

Home and Horticultural PESTS



The Control of Stored Product Insect Pests With Special Emphasis on Indianmeal Moth in Dried Flower Arrangement Materials and Crafts

In recent years, there has been an increased interest in utilizing dried flower materials to make floral arrangements and decorations. Participants range from individual hobbyists to cottage industry personnel to large commercial operators. Some personnel grow, harvest and dry their own plant materials, while others purchase their work stock. In either situation, both users and their customers may find that work materials and/or completed decorative items become infested with insects. Of the different potential stored product insect pests, Indianmeal moth is most commonly encountered/mentioned.

The Indianmeal Moth

The Indianmeal moth (IMM) is an insect with worldwide distribution. It's categorization as a pest stems from the fact that IMM larvae have been recorded feeding upon and contaminating more than 80 different commodities including nuts, dried milk, dried fruits, dried vegetables, spices, cacao, chocolate candies, biscuits, popcorn, marshmallows, pancake batter, cereals and various grain products, garden seed, herbarium specimens, dead insects, dog biscuits, bird seed, and wheat weaving and dried floral arrangements.

Life Stages. IMM undergo complete metamorphosis. That is, there are four life stages: egg, larva, pupa and adult. Eggs are ovoid, .5 millimeters in diameter and whitish, grayish-white or yellowish-white. Newly emerged larvae are 1 millimeter in length and whitish in color. Mature larvae (up to 12 millimeters in length) vary in color (whitish, pinkish, greenish, yellowish) depending on their food source.

Pupae are contained within silken cocoons. Newly formed pupae are yellowish-brown. However, within 24 hours, pupae become a deeper brown to reddish-brown. Just prior to moth emergence, pupae appear almost black in color. Pupae vary in size between 6 to 11 millimeters.

Moths are 5 to 10 millimeters in length with a wingspread of 16 millimeters. Upon emergence, moths are very colorful (head and thorax are reddish-brown; abdomen grayish-brown; front one-third of forewings is silvery-white or gray possibly with minute dark spots and the outer two-thirds is reddish-bronze to reddish-copper with irregular dark bands). Older moths which have lost their wing scales are more drab in appearance (brownish or grayish in color).

Generalized Life History. Indianmeal moths are sexually mature and capable of mating immediately after they emerge from pupae. Female moths live up to 2 weeks and are capable of depositing up to 400 eggs each. Eggs are deposited singly or in clumps on or near potential food sources.

Newly emerged larvae begin feeding immediately. There are 5 to 7 larval stages. Mature larvae either pupate where they are feeding or wander about before selecting (preferably) a hidden or protected site (crack or crevice) in which to prepare silken cocoons within which they pupate.

Generations Per Year. Various factors influence IMM developmental rates including genetic differences within individual or overall IMM populations, environmental conditions (i.e. temperature and relative humidity), and the type, quality and quantity of food.

Under outdoor conditions, mature larvae construct hibernaculums (a completely closed structure made from tightly woven silk) in which they overwinter. When temperatures warm in the spring, larvae emerge from their hibernaculums and spin loosely woven silken cocoons with openings at their anterior ends. Emergent moths thus begin a current season's cycle (3 to 5 generations) of IMM.

Under indoor conditions, where temperatures are "comfortable," IMM are capable of continual development. With ideal temperatures and relative humidity (86°F and 70 percent, respectively), development from egg to adult requires 3 to 4 weeks. At 86°F and 25 percent relative humidity, developmental rates are extended (5 to 6 weeks from egg to adult). Under controlled laboratory/insectary conditions, IMM can produce 12 generations per year. In indoor situations other than under controlled conditions, 7 and 8 generations per year have been reported by various authors.

IMM Infestation Sources

IMM naturally occur outdoors and are capable of perpetuating their species in the absence of people and materials associated with people. As such, IMM would not be considered pests. However, when IMM compete (damage or destroy commodities used by people), they are categorized as pests.

Outside Sources. Like most insects, IMM are capable of entering warehouses, sheds, homes, apartments, garages, and work areas through a variety of openings (windows, doors, cracks, crevices). Any of their developmental stages might be carried into insect-free areas on self-prepared or purchased stock and materials. Once indoors, IMM proceed to perpetuate their species.

Inside Sources. IMM may already be present within structures. If "clean" materials are brought into a storage and/or work area, the already existing IMM could easily transfer over onto the new materials. Or possibly, while there might be no IMM life stages in storage and/or work areas, there could be life stages in adjacent areas of the home—it would be a simple matter, then, for them to wander about and fortuitously encounter the "clean" decorative plant materials.

