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Structural and Public Health Pests: Flies (Drain Flies, Fruit Flies, Fungus Gnats)

Last Updated: October 13, 2009

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Introduction

Drain flies (Family Psychodidae) and fruit flies (*Drosophila* spp) are often present in schools and other settings where food is stored, prepared or consumed. Drain flies are also called filter, moth or sewage flies and may be confused with fruit flies or other small flies. Fruit flies may also be called small fruit, pomace or vinegar flies, and are sometimes confused with other small flies including humpbacked flies (Family Phoridae), drain flies or fungus gnats (Family Fungivoridae).

Adult female drain flies deposit egg masses in the gelatinous film associated with decaying organic matter in drains, garbage disposals, grease traps, sewers, bird feeders and bird baths, gutters and other locations. Larvae feed on decayed organic matter and can survive extremely wet conditions. Most infestations are generated from within the school including food service areas and custodial closets. Drain flies can carry bacteria and other microorganisms from egg-laying sites to food and surfaces that come in contact with food, and should not be tolerated.

Fruit flies are small-bodied (<1/8 inch long) and can pass through standard fly-screens to enter a structure. Adults, eggs or larvae may also be present on or in fruits or vegetables brought into kitchens, cafeterias or break rooms. Fruit flies, like drain flies, are strongly attracted to drains or any location where fermenting liquids are found. Large numbers of fruit flies may indicate unsanitary conditions including poorly managed garbage, and/or inadequate cleaning of drains and floors and hard-to-reach areas under and behind equipment.

Fungus gnats are also small flies which can be distinguished from drain and fruit flies by their long legs and long segmented antennae. Larvae feed on decaying matter including organic matter in plant pots if the soil is sufficiently wet. Fungus gnats typically do not harm healthy plants but their presence can indicate overwatering and insufficient soil aeration for healthy root growth. High populations may feed on plant roots and adversely affect plant growth, especially young plants, if

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preferred food, including microorganisms, is not available. Fungus gnats may also carry plant disease organisms from one plant to another.

Management practices include identifying and eliminating breeding sites and entry points. Frequent, regular cleaning of drains or locations where fermenting materials can accumulate, inspection of incoming produce, physical removal of over-ripe fruits and vegetables and prompt clean up of spilled food or drink generally provide the best results. Fungus gnats are often well controlled by moderating watering of potted plants so that soil dries in between waterings. Educating school staff is required since even well meaning practices such as saving unwashed empty beverage containers for recycling or composting kitchen waste could encourage infestation.

Table 1

Drain flies, fruit flies and fungus gnats most likely to be encountered in schools and other structures.

| Common and species name | Geographic distribution |
|---|--|
| drain or moth fly, <i>Psychoda alternata</i> | Throughout the US. |
| filter fly, <i>Telematoscopus albipunctatus</i> | Throughout the US. |
| Humpback fly, Family Phoridae | Throughout the US. |
| sewage gnat or psychod fly, <i>Psychoda cinerea</i> | Throughout the US. |
| common fruit fly, <i>Drosophila melanogaster</i> | Throughout the US. |
| fruit fly, <i>Drosophila repleta</i> | Throughout the US; most common in Southwest. |
| fruit fly, <i>Drosophila hydei</i> | Throughout the US. |
| darkwinged fungus gnat, Family Sciara | Throughout the US. |
| fungus gnat, Family Mycetophilidae | Throughout the US. |

Monitoring and inspection for drain flies, fruit flies and fungus gnats

Visual inspection of potential breeding sites including floor drains in food preparation and serving areas is required to ensure that drain and fruit flies do not become established. Visual inspection of incoming produce is essential to avoid introducing fruit flies. Indoor plants can be gently lifted and or shaken to determine if fungus gnats are present; adults will take flight when disturbed. Finally, when flies are present in a school, flies and fly carcasses of all types can often be found on or around window sills or in light fixtures.

Commercially available monitoring devices include cardboard sticky traps, baited traps designed specifically to attract adult fruit flies and glue-trap type fly lights. Yellow sticky traps can be mounted on stakes placed in potted plants to monitor for fungus gnats.

Fly traps should be numbered with the location noted on a list or ideally on a schematic diagram of the facility and dated and initialed each time they are checked or replaced. For drain and fruit flies, ideal placements include locations near plumbing fixtures, dishwashers, under prep tables and in trash or recycling storage areas.

Specific monitoring for fruit flies, including fruit fly traps, may not be required on an ongoing basis if the proper management practices are in place to prevent conditions conducive to fruit fly infestation.

Cultural and physical options for drain fly, fruit fly and fungus gnat management

Cultural, physical and mechanical management options are the best strategies and include posting notices to encourage the cleanup of spills, proper food storage and trash/recycle handling, elimination of standing water, fixing plumbing leaks, drying mops, emptying mop buckets and inspecting incoming produce and rejecting any infested or overripe product.

Biologically based drain and surface cleaners can be used at the end of the day to remove food residues from floors, coving, the underside of kitchen fixtures and equipment and drains. Foam based formulations are particularly effective under equipment and in drains.

