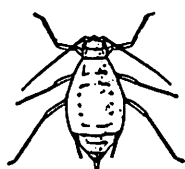
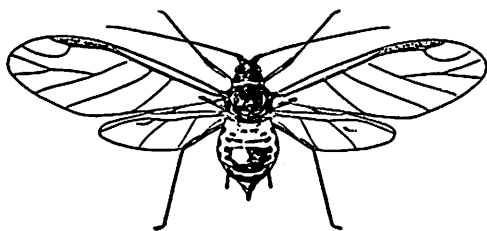


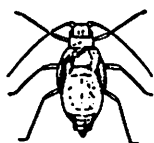
INSECT AND MITE PESTS OF CHRYSANTHEMUMS

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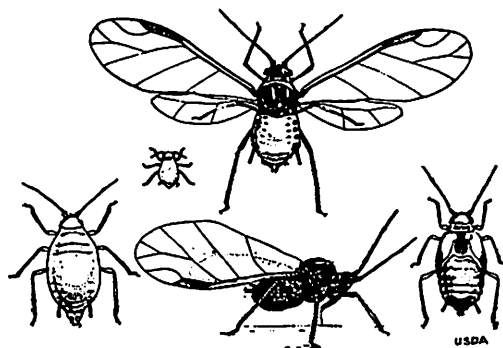
Most insect and mite pests of standard mums infest the plants after they are set out in the greenhouse. Try to exclude insects and mites from the greenhouse. The small size and mobility of insects and mites means that every grower must eventually cope with the identification and treatment of insects and mites. Many pesticides have been developed for greenhouse use, most of which are highly effective when applied properly. Problems with insects and mites should be anticipated or corrected before the buds begin to open to avoid phytotoxicity and gray mold on the blossoms due to spraying.