Minimization of Stored Product Insect Pests

Preparation of Storage/Work Areas

Insectproofing. The exclusion of outsiders is an essential element in preventing pest infestations. Thus, a facility being used for storing and working with dried flower materials must be as insectproof as possible. The feasibility of achieving insectproof conditions varies from practical/possible in newer facilities or facilities in good repair to impractical/impossible in older, possibly more dilapidated structures.

Windows should be equipped with tight-fitting screens. Torn screening should be mended or replaced. If necessary, use weather stripping or caulking to seal cracks around windows and screens. Structural cracks should be filled in with mortar or caulking. Open spaces around pipes and ducts entering structures should also be plugged. Breeding and hiding areas, such as cracks and crevices within storage or work areas should be filled in.

Sanitation. Sanitation around outer perimeters of warehouses, sheds, garages, and homes is imperative. Remove any harborages or food sources which could serve as an infestation source of stored product pests. Cleaned perimeter areas could be treated with a residual insecticide to eliminate any pests remaining after cleanup activities.

Sanitation within work and storage facilities is also important. Again, infestation sources can be eliminated with a thorough cleaning. Residual insecticide treatments and the use of home fogger/fumigation devices might be considered against various pests not eliminated via initial cleanup efforts and/or new arrivals. Ongoing cleanup activities should be a standard operating procedure for the purpose of depriving any "visitors" of a food source and the chance to become established.

Maintaining Insect-Free Facilities

Precautions can be taken to reduce the introduction of stored product insect pests (IMM especially) and the detection of IMM before they become established:

Exclusion. Doors and windows of work and storage areas should be closed and properly screened. If you are aware of having been in a setting where you recently observed or were exposed to IMM or other stored product pest infestations, take whatever steps you consider prudent to minimize the possibility of your carrying "hitchhikers" into your facilities.

Initial Handling of Work Materials. Inspect purchased or self-prepared materials prior to bringing them into storage and work areas. They could have become infested during preservation activities, or when held in storage prior to shipment.
Reject materials found to be infested.

Because it is difficult/impossible to spot eggs or small life stages, consider subjecting all incoming materials to a "cleansing treatment." Companies which store and utilize large quantities of dried plant materials might consider purchasing or constructing fumigation chambers in which incoming materials could be subjected to methyl bromide fumigation treatments.

Smaller operations might consider utilizing temperature extremes to further ensure against bringing pests into previously cleaned and treated work and storage areas. All insect life stages should be killed after an hour's exposure to 130°F, or 3 to 4 days exposure at 0°F. The amounts and sizes of materials will dictate the practicality of hot or cold treatments.

Upon removal from treatment facilities, consider placing and storing sanitized and uninfested materials in sealed, previously sanitized, containers for the purpose of excluding any stored product pests which might be present on the premises, despite the best efforts to guard against their presence. Container sanitization can be accomplished in several ways, including thorough washings, dipping in boiling water, heating in ovens or placement in freezers.

Monitoring. Indianmeal moth lends itself to monitoring. There is a commercially available pheromone (sex attractant) which can be used to monitor for the presence of IMM. Traps can be placed in storage and work areas and inspected regularly for moth interlopers. If moths are detected, facilities should be fumigated before IMM become established. Some fumigants or insecticides with fumigant activities are intended for use by commercial PCO's (Pest Control Operators) who can be contracted to treat premises. Other fogging and fumigating devices are available to the general public.

Pesticide Strips. An added barrier against both male and female moths would be the use of insecticide impregnated strips (referred to as no-pest-strips) which are registered for use in homes against mosquitoes, flies and gnats but which should also control Indianmeal moths.

Treatment of Infested Materials or Craft Items

Work materials or finished decorative products becoming infested with IMM or other stored product pests could be salvaged by utilizing the fumigation, heat or freezing techniques previously mentioned. The intent of generating sufficient concentrations of insecticide to kill insects in any of their

life stages by activating and placing home fogging or fumigation devices in a plastic sack, or in a 30-gallon garbage container covered with plastic, does not constitute a legal use of those products. Similarly, “no-pest” strips used in a similar manner would be considered illegal.

Insecticides

While there are no insecticides specifically registered for the control of stored product insect pests infesting dried plant materials, there are various products registered for use against stored product insects in general, specifically against IMM or generically against small flying moths. However, not all those products can be used in warehouses, workshops, other work areas or homes because those sites do not appear on their labels. **It is the responsibility of the user to read the label for the specific product in hand to ensure its proper and legal use for the task at hand.**

Active ingredients which might be considered as contact treatments, space or fumigation/fogging treatments or surface, crack and crevice residual treatments include: the fumigant methyl bromide; organophosphates such as chlorpyrifos (Dursban), diazinon (Diazinon 24E, Diazinon 2D), dichlorvos/DDVP (“no-pest-strips”, Vapon 20%, Vapon 2, Vapon 4E), and malathion (Malathion 57%); natural pyrethrins (CT511, Home and Garden Pesticide, Kicker, Pyrenone, Synerol); and pyrethroids such as cyfluthrin (Tempo), cypermethrin (Cyperactive), esfenvalerate (Conquer), permethrin (Dysect, Enforcer Flea Fogger), resmethrin (Vectrin, Resmethrin EC 26), and tralomethrin (Saga).

