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STICKY CARDS AND INSECT SCOUTING

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Sticky Cards

More and more growers are using sticky cards in their greenhouses. The cards are a simple tool for detecting early pest infestations and of measuring insect densities. The major cost of using sticky cards is not in the purchasing or the labor to put them out, the major cost is in sorting and identifying the insects caught and in recording that data. There are several problems associated with using sticky cards in the greenhouse. Some of them covered in this article are: 1) how do you get the adhesive off of your hands?; 2) what color cards do you use?; 3) how do you identify the insects on the cards?; 4) how many cards should be used?; 5) how often should the cards be counted; and 6) how do you integrate the use of sticky cards into a scouting program?

How to remove the adhesive. The adhesive used on sticky cards is a polybutene-naphtha inert rubber polymer which remains viscous for long periods. It is difficult to keep the adhesive off of your hands and hair when the traps are examine closely. Have a supply of waterless hand cleanser on hand. The Amway™ hand

cleanser is very good without too much odor. Gojo™ is effective at removing the adhesive, but it has a relatively strong odor. The hand cleanser with the most pleasing odor is Trebor Hand Cleaner of the Trebor Corp (800-366-0957). Trebor Hand Cleanser is labeled for removal of pesticide stains and residue (!) as well as grease, tar, ink, paint etc.

Color of the cards. Yellow cards have been recommended for many years. When the western flower thrips became such an obnoxious pest, blue sticky cards became available based on data showing blue cards are more effective than yellow cards at attracting this one pest. Because yellow, green, white and blue are attractive to plant pests, it is a good idea to wear red, brown or black clothing when working in the greenhouse. This should reduce the possibility of carrying aphids, whiteflies, thrips, fungus gnats, and other pests into the greenhouse or from one greenhouse into another.

Identifying insects on the cards. There are hundreds of thousands of different kinds on insects in North Carolina. Baker (1986) illustrated some

of the various sorts of insects found on yellow sticky cards (Figure 1). To be able to see the small insects gummed up in the adhesive, some sort of magnification is necessary. Student supply stores at colleges and universities usually sell hand lenses for \$7.00 or so. Ben Meadows Co. (1-800-241-6401) sells pocket magnifiers from about \$10.00 to \$30.00. You will need at least a 5 power but no more than 10 power hand lens. A 15 or 20 power hand lens does, indeed, give more magnification, but such a hand lens is too difficult to focus and the focal distance is so short, you will probably become mired up in the adhesive on the sticky card trying to use it. InterScience Co. (516-421-1342) has a small microscope which has a clear plastic base that allows light to reach the subject and hold the microscope at the proper focusing distance.

When insects alight on a yellow sticky trap, they immediately struggle and become ensnared in the adhesive often in awkward positions. However, the wings are either free of the adhesive or glued down securely. This is important because the wings are very important for identification. Antennae (feelers) on the heads of insects are also useful for identification but, unfortunately, the antennae are very fragile and often break off. The antennae and microscopic hairs of thrips almost always break off in the adhesive. For this reason, it is extremely difficult to remove thrips from sticky traps intact enough for specific determination. (If you need a specific determination of thrips, it is best to submit them to the Plant Disease and Insect Clinic, Box 7616, NCSU, Raleigh, 27695-7616, in the flowers in a tight paper bag). However, the yellow traps can be used to monitor whether thrips are becoming more or less abundant.

Aphids often settle symmetrically into the adhesive with the wings to either side of the body. Sometimes these trapped aphids give birth to 1 to 4 or 5 nymphs before they die and their bodies shrivel up. After a few days, aphids look like a tiny version of Bill the Cat, that is, only parts of them can be recognized. However, the front

wings of aphids usually have two parallel veins close to the outer or front edge. These veins end at a dark, skinny spot on the front edge. The legs and antennae of aphids seem to be long and skinny as well.

Fungus Gnats are small, dark, mosquito-like insects with gray wings. The wing has a distinct, Y-shaped vein at the tip. Fungus gnats have relatively long, skinny legs and antennae.

Leafminer Flies are shaped like eye gnats. Unless the specimen is completely mired up in the adhesive, it is possible to see a conspicuous yellow spot on each side. Leafminer flies have short antennae and legs which are of moderate length.

Parasitic Wasps: If you have lots of tiny parasitic wasps on the traps, something funny is going on. However, there may be a few on each trap. Parasitic wasps usually have antennae with elbows like an ant, and the forewings have only one vein which zigs toward the front margin and zags away. Usually parasitic wasps are more pointed at the rear than flies.

Shore Flies are the largest common fly found on sticky traps (occasionally a house fly or horse fly may fly in and get stuck.) Shore flies are about the size of the "drunkards" (fruit flies) which are attracted to sliced tomatoes in summer, but shore flies are dark with dark eyes and legs and wings. Shore flies also have pale spots on the wings. The antennae are short and the legs are moderately long.