Green Peach Aphid



USDA



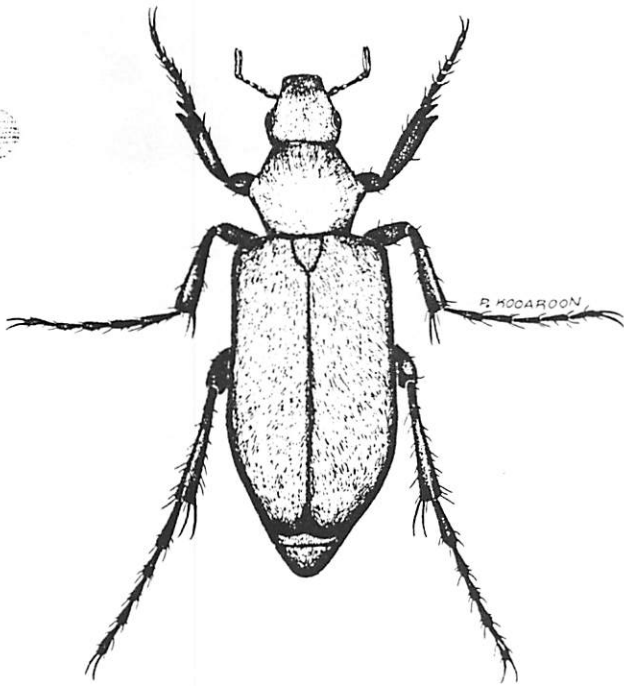
Melon Aphid

USDA

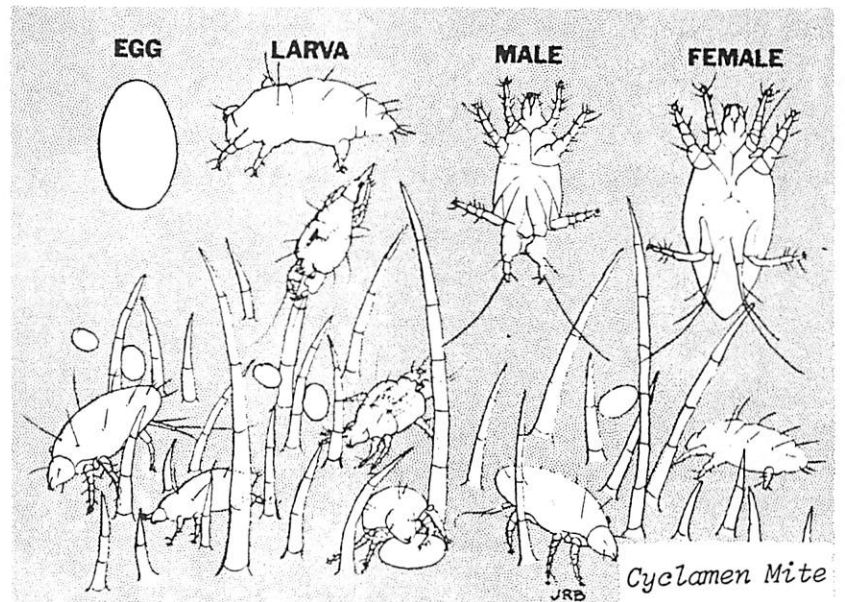
APHIDS disfigure plants by their cast skins and the honeydew they excrete. They also cause the plants to lose vigor and become distorted and the buds hardened. A dark fungus called sooty mold may grow in the honeydew, further disfiguring the plants. Two aphids are especially common on greenhouse grown mums: the green peach aphid and the melon aphid. The chrysanthemum aphid is less common. The green peach aphid is a small aphid that ranges from pale green to red to brown in color. The cornicles (the "exhaust pipes" that stick out the rear of the abdomen) of the green peach aphid are long and pale in color. The melon aphid is also a small aphid which ranges from green to yellow to red to black in color. The honey tubes of the melon aphid are dark. The chrysanthemum aphid is the medium-sized aphid and is shiny, dark brown or black. The honey tubes are short and shaped somewhat like a bottle. In the greenhouse, most aphids develop by giving birth to live young. Aphids reproduce at a rapid rate. Green peach aphids are more tolerant to pesticides than the other two, and often the green peach aphid will be the dominant pest species in a greenhouse range. Sprays such as Thiodan or nicotine sulfate, aerosols, smokes and vapors have been used for many years for aphid control. Temik, a granular systemic pesticide, and Pirimor, a 50% wettable powder, are two carbamates which are cleared for aphid control on chrysanthemums in the greenhouse.

Beetles such as the Japanese beetle, June beetle and the ROSE CHAFER are often attracted to mums in the summer through the vents. The immature stages of most of the beetles that feed on the blossoms of chrysanthemums are spent in the soil as white grubs where they feed on the roots of turf and other plants. A contact pesticide such as Thiodan is useful for control of adult beetles, the problem being that the beetles come in to feed on the flowers as well as foliage of mums. Consequently, it may be necessary to treat as the flowers are opening or are in full bloom.

CYCLAMEN MITES are so small they are almost invisible on their host plants, even with a good hand lense. Cyclamen mites infest a large number of plants besides chrysanthemums. African violets, ageratum, azaleas, begonias, gerberas, gloxinias, lantana, marigolds, snap dragons, vergena and zinnias are also attacked. The mites tend to crowd into the crevices and buds and to feed on the growing tips. Their toxic saliva causes twisted, hardened and



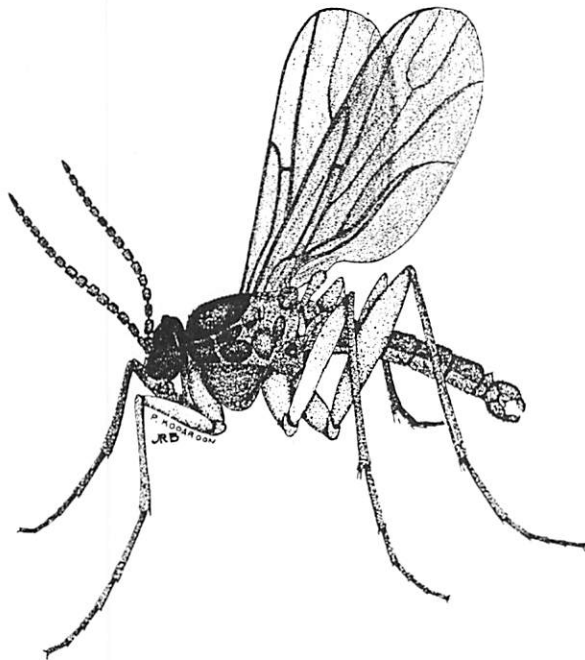
Rose Chafer



distorted growth in the terminal of the plant. The effects of their feeding may persist long after the mites have been eradicated. Cyclamen

mites are susceptible to most miticides. Growers who use systemic pesticides for aphid and whitefly control will also control their cyclamen mites. Kelthane and Thiodan are also effective for cyclamen mite control.

