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Eliminating Waste Caused By Household Pests

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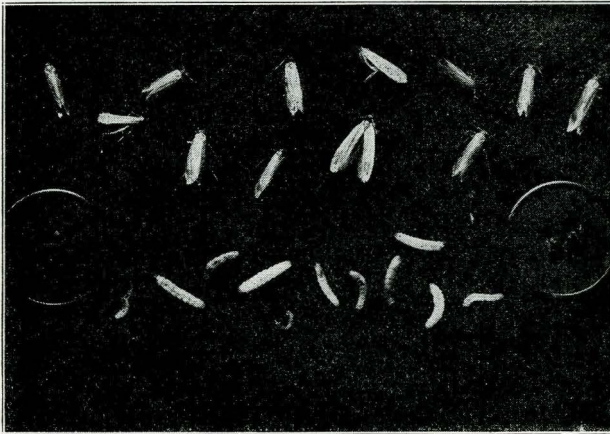
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Eliminating Waste Caused By Household Pests



Dollar Weevils

SOUTH DAKOTA STATE COLLEGE
EXTENSION SERVICE
C. Larsen, Director
Brookings, S. D.

Eliminating Waste Caused By Household Pests

By

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Much loss and inconvenience is experienced by homemakers each year through insects which have become pests in the home. Few homes in South Dakota have not experienced some damage from clothes moths. Much food has been destroyed or rendered unfit for use by other insects. It has been definitely established that flies and other household pests play an important part in the spread of typhoid fever, dysentery, cholera and other diseases which destroy health and deflate family savings.

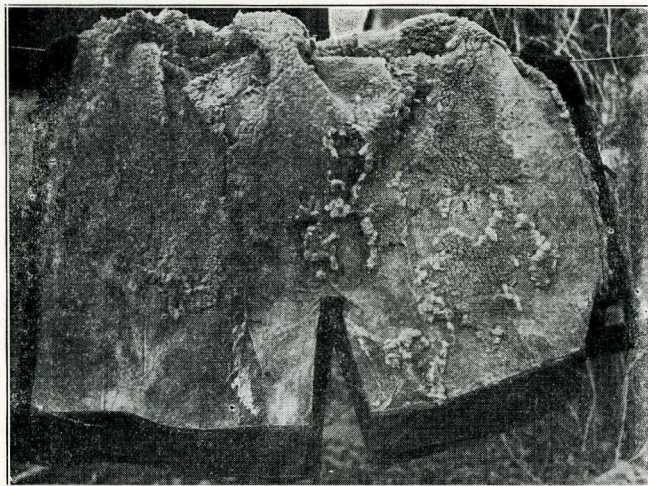


Fig. 1—Sheep lined coat damaged through careless storage (original).

Much of this loss, annoyance, and spread of disease can be avoided. It is our purpose to present in this circular the most practical methods of prevention and control of household insects common to South Dakota homes. We have attempted to include only the control measures that are practical in the average home. Certain widely recommended control measures that are too dangerous for inexperienced persons to attempt have purposely been omitted. Other commonly advocated poisons have been omitted because they are too dangerous to use in homes having young children. We have assumed that every home has at least visiting children who need to be considered.

Clothes Moths

Clothes moths lead the list of destructive household insect pests in South Dakota. There are three distinct species of clothes moths, namely; the case-making moth, the webbing moth and the gallery-making or tap-estry moth. The first two are by far the most abundant in this country. Although their activities are somewhat different they are similar in appearance and the same control measures are used for both.

Description and Life Cycle

The moths are tiny, yellowish-brown, narrow-winged "millers" having a wing expanse of a little more than one-half an inch. The "millers" themselves are absolutely harmless as their mouth parts are unfitted for consuming fabrics. They lay tiny, white, bead-like eggs on fabrics and furs which hatch into small larvae (worms). See cover page. These larvae feed only on fabrics of animal origin. They mature in a number of weeks, depending on the temperature of the room. When full grown they are a little over one-quarter of an inch in length. They then transform into the pupal stage in a silken cocoon and in a couple of weeks the moths emerge and are ready to start on another cycle, namely egg, larva, pupa and moth.

Clothes moths become dormant and will not develop below a temperature of about 40°F. Since our homes are maintained at a livable temperature the year around, these moths are free to breed and multiply during the entire season with the result that tremendous damage will occur unless something is done to hold them in check.

Control

The control of clothes moths can be divided into two parts, (1) preventive measures and (2) destruction of the pests after infestation has gained a foothold. We believe that preventive measures should be practiced at all times by all homemakers as such measures will keep heavy infestations and damage down to a minimum.

Preventive Measures

1. Care of Storage Places

Clothes moths shun light. They are lovers of the dark and do their worst damage under such conditions. When building or remodeling homes, windows should be made in closets. Well-lighted closets are less susceptible to moths than dark ones. Closets without windows require special attention. The door should be left open frequently to admit light and fresh air. The closet should be cleaned regularly and contents checked for possible infestation. Trunks and other dark storage places require the same attention and care.



Fig. 2—While sunning, lapels, folds and pockets should be thoroughly brushed (original).

2. Disposal of Old Woolens and Furs.

The elimination of breeding places for clothes moths and the proper disposal of old worn-out woolens, silks and furs is the only means of protection that is necessary in the average home. Homemakers who follow the practice of storing old worn-out clothing in attics, basements and dark closets, invite damage by clothes moths (Fig. 1). Heavy infestations usually start in such places and then spread to the entire house. Do not let such old clothing accumulate.