Thrips are the tiniest insects you will find in any numbers on sticky traps. Thrips evidently are serene insects because they seem to fold their wings over their abdomens with aplomb before sinking into the adhesive (no struggle, no undignified posture for thrips). Consequently, most specimens appear spindle-shaped with the wings protruding neatly at the rear. If you look closely enough on some specimens, you will be able to see the hairs which line the edges of the wings. Often, the stocky antennae protrude in a V-shape at the front (these antennae are much more fragile than they appear, however).

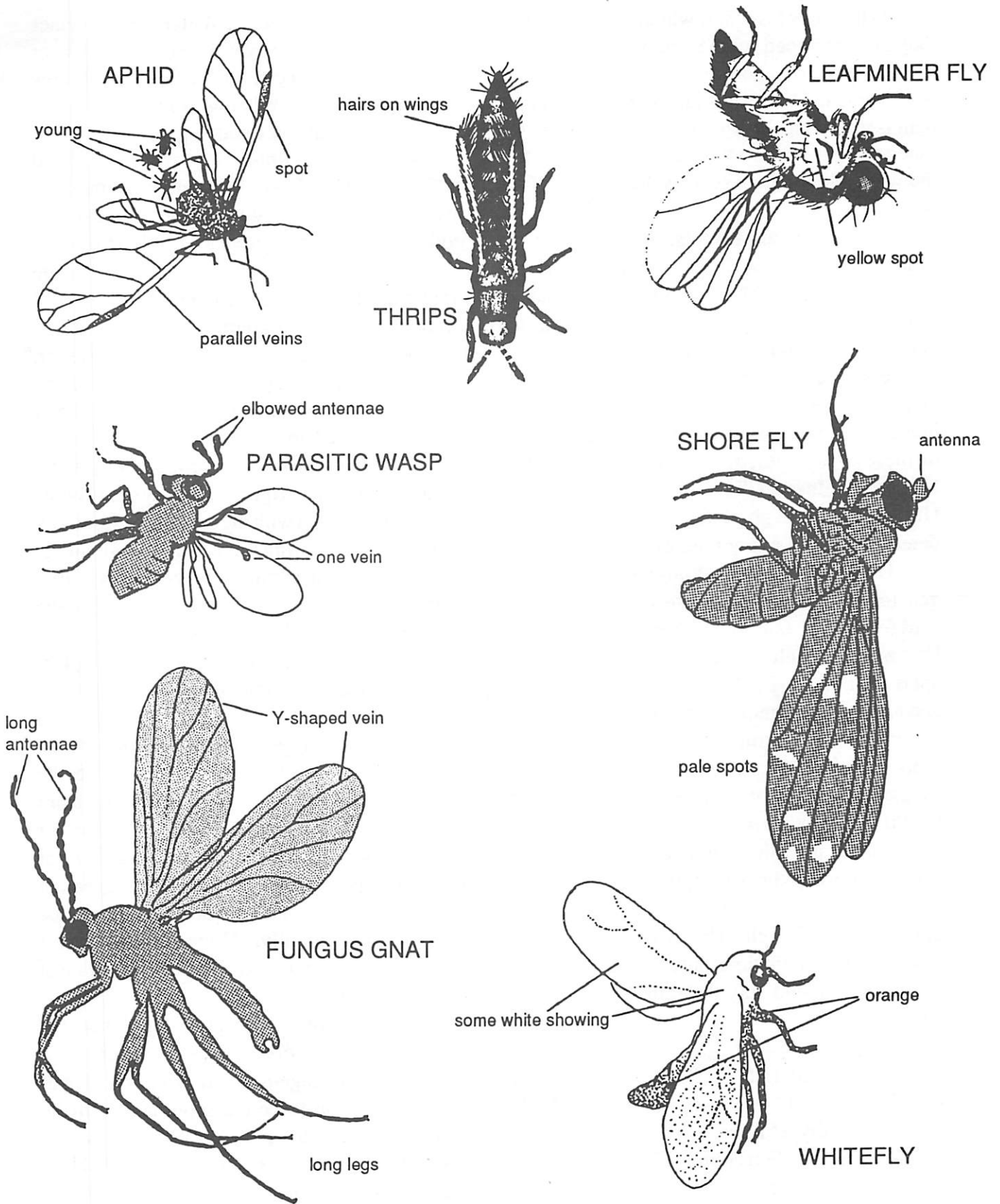


Figure 1. Insects frequently found on sticky cards in greenhouses.

Whiteflies lose their white, waxy bloom as they are entrapped by the adhesive. The insect shows its true orange color and its fragile nature on the traps. Whiteflies are only a little larger than thrips. Usually enough of a wing or leg or other part protrudes above the adhesive so that the white bloom there reveals the identity of the whitefly.

Miscellaneous Insects. There are on the order of one million different kinds of insects. Should you not be able to identify all the kinds of insects you find on yellow sticky traps, do not despair. Precious few entomologists can identify all the species of insects found on such a trap. Hopefully, the above information will help you identify the most common and important insects on these traps. If not, traps can be sent to the Plant Disease and Insect Clinic, Box 7616, N. C. State University, Raleigh, NC, 17695-7616, for a determination of everything except thrips.