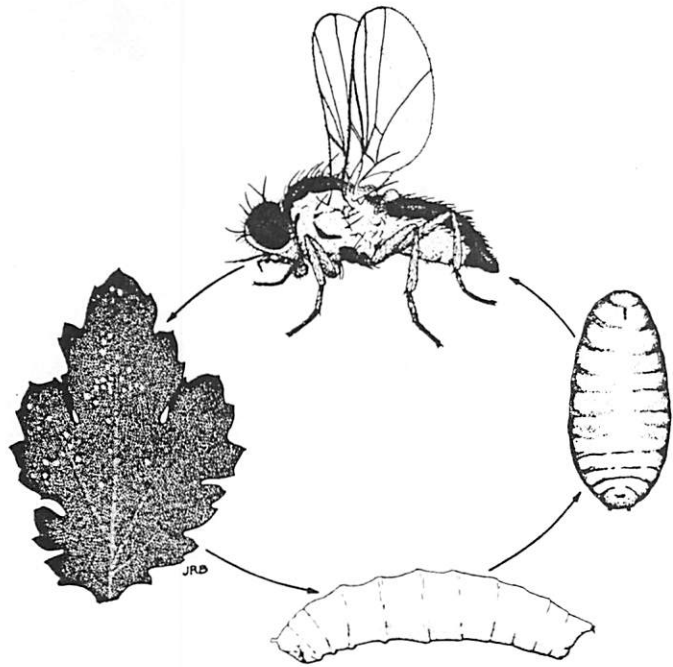
FUNGUS GNATS may become a problem in beds that are kept too moist. Fungus gnats are small, dark insects about 1/8 inch long that are often noticed sliding nervously over the soil medium, the lower leaves of the plants and the sides of the beds. The larvae of fungus gnats are small maggots which feed on the roots and sometimes feed on the inside of the stems. There is no specific pesticide which can be recommended for fungus gnat control, although growers who use systemic pesticides for whitefly and aphid control do not have problems with fungus gnats.



Darkwinged Fungus Gnat

LEAFMINERS are a constant threat to the production of mums in North Carolina. Three species often attack our mums: the chrysanthemum leafminer, the serpentine leafminer and a species with no common name, *Liriomyza trifolia*. The chrysanthemum and serpentine leafminers are controlled by the use of Temik. *Liriomyza trifolia* appears to be resistant to Temik. Some growers are finding that they can control this pest by applying Di-Syston as well as Temik to the soil surface. The adults of these three leafminers are small, dark flies with yellow sides about the size of an eye gnat. Females

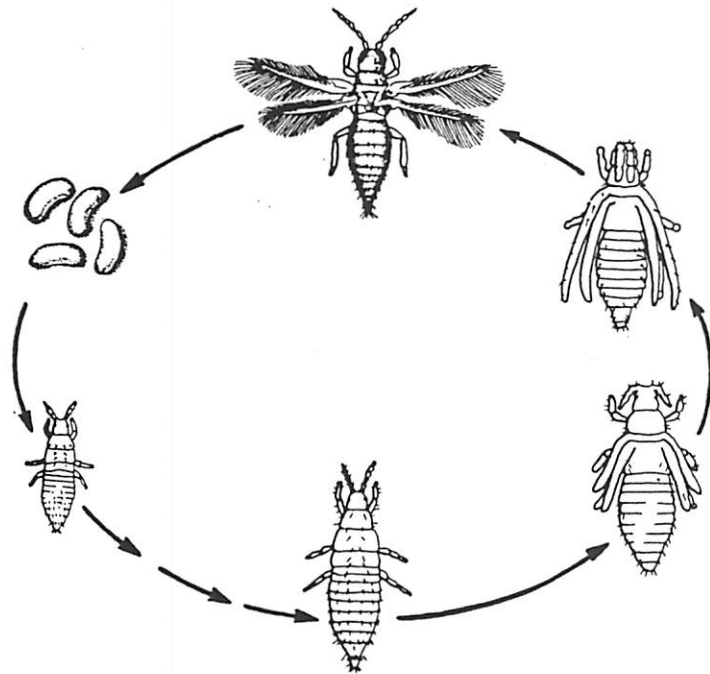
puncture the leaf surface to feed on the sap which exudes and to lay their eggs. The young maggots hatch from the eggs and feed on the leaf tissue, tunneling between the leaf surfaces. The result is a messy, serpentine tunnel which disfigures the leaf. The major damage to the plant is to the foliage which must be stripped off at the time the flowers are bunched for sale.