Several products consist of a combination of active ingredients. Dual contains pyrethrin/chlorpyrifos. Raid MAX contains pyrethrin/cyfluthrin. CT250, Raid Roach and Flea Fogger and BugOut Fogger each contain pyrethrin/permethrin. Another Raid Roach and Flea Fogger product contains a mixture of pyrethrin and tetramethrin. Product names do not necessarily indicate the inclusiveness of insect pests on the label per se, therefore, again illustrating the necessity of checking product labels to validate the legal use of various products.

Various companies purchase active ingredients from major manufacturers and formulate those chemicals into their own products. Some product lines may have wide distribution and marketing channels while other products may be of limited or localized distribution. Consumers need to check to see which products are available within their respective locales. **Read product labels to ensure their proper and legal registration for use on stored product pests in warehouses, homes, garages and/or workshops.**

Product availability may vary. Many products are marketed for sale to and use by professional/industry personnel, and, therefore, are not available to the general public. Local Pest Control Operators can be contacted for the purpose of hiring their services.

Insecticide Product Sources

AgrEvo Environmental Health

95 Chestnut Ridge Road
Montvale, NJ 07645
Phone: 800-331-2867

BIO-STRIP, INC.

P.O. Box 8050
Reno, NV 89507
Phone: 702-348-0037

CHEM-TECH, LTD.

4515 Fleur Drive
Des Moines, IA 50321
Phone: 515-287-6778

Enforcer Products, Inc.

P.O. Box 1060
Cartersville, GA 30120
Phone: 404-386-0801

IQ Products Co.

16212 West Montgomery Road
Houston TX 77086
Phone: 713-444-6454

Loveland Industries, Inc.

P.O. Box 1289
Greeley, CO 80632
Phone: 970-356-8920

Miles Inc.

Speciality Products
Box 4913
Kansas City, MO 64120
Phone: 800-842-8020

Miller Chemical & Fertilizer Company

Radio Road
Hanover, PA 17331
Phone: 717-632-8921

Paragon Professional

Pest Control Products
P.O. Box 17167
Memphis, TN 38187

Prentiss Incorporated

C.B. 2000
Floral Park, NY 11001
Phone: 516-326-1919

S.C. Johnson & Son, Inc.

1525 Howe Street
Racine, WI 53403-2236
Phone: 800-558-5252

Indianmeal Moth Pheromone Sources

Great Lakes IPM

10220 Church Road, NE
Vestaburg, MI 48891
Phone: 517-268-5693
517-268-5911

Scentry

A Division of Ecogen, Inc.
2005 Cabot Boulevard West
Langhorne, PA 19047-1590
Phone: 215-757-1590
800-220-2135

CHEMICAL INFORMATION		
Active Ingredient	Products	Manufacturer
chlorpyrifos	Dursban	Prentiss Incorporated
cyfluthrin	Tempo	Miles Inc.
cypermethrin	CYPER-ACTIVE	AgrEvo Environmental Health
diazinon	Diazinon 24E, 2D	AgrEvo Environmental Health
dichlorvos (DDVP)	“no pest strips”	Bio-Strip, Inc. Loveland Industries
	Vapon 2, 4E, 20%	Prentiss, Incorporated
esfenvalerate	CONQUER	Paragon Professional
malathion	Malathion 57%	AgrEvo Environmental Health
permethrin	Dysect	CHEM-TECH, LTD.
	Enforcer [®] Flea Fogger	Enforcer Products, Inc.
pyrethrins	CT511, Home and Garden Insecticide	CHEM-TECH, LTD.
	Kicker, Pyrenonne, Synerol	AgrEvo Environmental Health
pyrethrin + chlorpyrifos	Dual Use EC	AgrEvo Environmental Health
pyrethrin + cyfluthrin	Raid [®] MAX	S.C. Johnson & Son, Inc.
pyrethrin + permethrin	CT-250	CHEM-TECH, LTD.
	BugOut Fogger	IQ Products Co.
	Raid [®] Roach and Flea Fogger	S.C. Johnson & Son, Inc.
pyrethrin + tetramethrin	Raid [®] Roach and Flea Fogger	S.C. Johnson & Son, Inc.
resmethrin	Vectrin 3%, LO	AgrEvo Environmental Health
	Resmethrin EC 26	Miller Chemical & Fertilizer Company
tralomethrin	Saga Multipurpose, Saga WP	AgrEvo Environmental Health

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