3. Preparation of Garments and Fabrics for Storage.

Clothing which is continually or frequently worn is in little danger of moth damage if cleaned and pressed regularly. Woolens, furs and other fabrics of animal origin that are not used for long periods and stored in dark poorly ventilated places are extremely susceptible to attack by this pest. Woolens and furs that are to be stored for the summer should be cleaned and thoroughly aired out of doors for several hours in strong sunlight. Sunshine has a strong positive killing action on the larvae and eggs. While sunning, lapels, folds and pockets should be thoroughly brushed and the garment vigorously shaken to dislodge any moth eggs or larvae that may be present (Fig 2). Where moths are a problem in the home such sunnings and brushings should be given all stored woolens and furs every 3 or 4 weeks during the summer. Dry cleaning and pressing of heavy woolen garments just before storage is an added protection. Such treatment kills all stages of the moth should eggs or larvae be present.

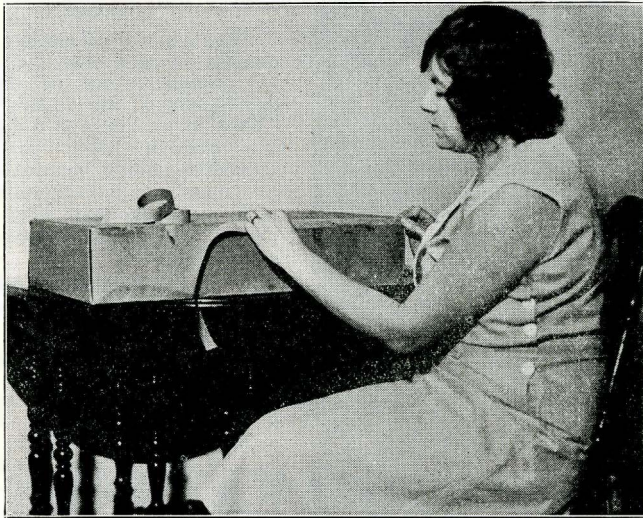


Fig. 3—After sunning and cleaning the garments should be sealed in heavy cardboard boxes for storage (original).

4. Storage

Pasteboard Boxes.—Large pasteboard boxes can be obtained from dry goods stores, tailor shops and clothing stores. When properly sealed these make excellent moth proof containers for storing woolens and furs. If such materials are well sunned and brushed before placing in boxes there is little danger of them becoming infested if they are properly sealed. These boxes can be made moth tight by pasting strips of heavy paper over the cracks at the edge of the cover (Fig 3). If naphthalene flakes are scattered through materials in storage in such boxes once a year they can be safely stored in this manner for several years without sunning and brushing.

Storage in Cedar Chests.—Fresh cedar contains a volatile oil which is highly repellent to clothes moths. If woolens are free from moths when they are put into good tight cedar chests for storage they will be uninfested when taken out. Cedar chests or cedar chips, however, will not kill the “millers”, or their eggs or larvae that are more than half grown (Fig. 4). For safe storage in cedar chests the materials, therefore, should be

thoroughly sunned, aired and brushed. It is safest to place the garments or materials in sealed bags or boxes before storage in the chest, unless the chest itself is kept tightly closed.

Storage in Moth Proof Bags.—Large paper moth-proof bags are now obtainable at many drug and department stores. When properly used they are very efficient protection against moths. If materials are infested before placing in such bags, of course, the damage will continue. It is, therefore, important that clothing be thoroughly sunned and brushed several times after which the bags can be tightly sealed with gum paper to prevent infestation.

Cold Storage.—Since clothes moths will not develop below a temperature of 40° F. expensive furs can be safely kept in cold storage during the summer. In our larger cities such cold storage space is available at nominal rental charges.



Fig. 4—Cedar chests or cedar chips will not kill “millers,” their eggs, or larvae that are more than half grown (original).

5. Moth Repellents.

Naphthalene.—Naphthalene is the material from which so-called moth balls are made. It is one of the most effective moth repellents and when used in sufficient quantity apparently has some killing effect on the larvae as well as the “millers” and eggs. This material, however, is far more effective as a repellent than as a fumigant and it is therefore recommended to be used only to keep moths out of uninfested stored fabrics. We believe it is more efficient when used in the flaked form rather than the moth ball form. For the average-sized chest or trunk used for storing woollens, from 1 to 3 pounds of flaked naphthalene should be scattered thoroughly throughout the layers of materials stored. Chests and trunks should be kept tightly closed as naphthalene is not effective when used in loose bureau or dresser drawers or in loose, poorly constructed trunks. Impure naphthalene flakes often cause some staining of white materials, therefore care should be taken not to allow the flakes to come directly in contact with such fabrics.

6. Home Remedies.

There are many so-called “home remedies” in common use throughout the country. All “home remedies” have been scientifically tested out by

well trained and experienced research workers and practically all of them have been found to be worthless. Among those that have been found to have little or no repellent action are pepper, allspice, red cedar leaves, formaldehyde, lead-carbonate, lead-oxide, eucalyptus leaves, hellebore, lime, quassia chips, tobacco, sodium-bicarbonate, salt, sulphur, lavender flowers, borax and others.

7. Moth-Proofing Materials.

Commercial products are now on the market which are known as moth-proofing materials. Some of these have merit while the value of others has not yet been definitely established. They have much promise and no doubt in the near future this method will be widely used in the manufacture of rugs and over-stuffed furniture. Because moth-proofing materials are still in the experimental stage, we cannot give definite recommendations as to their universal use at the present time.