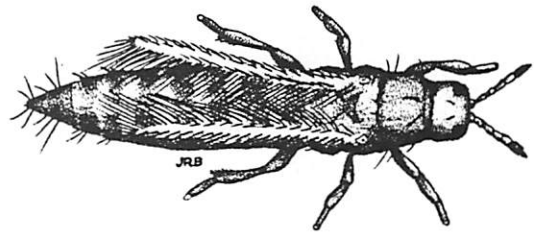
Liriomyza trifolia

MEALYBUGS are small, sucking insects which feed on the buds, leaves, stems and sometimes even roots of chrysanthemums. Two species are commonly found in greenhouses in North Carolina: the citrus mealybug and the Mexican mealybug. The citrus mealybug is about 1/16 of an inch long, orange to purple in color and covered with a white, waxy bloom which resembles flour. The Mexican mealybug closely resembles the citrus mealybug except that the filaments of wax surrounding the body are conspicuously longer at the rear. Both the citrus and Mexican mealybugs lay their eggs in a dense, cottony or waxy material called an ovisac. The ovisac of the citrus mealybug is diffuse whereas the ovisac of the Mexican mealybug is compact and more or less linear. Both species feed by sucking sap from the plant and also excrete honeydew in which sooty mold may grow. However, the citrus mealybug has a toxic saliva which causes distortion and hardened growth and eventually the death of infested plants. Consequently, the citrus mealybug is a much more serious pest. Because mealybugs tend to cram into crevices and cracks on the plant,

they are difficult to treat with sprays. Systemic pesticides give adequate control, whereas spray treatments must be repeated two or three times to give adequate control. Various aerosols and sprays are commonly used for mealybug control, but the secret to success is thoroughness.



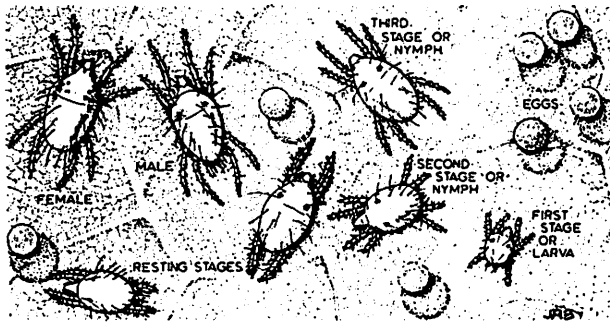
Greenhouse Thrips



Flower Thrips

THRIPS are a perennial problem for the mum grower. Two species may be present where ground beds are not sterilized between crops: a greenhouse thrips and a banded greenhouse thrips. Flower thrips are a constant problem because they can migrate into the greenhouse through the cooling pads any time the fans are turned on during the year. Thrips confine their activities primarily to the buds and flowers. The eggs are inserted into the petals and the young larvae hatch and feed deep in the flower buds or at the bases of flowers which have opened. Two of the stages are spent in the soil and are

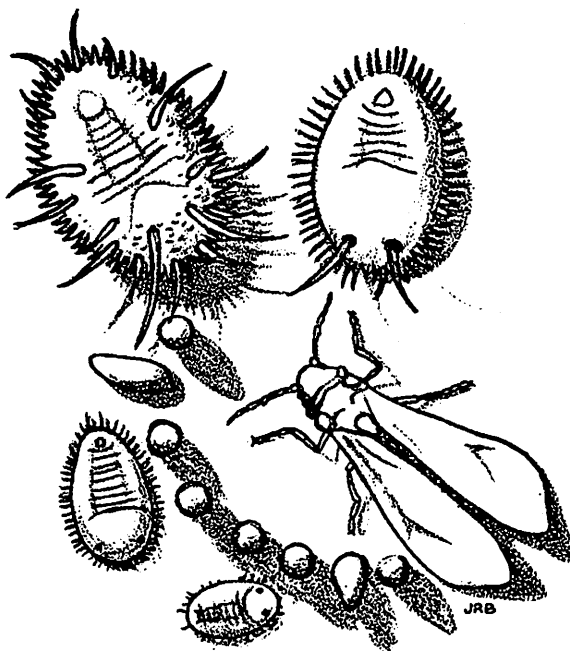
consequently eliminated by soil sterilization or the use of granular systemic pesticides. However, flower thrips reproduce throughout the year on weeds, trees and turf, and the adults migrate through the vents or fans throughout the year. However, the primary season for mass migration seems to be during the month of June. Thrips are susceptible to most pesticides used for greenhouse insect control. Thrips are so small that their damage is often done before they are noticed.



Spider Mites

infestations may be overlooked until the buds are starting to show color. At this time the mites seem to be attracted to the buds, and their feeding may cause considerable damage and webbing on the opening flowers. Thorough application of pesticides to the undersides of the plant foliage before the flower buds open is essential for good control. In hot weather, applications may be needed at 5 to 7-day intervals to kill mites which were in egg and resting stages during the previous applications. In hot weather, development from the egg to egg-laying female may occur in 6 days. Plictran is an effective miticide which has recently been cleared for greenhouse use on ornamentals. Temik, Phosdrin, Kelthane, Pentac, Tedion and Dibrom are commonly used for spider mite control as well.