How many cards should be used? The general rule of thumb is to use at least one sticky card for every 1,000 square feet of growing area. Heinz and Parrella (1991) placed the card 50' apart with the long side horizontal and 8" to 16" above the crops. Sanderson and Ferrentino (1991) recommended placing the cards just above the crop with the long side vertical. Matteoni and Steiner (1991), recommended one card per 300 to 400 plants or 1 per 500 to 1000 sq ft with the card placed just within the canopy of the the crop. For monitoring the sweetpotato whitefly, the cards should be oriented East to West and sloped upward at a 45° angle. The cards can be moved upward from time to time, but the relative location of the card should stay the same from week to week.

HOW OFTEN SHOULD THE CARDS BE COUNTED? - Sticky cards should be examined daily (Miller, 1990), twice weekly (Sanderson and Ferrentino 1991), or weekly (Matteoni and Steiner 1991). At least, they should be scrutinized once a week and the results written down. The cards should be changed

every three to four weeks (Matteoni and Steiner 1991) or at most whenever they become dirty or so covered with insects, it is difficult to tell how many more insects are being caught each day.

Insect Scouting

Scouting is an important part of Integrated Pest Management (IPM). IPM can be an important part of growing top quality ornamental and bedding plants in the greenhouse. IPM uses all suitable methods to reduce insect and mite populations to the lowest acceptable level. IPM is a comprehensive program and each greenhouse must be considered individually. However, some basic practices apply to most greenhouses. The counts from the sticky cards are one kind of information used in pest suppression decision making. A suggested form for recording sticky card data is shown in figure 2. Sticky card counts should be combined with the results of examining plants randomly during the week throughout the growing area. In addition, a weekly scouting program should be conducted throughout the growing season in which at least three plants per bench are closely examined for pests (one plant at each end and one in the middle; see Figure 3). Put a plastic flag or other marker on the plant so it can be found each week. It is a good idea to look at the same plants each time you scout. Write the number and stages of various pests on the plant marker as well as the record sheet. Thus other workers as well as the scout can also check for increases of pests. Integrated Pest Management is a complex program as each crop must be considered individually. However, there are a number of basic practices which apply to most greenhouse crops.

Responsibility. Constant vigilance for insects, mites and diseases is a required for effective pest management. It is a good idea to assign one person to be the scout and to make scouting an official, paid duty of the scout. Scouting for insects and other pests should be done on a regular basis (perhaps weekly during the winter and twice weekly during the summer). The scout should keep written records of where

Figure 2. Example sheet for recording yellow sticky card data.

YELLOW STICKY CARD DATA									
Date	Location	Card no.	Date card placed	Number of insects present on sticky cards					
				White-flies	Thrips	Aphids	Fungus gnats	Shore flies	Other

Figure 3. Example foliar inspection sheet for recording pests found on scouted plants.

FOLIAR INSPECTION SHEET													
Date	Time		Location	Plant / variety	Number of plants		Whiteflies				Mites	Other pests	Diseases and comments
	in:	out:			Checked	Infested	Eggs	Young nymphs	Older nymphs	Adults			

Code for species of whitefly using the following: BW = bandedwing whiteflies; GH = greenhouse whiteflies; SP = sweetpotato whiteflies.

various pests are found, both in a log book and on the stakes which mark infested plants.

Record Keeping. A written log should be kept of pest type, locality, abundance, and all pesticides applied. Such records can be of long term benefit as many pests tend to appear at about the same time each year. However, the short term benefits of written records may be of greater benefit. By knowing what pests survive a pesticide application alerts the grower to the possibility of poor timing, poor application or pesticide resistance in the pest population. A change in strategy, application technology, or type of pesticide can be made before the crops are significantly damaged. A crop treatment record keeping form is suggested in Figure 4.

Clothing. An effort should be made to avoid carrying insects into the greenhouse by wearing clothes which are brown, red or black. Don't wear white, yellow, or green, as these colors are attractive to aphids, thrips, whiteflies, leafminers and fungus gnats. Light to dark blues are also attractive to aphids and thrips.

Quarantine. Before any plant material is brought into the greenhouse, it should be thoroughly inspected for insects, mites and diseases and the data recorded (perhaps on a form such as Figure 5). Furthermore, new plant material should be kept in a separate section for a week or more before such material is incorporated into the production area. Such highly resistant pests such as the green peach aphid, western flower thrips, and sweetpotato whitefly move readily on plant material. The swapping of insects, mites and diseases on infested plant material is without doubt the major way resistant thrips, aphids and whiteflies are transported throughout the greenhouse industry.

Monitoring. Pests can be monitored by using yellow and blue sticky cards, yellow pan traps, and by examining the foliage, flowers and occasionally the roots. Light traps outside can be used to monitor for European corn borer, corn earworm and beet armyworm adults for outdoor potted crops such as fall mums and Christmas cherries.

Thresholds. Thresholds are levels of pests above which unless action is taken, damage will occur to the crops. Because greenhouse operations vary greatly in choices of pesticides, etc., thresholds for action also vary from operation to operation. Estimates range from 1 whitefly per trap per week (Dr. Dick Lindquist, personal communication) to 5 whiteflies per trap per week (Matteoni and Steiner 1991).

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