Destruction of Moths

Many homemakers have discovered serious damage by moths when they thought their homes were uninfested. When this occurs it is too late for preventive measures and actual moth "cures" must be resorted to.



Fig. 5—Place the carbon disulphide in a flat dish or pan on a high shelf (original).

1. Fumigation.

Fumigation with Carbon Disulphide.—Carbon disulphide is a highly effective fumigant. It is deadly to the clothes moth in all its stages when confined in concentrated amounts from 18 to 24 hours. It can be obtained from most drug stores for around 40c per pound. Carbon disulphide has its limitations and dangers when used in or about the average home. It is an ill-smelling colorless liquid that evaporates very rapidly when exposed, giving off a gas that is much heavier than air. The gas evolved from this liquid is highly inflammable and explosive and herein lies the danger in its use. It should not be used in the home near an open flame and is not recommended for use during the colder months when stoves or furnaces are in operation. The fumigation of the entire home with carbon disulphide is not recommended. Its use should be confined to the fumigation of clothes closets, trunks, chests, etc.

Fumigation of Closets with Carbon Disulphide.—To eradicate moths successfully from an infested closet there are certain preliminary provisions that must be attended to before the actual fumigation starts. All cracks in the floor must be sealed by pasting gummed paper over them. Infested materials packed on shelves or in chests should be unfolded and hung loosely in the closet. Pour the proper amount of carbon disulphide into shallow trays or pie pans and place on the upper shelf (Fig. 5). Use 9 fluid ounces of the chemical for each 100 cubic feet of air space in the closet. Immediately close the door and seal it by chinking the cracks and key hole with wet newspapers (Fig. 6) or by pasting gummed paper over

them. Allow fumigation to continue for from 18 to 24 hours, then open the door and let the closet air out for several hours. If the fumigated materials are hung out of doors for several hours the odor of the chemical will disappear.

This fumigation will kill the moth in all its stages if the closet is tight enough and the temperature is not below 65 degrees. Do not fumigate when a high wind is blowing outside. Under such a condition it is difficult to maintain concentrated amounts of the gas in closets for a long enough period of time.

The Fumigation of Chests or Trunks With Carbon Disulphide.—To fumigate infested materials in chests or trunks first seal all cracks by pasting heavy paper over them on the inside. Pile the fabrics loosely into the chest or trunk. Pour the chemical into a shallow pan and place it on top of the materials and immediately close the lid. Seal by pasting strips of paper over the crack formed by the top and sides. Keep closed for from 18 to 24 hours.



Fig. 6—The closet should be sealed tightly with gummed paper or by chinking all cracks tightly with moistened newspaper (original).

Fumigation With Carbon Tetrachloride.—Carbon tetrachloride is similar to carbon disulphide in use as a fumigant. It is **non-inflammable** and **non-explosive**. It is not as toxic as carbon disulphide and therefore has to be used in heavier doses for effective results. Carbon tetrachloride is used exactly the same as recommended above for carbon disulphide except the dosage should be about $2\frac{1}{4}$ times as heavy. Since the price of both is about the same per pound, the tetrachloride is considerably more expensive to use than the disulphide, but it has the decided advantage of being non-inflammable. Where it is desired to fumigate closets or chests during the winter when the stove or furnace is in operation, we would recommend the tetrachloride because the disulphide would be too dangerous to use under such conditions. As with the disulphide the temperature must be above 65 degrees for effective fumigation with this material.

Fumigation With Para-di-chloro-benzene.—Commercially para-di-chloro-benzene is known as P.D.B. and for sake of brevity we shall hereafter call it P.D.B. in this circular. P.D.B. is a white crystalline substance with an odor somewhat similar to naphthalene. Most people consider the odor of P.D.B. on clothing much less repulsive than naphthalene. It can be obtained from or through any drug store. It vaporizes slowly in air, giving off a gas that is deadly to all stages of the moth when confined in sufficient concentration. It is used in the same way as recommended previously for naphthalene. For fumigating infested materials in tight chests or trunks, scatter the P.D.B. crystals among the clothing at the rate of one pound per each 10 cubic feet of air space in the container. This fumi-

gation should be allowed to continue for several weeks. P.D.B. has the advantages of being non-inflammable, is not poisonous to the higher animals and will not stain or otherwise injure fabrics.

P.D.B. should not be scattered about rooms, closets or loose bureau drawers. Neither should it be scattered or blown into over-stuffed furniture. Under such conditions it is impossible to maintain the gas in concentrations sufficiently high for effective control.

Fumigation With Heat.—Clothes moths cannot stand high temperatures and this fact may be utilized in eradicating them from furniture, carpets, and woolens. A temperature of 135 degrees maintained for half an hour will kill all stages of the insect. By picking unusually hot periods during the summer, supplemented by artificial heat it is possible, in some homes, to raise the temperature as high as 140 or 145 degrees. If such temperatures are maintained for 10 or 12 hours it should penetrate most objects sufficiently to kill the moth in all its stages. The piano is about the only object in the average home that would be injured by such high temperatures.

In attempting the heat method of eradicating clothes moths it is suggested that all infested materials be assembled in one room and all heat from the heating plant be directed into this room. Temperatures sufficiently high for fumigation purposes can be obtained by this method easier than attempting to raise the temperature of the entire building. A good thermometer should be used in connection with this procedure to see that the proper temperature is obtained, otherwise the attempt may result in failure.

Cyanide Fumigation.—The most effective method of fumigating infested homes is by the use of cyanide. However, this process is absolutely too dangerous for the inexperienced person to attempt.