When cleaning drains, great care must be taken to avoid spreading bacteria such as *Listeria* and other microorganisms, especially in food service areas. An initial clean out may require scraping or brushing accumulated organic matter which should be done only after all food has been put away. Clean all food contact surfaces after cleaning the drains and before removing food from storage. Care should also be taken to prevent clumps of organic matter from falling down into and potentially clogging the drain pipe.

Cultural and physical strategies for drain and fruit flies and fungus gnats.

- Clean areas where food residues may accumulate. Key locations include the undersides of prep counters and around kitchen equipment and fixtures. A steam cleaner may facilitate the cleaning process.
- Eliminate breeding sites by sealing cracks, edges around coving, tiles and kitchen fixtures/equipment to eliminate accumulation of organic matter.
- If necessary, use a squeegee to dry floors and under counter areas after mopping to eliminate standing water.
- Repair plumbing leaks promptly to prevent water accumulation.
- Clean up food and drink spills immediately.
- Rinse all beverage containers prior to placement in lined recycle bins. Do not store recycled containers for more than seven days.
- Inspect incoming fruit and vegetables for the presence of fruit flies. Over-ripe produce is most suspect and may be harboring eggs and larvae even if adults are not evident.
- Store fruit and vegetables in plastic bins in a cool storage room.
- Follow First In, First Out (FIFO) practices for food products that are susceptible to infestation, i.e., use up oldest inventory first.
- Use liners for waste containers and empty and clean these bins daily.
- Clean drains/traps and strainers at least twice per week to eliminate residues that encourage fly development.
- Maintain a slight positive air pressure in kitchens and cafeterias to discourage fly entry.
- Install air/strip curtains over the kitchen service entrance.
- Place exterior trash cans, recycle bins and dumpsters away from building entrances.
- Use non-toxic fruit fly traps to capture adult fruit flies.
- Avoid overwatering potted plants; allow soil to dry between watering to prevent fungus gnat breeding.
- Use yellow sticky traps placed on a stake in plant pots to capture adult fungus gnats.

Table 2

Commonly used products for physical, cultural or mechanical management of drain and fruit flies and uses.

| Type | Example Products | Uses |
|--------------------------------|--|---|
| baited traps | Natural Catch Plus® Fruit Fly Trap 960 Vector® Fruit Fly Trap | Place in areas where fruit flies are a problem. |
| unbaited traps | Tangle-Trap Sticky Whitefly Trap | Place 3x5 trap in indoor plant pots to monitor for and suppress fungus gnats. |
| microbial-based drain cleaners | DrainGel™ InVade Bio Foam™ | Used to break down organic matter in drains and other potential breeding sites. |

Pesticide options for drain fly, fruit fly and fungus gnat management

Pesticide options have limited value and are rarely required for the management of drain and fruit flies and other small flies. Chemicals are sometimes used to knock down adult fruit flies or to help break the lifecycle and prevent the emergence of adults, but will not provide long-term control.

Table 3 Pesticide products available for the management of fruit flies.

a. Insecticides carrying a CAUTION label or exempt from EPA registration, in formulations that reduce potential for exposure.

| Active Ingredient | Example Products | Uses |
|-------------------------------|-------------------|---|
| <i>Bacillus thuringiensis</i> | Gnatrol® 73049-11 | Apply to soil for fungus gnat suppression. |
| hydroprene | Gentrol® 2724-351 | Liquid spray or foam formulations applied to potential fruit fly breeding sites to help prevent the development of adult fruit flies. |

b.

CAUTION-label formulations with greater potential for toxicity and/or exposure.

| Active Ingredient | Example Products | Uses |
|-------------------|---------------------------------|--|
| pyrethrins | BP 100® 499-452 PT 565® 499-374 | Space spray/aerosol for knock down of adult fruit flies. |
| cyfluthrin | Tempo® SC Ultra 3125-498 | Liquid residual applied to exposed surfaces. |

Priorities for fruit fly management

- Research
- Efficacy of botanical pesticide products for flies including residual activity.
- Strategies for deployment of fly light traps, i.e., how many, where and when to place or remove monitors.

Additional resources for the management of drain and fruit flies and fungus gnats

Arizona Cooperative Extension. 2004. Filth Flies. Pest Press. cals.arizona.edu/urbanipm/pest_press/2004/march.pdf (PDF)

Iowa Insect Information Notes on Fruit Flies, Vinegar Flies, Pomace Flies. 2005. Iowa State University. www.ipm.iastate.edu/ipm/iin/ffruitfl.html

Jacobs, S.B. 2008. Moth Flies in the Home. Penn State University Entomological Notes. <http://www.ento.psu.edu/extension/factsheets/mothFliesHome.htm>

Lyon, W.F. Undated. Drain Flies. Ohio State University Extension Fact Sheet. <http://ohioline.osu.edu/hyg-fact/2000/2071.html>

Potter, M.F. 2007. Fruit Flies. University of Kentucky College of Agriculture. www.ca.uky.edu/entomology/entfacts/ef621.asp

University of California. 2001. Fungus Gnats, Shore Flies, Moth Flies and March Flies. <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7448.html>

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