SPIDER MITES reproduce throughout the year on trees, shrubs and flowers in North Carolina. Because of their small size and their habit of feeding on the undersides of the leaves, spider mites may be overlooked until the population is large. Spider mites are small but visible and develop through a series of larval and nymphal stages. Between each moving stage is a resting stage. The eggs and resting stages are usually more resistant to pesticides than the active feeding stages. The most common spider mite in the greenhouse is the twospotted spider mite. Because symptoms do not show up readily on the foliage of standard chrysanthemums, spider mite



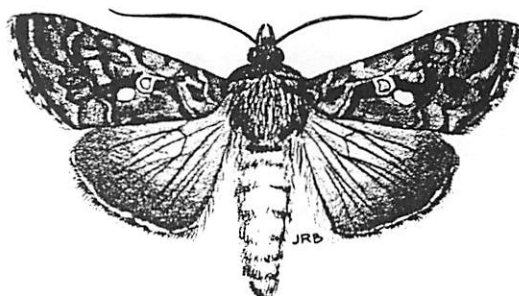
Greenhouse whitefly

WHITEFLIES are a universal pest of ornamental plants in the greenhouse. Populations seem to build up rapidly, although development from egg to adult takes about a month. Nymphs feed by sucking sap from the undersides of the leaves and unsightly sooty mold may grow in the honeydew excreted. Plants may become unthrifty and chlorotic if the whiteflies are uncontrolled. Eggs are laid on the undersides of the leaves, and adults spend most of their time feeding and laying their eggs on the bottoms of the leaves. One female may lay as many as 400 eggs. The immature stages are small, flattened and almost colorless but can be easily seen with the aid of a hand lens. Whitefly control is difficult because the eggs and immature stages are resistant to most aerosol and insecticide sprays. Control of established populations depends upon regular application of pesticide to control emerging adults until the last of a whole generation of immature whiteflies has emerged. Systemic pesticides such as Temik give adequate control. A synthetic pyrethroid, SBP 1382, and an insect growth regulator, Enstar, both give excellent control of all stages of the whitefly.

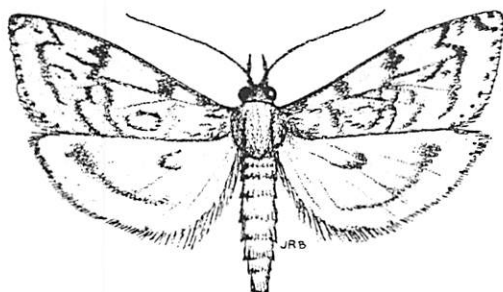
WORMS such as the beet armyworm, cabbage looper, greenhouse leaf-tier, corn earworm and European corn borer are important agronomic pests but are equally important pests of standard mums. Beet armyworms, cabbage loopers and greenhouse leaf-tiers attack the foliage. In addition to consuming foliage, the greenhouse leaf-tier webs infested leaves together in an unsightly web. European corn borers infest the stems of mums and corn earworms generally infest the buds and feed within the unopened bud so that when the bud opens, all the petals drop off. Dipel, a bacterial pesticide, gives adequate control of worms on mums. Sevin, if applied at regular intervals, will control small worms. Lannate is cleared for worm control on chrysanthemums grown in the field. Worms are the immature stages of moths. Most moths are nocturnal and are attracted to light. Screening the vents to prevent the entrance of moths into the greenhouse is one consideration to give for adequate worm control.



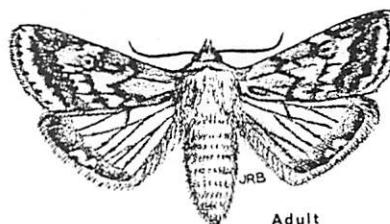
Beet Armyworm



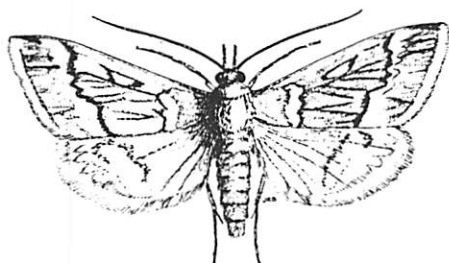
Cabbage Looper



Greenhouse Leaf-tier



Adult



European Corn Borer



Pupa

Corn Earworm



Larva

Observe all precautions on the label of whatever pesticide you use in your greenhouse. The use of trade names in this article does not constitute endorsement of one product to the exclusion of similarly labeled pesticides.