2. Commercial Moth Sprays.

The pyrethrum oil sprays commonly sold on the market under such trade names as Flit, Kip, Fly-Tox, etc., are effective in eradicating clothes moths. They are excellent for spraying onto the walls and into cracks and crevices of infested closets. They can also be sprayed directly onto infested clothing without leaving stains or odors. If used in sufficient quantity as a fine, misty spray they will kill the moth in all its stages. Their chief disadvantage lies in the fact that they are rather expensive.

Moth Control in Over-Stuffed Furniture

It is very difficult to eradicate moths in over-stuffed furniture. In homes where moths are known to exist it is important to practice continually preventive measures in connection with the over-stuffed furniture. Such furniture should be brushed out thoroughly along the seams and under the cushions every week or ten days. This will remove any eggs which are usually deposited in such places.

It is not uncommon for homemakers to discover moths in furniture only after heavy infestation has become established (Fig. 7). Under such conditions we would recommend the following eradication methods, any one of which, if properly carried out, should result in a 100 per cent clean-up of the pest:

1. Heat.—If the heating plant in the home is such that the temperature of a single room can be safely raised to 135 degrees, all infested

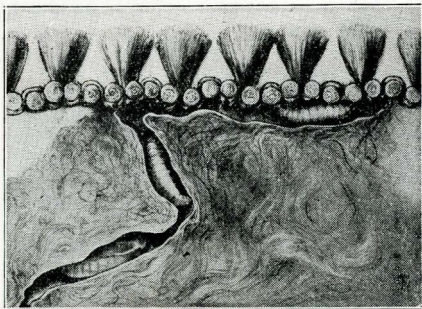


Fig. 7.—Moth larvae often inhabit the stuffing of furniture. They eat the silk or wool threads of the pile from beneath, causing the pile to drop out. (after Back).

furniture should be assembled in this room and this temperature maintained for 10 to 12 hours. This can be accomplished in most homes only during excessively hot periods during the summer. It is difficult to maintain such temperatures when high winds are blowing outside.

2. Fumigation With Carbon Disulphide or Carbon Tetrachloride.—Fumigation with these materials is not effective below a temperature of 65 degrees, therefore only summer fumigation is recommended. If a room is available (preferably in an out building) that can be made tight, successful fumigation can be accomplished. Use three-fourths of a pound of the disulphide or one and three-fourths pounds of the tetrachloride for each 100 cubic feet of air space in the fumigation room. Allow fumigation to continue for from 18 to 24 hours. Do not attempt such fumigation on windy days as it is impossible to confine the gas for a long enough period under such conditions.

3. The Use of Gasoline.—Under the present condition of depressed finances the use of high test gasoline is believed the most practical method of ridding over-stuffed furniture of moths. A fire hazard is connected with the use of this material but with proper precautions it can be used with comparative safety.

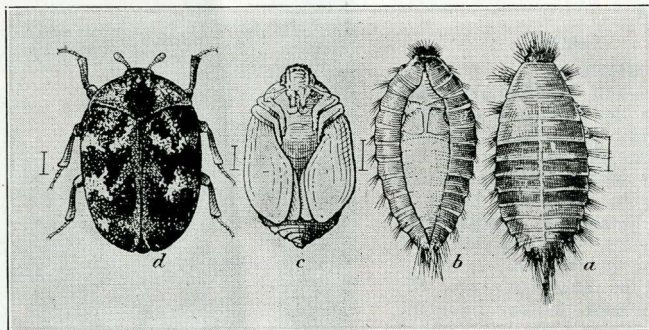


Fig. 8—Carpet Beetles. The larvae can be distinguished from clothes moth larvae as they are covered with long hairs (after Riley).

First remove the back and bottom covering of the infested furniture. Pick a warm day for the work and remove the furniture to an open porch or other handy location in the open air. With an ordinary 3-gallon compressed sprayer, spray gasoline into the back and bottom of the furniture until all parts are thoroughly soaked. This will kill the moth in all its stages. Do not return the furniture to the house until it has been thoroughly aired for several hours (preferably over night). This will largely avoid fire hazard. The use of high test gasoline will eliminate any danger of staining the fabric.

The cushions of over-stuffed furniture present a difficult problem as they cannot be taken apart. These should be either sprayed with gasoline until they are thoroughly wet all the way through or else completely submerged. If one does not desire to use gasoline on the cushions as described above they can be easily heated to a point where all stages of the moth will be killed without injury to the cushions. Place the cushions in a large box, leaving air circulation space between each cushion. By placing the open side of this box in front of and above the open oven of the cook stove and directing the heat from the oven into the box by means of heavy paper or blankets, the cushions can be heated to the point where all insect life present will be killed. This can also be accomplished by placing the box of cushions over an open register of a

hot air furnace. Close watch should be kept of the cushions during this operation and the use of a good high-temperature thermometer is suggested to avoid injury of the cushions by too high temperatures. A temperature of 160 degrees can be maintained indefinitely without injury to the cushions. The heat should be allowed to play on the cushions until it has penetrated to all parts of the wadding and padding.

Carpet Beetles

Carpet beetle injury in the household is very similar to that of clothes moths. The adult is a black or speckled oval beetle about one-eighth of an inch long. The larvae, (worms) can be distinguished from clothes moth larvae as they are covered with long hairs (Fig. 8). They feed on the same materials that are damaged by clothes moths, namely fabrics of animal origin such as woolens, furs and silks. They are especially bad in tacked down, immovable rugs and in over-stuffed furniture. They do not develop as rapidly as clothes moths and are not as serious in South Dakota, but occasionally there are cases where they have caused severe damage.

