the fumigation to assure that they do not enter the facility in the event of an emergency.

b. Gas sampling tubes provided by the contractor should extend a minimum of 15 meters (50 feet) from the building. Officers should have extra gas sampling tubes to extend beyond 15 meters (50 feet) if necessary.

c. Gas detector kits, halide detectors, and self-contained breathing apparatus (e.g., Scottair® packs) must be on site.

d. Gas detection equipment must be available and must be used to monitor for the presence of gas in the atmosphere.

e. At least one officer experienced in fumigation should be at the fumigation site at all times during the fumigation.

f. Gas masks must be available for all officers. These gas masks will be worn during gas introduction and while halide detector readings are being taken. Gas mask fit tests must be conducted prior to beginning a fumigation to assure that available gas masks fit all personnel who are at the site.

Addendum C--Host Range List

See Khapra Beetle Program Manual.

Addendum D--Life History

1. SYSTEMATIC POSITION

Khapra Beetle (Trogoderma granarium Everts)

Class: Insecta

Order: Coleoptera

Family: Dermestidae (Carpet Beetles)

Related economic species are:

T. glabrum (Herbst)

T. variabile Ballion

T. grassmani Beal

T. simplex Jayne

T. inclusum LeC.

T. sternale Jayne

T. ornatum (Say)

T. teukton (Beal)

2. IDENTIFICATION CHARACTERS

- Adult: A. Size; length about 1.7 to 3.8 mm, shape short and oval, about two times as long as wide.
B. Barely visible club-like antennae.
C. Color varying from reddish brown to dark brown or black, often with a pattern of darker hues set in lighter background.
D. Usually hairy, but these are easily rubbed off, giving body a shiny cast.
E. Wings present.
F. (With microscope) Plate behind middle pair of legs rounded when between legs (the anteromedial metasternal process). Usually will separate khapra beetle from other Trogoderma spp., but is not always reliable. (See Okumura, 1966.)
- Pupa: A. A hardened spheroidal structure, about 5 mm long.
B. Whitish color.
C. Enclosed in last larval skin.
- Larva: A. About 3 to 4 mm long, cylinder-like and divided into segments.
B. Yellowish-brown color with lighter white to yellowish brown between segments (giving a ringed appearance).
C. Reddish-brown hairs over body, longer hair tufts at terminal end.
D. Three visible pairs of legs.
- Egg: A. About 0.4 mm length, very minute, cylindrical, rounded at one end.
B. White color.
C. Laid loosely and singly in the host material.

3. BIOLOGY

Each female usually deposits about 50 eggs in its lifetime. At temperatures above 90° F. (32° C.) this number may go up to 100 eggs per female. Eggs are deposited loosely and usually singly in host material. Hatching usually takes place in 1 to 2 weeks. The larvae pass through five to nine moults in a period ranging from several weeks to several years. They are capable of survival for more than 7 years without food. The larvae pupate inside the last larval skin. The pupal stage ranges from 2 to 23 days. The newly emerged adult usually reaches sexual maturity 2 days after emergence.

One to 3 days after mating, the female begins to deposit eggs, the largest number being on the first day. Adults are usually short-lived, but have been known to survive several months or even years at temperatures below 50° F. (16° C.). Activity occurs primarily at dusk. Adults are winged but do not fly.

Completion of the life cycle usually takes 4 to 6 weeks, but it can take several years depending upon the temperature and available food supply. There are usually four to five generations per year, but there can be as many as 12 under optimum conditions. Studies indicate that the best climatically suitable areas in the continental United States are in Arizona and New Mexico and in the Mexican State of Sonora. This area has a mean monthly temperature of over 20° C. (68° F.) and a mean relative humidity of less than 50 percent for at least 4 consecutive months. It can, however, survive cold winter months in heated warehouses, grain storage tanks, or any establishment offering protection from freezing temperatures.

Damage is caused by larval feeding which reduces the host to a useless frass.

It is a native of the Indian Region, but now widespread throughout Asia, the Middle East, Africa, and southern Spain. It is easily transported, for almost any article or material coming in contact with an insect is capable of transporting it. Usually they are transported in grain or grain products.

Addendum F—Technical Application Data

1. METHYL BROMIDE FUMIGATION

Refer to the PPQ Treatment Manual T307 for commodities fumigation and Section III, Part 12 (new), for structural fumigation.

2. SURFACE TREATMENT

Malathion—57 percent (18.9 liters) 40 pt in (378.5 liters) 100 gallons of water (premium grade) emulsifiable concentrate (EC) applied in accordance with label directions. See Khapra Beetle Program Manual.

For flushing, one of the following should be added:

Dichlorvos—0.25 percent actual ingredient (ai) (3.8 liters) 1 gallon per (380 liters) 100 gallons of water added to spray solution as given in the Khapra Beetle Program Manual or

Pyrethrin—0.25 percent ai (94.6 liters) 25 gallons of Formula 7243 per (38 liters) 100 gallons of water added to spray solution as given in the Khapra Beetle Program Manual.

3. STERILANT

Ethylene Oxide (ETO)—100 percent concentration in a closed system is for fumigation of spices only. Residue tolerance is 50 ppm.

The spices are loaded into a high-vacuum chamber which is then sealed and preheated to 115° to 125° F. (46.11° to 51.67° C.). A 29-inch vacuum is drawn and the ETO introduced in the chamber to a concentration of 1,500 milligrams per liter (90.75 lbs/1,000 ft). The dwell period is 4 hours after which a 29-inch vacuum is again drawn to remove the ETO.

Addendum G--Forms

	<u>Number</u>	<u>Title</u>
CONTROL	PPQ-429	Fumigation Record
	PPQ-468	Caution--Pesticide Treatment in Progress
	PPQ-552	Pesticide Samples for Chemical Analysis
	PPQ-602	Environmental Monitoring
	PPQ-603	Residue Sample for Food or Feed Product
REGULATORY	PPQ-214	Warning Quarantine Label
	PPQ-244	Warning Quarantine Tag
	PPQ-254	Disposition of Plants and Plant or Animal Products
	PPQ-287	Mail Interception Notice
	PPQ-429	Fumigation Record
	PPQ-468	Caution--Pesticide Treatment in Progress
	PPQ-518	Report of Violation
	PPQ-519	Compliance Agreement
	PPQ-522	Certified Under All Applicable Federal or State Cooperative Domestic Plant Quarantines Tag
	PPQ-523	Emergency Action Notification
	PPQ-524	Issuance Record--Permits and Certificates
	PPQ-527	Package Certificate
	PPQ-530	Limited Permit
	PPQ-535	Certificate of Treatment Label
	PPQ-537	Limited Permit Label
	PPQ-540	Certificate of Treatment
	PPQ-551	Regulated Establishment Record
	PPQ-554	Certified Under All Applicable Federal or State Cooperative Domestic Plant Quarantine Label
	PPQ-577	Phytosanitary Certificate
SURVEY	PPQ-343	Trapping Record
	PPQ-345	Caution Label for Trapping
	PPQ-391	Specimens for Determination

Addendum H--Contributors

Industry

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