Control

1. Prevention.

The adult beetles are often found in the spring of the year on flowers out of doors, especially on the flowers of the common bridal wreath. It is possible to introduce them into the house on bouquets of cut flowers. Where this pest has been a problem, it would be well to examine carefully all cut flowers before bringing them into the house and shake off any beetles present.

2. Eradication.

Since the food and work of the carpet beetle is similar to that of the clothes moth the same eradication methods given for clothes moths will also give results for this pest.

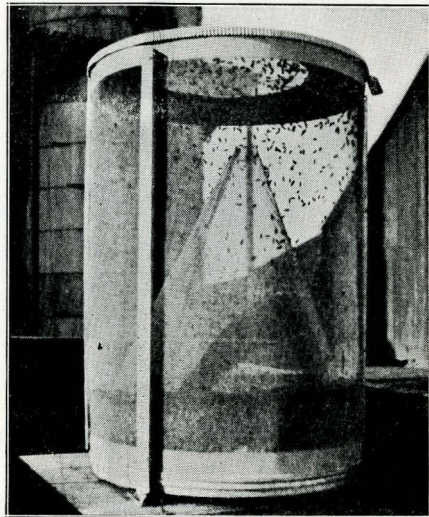


Fig. 9—Cone fly trap (after Bishop).

The House Fly

There is no insect of the home that is as universally tolerated as is the common house fly. This pest has become so universal that the public simply considers it as an unavoidable nuisance. The fact of the matter is, the house fly is the most dangerous household pest we have because of the part it plays in the spreading of human diseases. Flies breed in filth such as manure, garbage, decaying vegetable matter and human excrement, and being attracted to human food in homes, often contaminate it with dangerous germs.

Control

1. Elimination of Breeding Places.

The first essential in the reduction of house flies is the elimination of their breeding places.

Stable Manure.—Stable manure on the farm is the principal breeding place for the house fly. If this manure were spread on the land for fertilizer once a week instead of allowing it to accumulate until fall, winter or spring, a great reduction in house fly population would result.

In town, stable manure should be kept in fly-tight containers or treated chemically. Ordinary powdered borax is excellent for killing developing fly maggots in manure. One pound of the borax is sufficient for treating eight bushels of manure. This can be done by sprinkling the borax over the manure and then washing it in with water. This does not destroy the fertilizing value of the manure.

Garbage.—Garbage should be kept in containers with tight fly-proof covers at all times during the warmer months of the year. Such garbage should be disposed of at short intervals.

Privy.—Most South Dakota farms are not equipped with a sanitary sewage disposal system, namely the septic tank. Under the present depressed conditions it will probably be years before the majority of our farms will be so equipped. The privy is still the rule rather than the exception on South Dakota farms. It is the most dangerous breeding place for the house fly.

It would be the height of economic folly to recommend a septic tank on every South Dakota farm under the present severe financial depression. Although the septic tank is the most sanitary and safe system of farm sewage disposal so far devised, the privy can be made much more sanitary and safe than most of them are at the present time. There is no excuse for an open privy vault where flies can enter and leave at will. Such vaults should be fly-tight and supplied with tight fitting covers. The contents of the vault should be thoroughly sprinkled each day with finely screened ashes or preferably lime. Such a procedure would reduce the number of cases of intestinal diseases on farms and in smaller towns.

2. Screening.

Good window and door screens are essential in all homes. Such screens should be tight fitting and constantly kept in good repair. On the farm, most flies enter the house through the kitchen door. This trouble can be reduced by building a back porch over the kitchen door containing screened windows on two sides and a screened entrance door on the other not directly in front of the kitchen door. With this arrangement, flies cannot gather on the kitchen door in such large numbers. They will be less numerous on the porch screen door because there is less warm air and kitchen odor there.

3. Fly Traps.

Screen wire fly traps can be employed with gratifying success to catch house flies before or after they gain access to dwellings. There are many types of fly traps varying from the cone traps to the Hodge window traps (Fig. 9). Many of these traps are excellent and their use is recommended, especially early in the season to catch the first appearing flies before they lay their eggs. Bread and milk, bananas or other soft fruit make good baits for fly traps.

4. Fly Sprays

Pyrethrum oil fly sprays sold under trade names such as Flit, Kip, Fly Tox, etc. are effective in killing flies within buildings but cannot be used with much success out of doors. These oil sprays should be blown into the air of infested rooms through an atomizer sprayer and will kill all flies present if used in sufficient quantity.

5. Fly Poisons

Many of the commercial fly poisons on the market contain arsenic as the poisoning element. Although efficient they are rather dangerous in homes having children. A cheap and very efficient fly poison can be made with formaldehyde. Stir one tablespoonful of 40 per cent formaldehyde into a pint of water or a solution of milk and water in equal parts. Sweeten this with a little sugar. Pour into shallow pans or saucers and place where flies abound. These poison pans are more effective if a piece of bread is placed in the center of each on which the flies may alight and lap up the poison. Formaldehyde must be considered as moderately poisonous to humans at the above mentioned strength and, therefore, should be kept away from children.

House Ants

The amount of food that ants consume in South Dakota homes is negligible but the amount of food they contaminate and render unfit for human consumption is great. In addition to spoiling large amounts of food they are a household nuisance.

Several species of ants infest South Dakota homes. Most of them build their nest out of doors but some live within buildings. Their food can be divided into (1) sweets and (2) greases. They are social insects that have a life cycle similar to the honey bee. A single queen heads each colony, laying all of the eggs while the workers care for the developing brood and gather the food for the colony (Fig. 10). It is the worker ants that cause so much annoyance in homes.

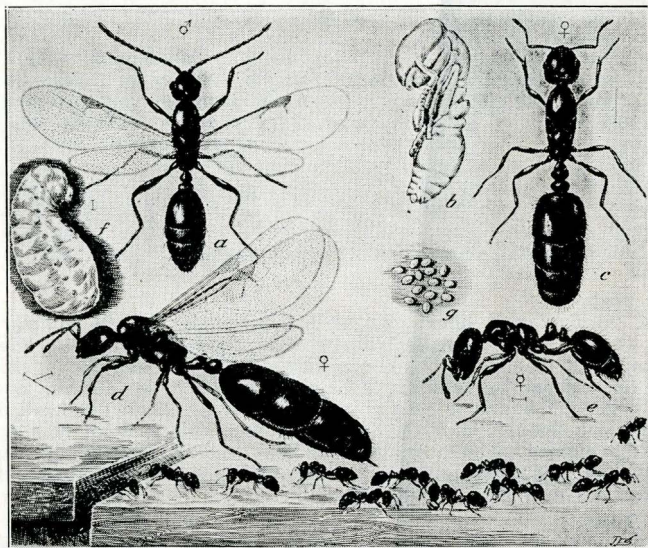


Fig. 10—The worker ants travel to and from the nest to feed the queen and the young (after Marlatt).

Control

1. Destruction of the Nests.

By following the path taken by ants when pillaging food one can sometimes locate the nests of certain species. The nests of the most troublesome species, however, are so numerous and widespread this is not always possible. The nests usually are found in the ground often close to the foundation of the house.

The nests can be destroyed by fumigating with carbon disulphide. With a sharpened stick, punch a hole 4 to 6 inches deep in the nest and pour in about one-half ounce of carbon disulphide and immediately close the hole with a ball of mud or clay (Fig. 11). The gas evolved from the chemical, being heavier than air penetrates down into the nest causing the death of the inhabitants. Where the nest is large several such holes should be made, pouring the chemical into each and plugging the top. Since carbon disulphide is inflammable and explosive great care should be exercised in handling it.

Ant nests can also be destroyed by the use of large quantities of boiling water. Kerosene in sufficient quantity will also destroy ant nests,

however, this should not be used in lawns or near flowers, shrubs or other valuable plants as it will kill them.

2. Ant Baits.

Repellent Ant Baits.—A simple and excellent repellent ant bait can be made from sodium arsenite and syrup (preferably corn syrup or extracted honey). Thoroughly mix 4 grams (the amount that can be held on the tip of an ordinary case knife) of powdered sodium arsenite into a glass of syrup. Since sodium arsenite is poisonous old rags or sponges should be soaked in this poisoned syrup and stuffed in old tin cans with tight fitting covers. Holes punched in the can with nails allow ants access to the bait and still make it absolutely safe to use around children.

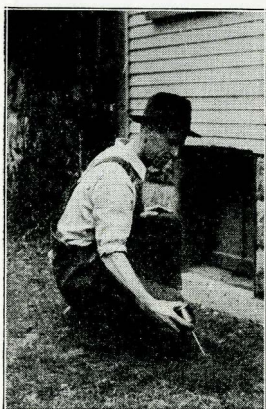


Fig. 11—Destroying ants' nest along the foundation of the house (after Parks and Jones).

If these cans are placed on shelves, under sinks, etc. where ants are known to have their runways, they are often driven out of the house in a comparatively short time as the bait is highly repellent to them. Upon removal of the bait reinfestation usually takes place so it is necessary to keep these baits set at all times during the active ant season.

Attractive Ant Bait.—Attractive ant baits must contain only a weak poison to be effective because it is necessary for the worker ants to carry the poison to the nest where it is fed to the queen and developing brood, this resulting in the destruction of the entire nest. If a violent poison is used many of the workers will succumb before they are able to return to the nest. Perhaps the best attractive ant bait is rather complicated to prepare but it is effective. A. Boil 9 pounds granulated sugar, 6 grams tartaric acid (crystals) and 8.4 ounces of benzoate of soda in 9 pints of water for 30 minutes. B. Dissolve 15 grams of sodium arsenite in one-half pint of hot water. Then add the solution B to the solution A and stir well. Finally add one and one-fourth pounds of extracted honey to the entire mixture and stir thoroughly.

The above formula has been scientifically worked out and should be adhered to rigidly. When the materials for this bait are purchased from the drug store the purchaser should have the druggist weigh them out in the proper amounts. If a small quantity of the bait is desired all ingredients should be reduced in their proper proportion. The bait should be placed before the ants similar to the method described under repellent ant bait.

Bait For Grease Eating Ants.—If the ants that are causing trouble do not respond to the baits described under 2 and 3 the probability is that they are grease eating forms. In that event use the following bait. Mix 3 grams of sodium arsenite in a cup of lard or bacon grease and use it as described in paragraphs 2 and 3.

3. Trapping

Some authorities have recommended trapping ants by soaking sponges in sweetened water and placing where ants abound. Such sponges will soon become literally filled with ants. They can then be submerged in hot water and the sponges replaced to collect more ants. If this is repeated often enough the ants may become discouraged and leave the house entirely. This procedure cannot be relied upon because such sweetened sponges might tend to attract more ants into the house than would otherwise come.

4. Barriers

Ants can be kept from reaching foodstuffs on tables or kitchen cabinets having legs by setting the legs of such furniture in shallow containers containing kerosene. To reach such table or cabinet the ants would

have to swim a minature mote of kerosene which they will not do. Old tin can covers or mason jar tops are good for this purpose.

One of the most effective ant barriers can be made by sprinkling powdered sodium flouride across their regular runways. If this is repeated at intervals during the summer ants can often be kept entirely from the home.

Corrosive sublimate ant tape for tacking around the legs of tables and cabinets is **not** recommended because, although it is an effective ant barrier, it is far too poisonous and dangerous to use where children are around.

Cockroaches

Because of their filthy habits, cockroaches are among the most disgusting insects inhabiting human dwellings. Although there are several species that cause trouble, among which are (1) the large American roach, (2) the Oriental roach and (3) the small German roach, the latter is by far the most common in our homes. Their habits are similar and the same control methods are equally effective against each so they need not be considered separately in this circular.

Cockroaches are active only at night, hiding by day behind baseboards, under sinks, in dark basements and similar places. They are very thin in body structure which enables them to pass easily through surprisingly narrow cracks. The eggs are laid in a brown, bean-like pod which is carried about by the female roach until it has been completely filled with eggs. It is then deposited in some warm, dark, damp place where the young will find conditions best suited for their development after they hatch. Keeping cracks filled, careful sanitation and ventilation of possible breeding places are preventive measures.

Control

1. Sodium Fluoride

Sodium Fluoride (a fine white powder) is undoubtedly the best remedy for roaches in the home. It is applied as a dust liberally sprinkled in cracks along baseboards, under sinks, on pantry shelves, and in fact in all places which are known to be frequented by the pest. It can be applied with a dust gun, an ordinary pepper shaker or shaken through a cheese cloth bag. It can be used straight or diluted with equal parts of flour or air-slaked lime.

Cockroaches have the habit of cleaning their legs and antennae by drawing them through their mouth. Sodium flouride seems to irritate these parts when the roaches crawl through it. The result is they invariably start cleaning operations with their mouth as soon as they come in contact with this dust. In so doing some of the fluoride gets into their food tube and death follows.

Sodium fluoride cannot be considered as a violent poison to human beings but is poisonous if taken in large amounts. In applying the dust care must be taken not to shake it into food. **The storage container should be clearly labeled and kept in a place not accessible to children.**

2. Sodium Fluosilicate

Sodium fluosilicate is also an excellent cockroach poison. It should be used as a dust as described under sodium fluoride. Its poisonous properties as far as humans are concerned are about the same as sodium fluoride.

3. Boric Acid and Borax

Powdered boric acid has been found effective against roaches by Pennsylvania entomologists. It should be used as described for sodium fluoride. This material has been widely recommended for roaches but some have found that it does not give satisfactory results.

4. Arsenical Poisons

Cockroaches may be poisoned by mixing lead arsenate with ordinary paste or glue and daubing it on pieces of cardboard. These treated cardboards are then placed where the roaches are known to be abundant.

Insects Affecting Cereals and Other Food Products

Household cereals such as flour, corn meal, and breakfast foods, often become infested with insects and rendered unfit for human food. Such infested food is usually spoken of by the housewife as "weevily" or "wormy" and considerable waste in South Dakota homes results.

The principle offenders are the confused flour beetle, saw-toothed beetles, and the Indian meal moth. Homes usually become infested by bringing in contaminated flour, meal or breakfast foods as these pests are often bad in mills, warehouses and even grocery stores. Where infested cereals are stored in warm places in homes the pests will multiply uninterrupted with the result that the entire supply may be badly damaged and rendered unfit for food.

Control

1. Insects Affecting Cereals

Preventive measures.—Most breakfast foods are now sterilized by heat by the manufacturer and then sealed in insect-tight packages. Housewives should insist on buying only unbroken packages of such products to prevent bringing infested material into the home.

Flour bins in kitchen cabinets and other cereal containers should be thoroughly cleaned of old flour or meal before a new supply is introduced. Cracks in food containers can be filled with melted paraffin. In cleaning a flour bin that has been infested, it would be well to drench it out with boiling water after all the old flour has been removed. This will kill any eggs or larvae that are hidden away in cracks and out of reach of the cleaning process.

Use of Heat.—If flour or meal has become lightly infested it can be freed of the insects and still be used for food, thus eliminating waste. Place the infested flour or meal in shallow containers and heat in the oven to a temperature of 135 or 140 degrees. If this heat is maintained for approximately 30 minutes all insect life will be killed without injuring the cereal. The storage bins should be cleaned and scalded out before restoring the heat treated product. After the heat treatment, flour and meal should be run through a fine sieve to remove worms, beetles and any webbing.

2. Bean Weevils

Beans stored for food in heated houses are often completely ruined by the bean weevil. Such beans when heavily infested are found to be full of small round holes with the entire inside eaten out. To prevent such injury to beans, store them in an unheated building as the weevil cannot develop and multiply under South Dakota winter temperatures. Bean weevils can be killed by removing the beans from a warm place to the open air under sub-zero temperatures. This sudden change in temperature will often kill the weevil as readily as fumigation.

3. Larder Beetles

Larder beetles at times may cause considerable damage to stored hams, bacon, other meats and animal products. The beetle is dark brown in color and about one-fourth inch long having a yellowish band across the upper part of its back. The worm stage is about one-half inch long when mature and is sparsely covered with long hairs.

Home cured hams, shoulders and bacon should be bagged before they are put into storage. Cured meats can be protected from this pest by a liberal application of a wash composed of a saturated solution of borax. This wash will not penetrate the meat to any great depth and can be trimmed off before using without danger to those who eat it. Hams and bacon that have been injured by this pest need not be entirely wasted. The infested parts should be trimmed off and immediately burned, the remainder being entirely safe to use as food.

Fleas

Although not a pest of major importance in South Dakota homes, many complaints of fleas have been received during recent years. Fleas do not injure human food or clothing but are troublesome pests because of the annoyance they cause.

Most infestations of fleas can be traced directly to animal pets, chiefly cats and dogs. Homes not having cats or dogs are seldom bothered with fleas. This suggests the most logical method of control.

Control

Where the infestation is traced to cats or dogs, or both (which is usually the case), the sleeping quarters of these pets should be thoroughly cleaned and drenched with boiling water, preferably hot lye water. The animals themselves can be freed from the pest by repeated dippings or washings in strong creolin solution made by diluting three teaspoonfuls of creolin to each quart of water. Where the source of infestation is thus eliminated the pest will usually subside as a nuisance in the household.

Bed Bugs

Of all the household insects with which South Dakota housewives have to contend, the bed-bug undoubtedly is the most obnoxious and disgusting. It is true that this pest is more prevalent in the poorer hotels, cheap rooming houses and poorly kept homes, but it often gains access to the best kept homes. It is no disgrace to have bed bugs in the home, but it certainly should be a disgrace to keep them after one knows they are present.

Control

1. Prevention.

Bed bugs have no wings and, therefore, are not capable of traveling long distances by their own powers of locomotion. Where houses are close together, as in town, one home may become infested by the pest migrating from a neighboring house, but this is the exception rather than the rule. In the majority of infestations the bugs are carried into the house by man. Where an occupant of the home does considerable traveling he may bring bugs home in his traveling bag. Visitors staying over night may be the source of infestation. Second hand clothing or furniture purchased at sales or second hand stores often are the source of infestation. Bed bugs have been known to become established in the house through laundry brought from the washer woman's. The point is that bed bugs are spread principally by man. This being true, we believe that the same agency (man) can also prevent much of the spreading of this pest with a little diligence and care. All second hand clothing, traveling bags after trips, or materials that may harbor bed bugs should be carefully looked over before allowing them a permanent place in the home. Although this necessitates a little extra work it will prevent many infestations. Where clothing to be brought into the home is found infested, it should be boiled, dry cleaned or fumigated.

2. Home Remedies.

The food of the bed bug in the home is solely the blood of man. Because of this it is almost impossible for an infestation to become heavy before it is discovered. As a rule, infestations are discovered while a single room or a single piece of furniture is infested and before the bugs have spread over the entire house. Under such a condition the old fashioned "home remedies" are certainly effective if diligently applied.

Kerosene, gasoline or benzine will kill all stages of the bed bug. The difficulty lies in the fact that the bugs are active only at night and hide out in cracks in the wall or furniture, behind wall paper, baseboards and in similar places during the day. To be effective against bed bugs, these liquids should be forced into all cracks and crevices in the infested furniture and rooms by means of a syringe or feather. The treatment must be thorough and should be made several times at intervals of 3 or 4 days in order to give time for any eggs that could not be reached by previous treatments to hatch. The fire hazard connected with the use of gasoline and benzine should not be over-looked and the operator is urged to exercise extreme care at all times while using these materials. In case over-stuffed furniture becomes infested the gasoline treatment as discussed under clothes moths will eradicate them. Liberal applications of boiling water in infested cracks and crevices will also kill both the bugs and their eggs.

3. Use of Corrosive Sublimate.

A very poisonous but excellent solution for killing bed bugs can be made by dissolving one ounce of corrosive sublimate in a pint of wood alcohol and then adding a quarter of a pint of turpentine. This solution painted into the cracks of the bedstead or other places where the bugs abound will give good results because of its high powers of penetration. Corrosive sublimate is very poisonous and should be stored in the home where it is not accessible to children. Attention is also called to the fact that alcohol will ruin varnish finishes, hence this solution should not be used where fine woodwork or furniture are apt to be damaged.

4. Fumigation.

Sulphur Fumigation.—Infested rooms or even entire houses can be rid of bed bugs by fumigating with sulphur. First tightly chink all windows and outside doors. Wet newspapers and a case knife can be used for this purpose. Not less than two pounds of sulphur should be burned for each 1000 cubic feet of air space in the infested room or building. The sulphur should be placed in a kettle or similar metal container. This is then set on bricks or stones in a tub containing 3 or 4 inches of water to avoid danger of fire by the burning sulphur sputtering over the edge of the kettle. It is sometimes difficult to get the sulphur started to burning. A cup of wood alcohol poured onto the sulphur before lighting will give quick and complete combustion. Sulphur fumigation should continue for from 18 to 24 hours before ventilation is started.

Sulphur fumes will bleach certain colors in fabrics and even wall paper. All drapes, curtains and similar fabrics in the room should be removed before the sulphur is burned. The fumes will tarnish metals, therefore all metals should be removed that are movable. Immovable metals such as door knobs, electric light fixtures, etc. can be protected against tarnishing by an application of vaseline or axle grease.

Cyanide Fumigation.—This is most effective against the bed bug but again we cannot recommend it because it is too dangerous for inexperienced persons to handle.