

**Development of adult:** It takes worker bees about twenty-one days to develop from egg to adult. During this process, each individual passes through a larval (feeding) stage followed by a pupal (transformation) stage. The larval stage is the most susceptible to pesticide poisoning during development.

**House bees:** These bees are emerged worker adults up to twenty-one days of age. They care for the brood, process pollen and nectar gathered in the field by older workers, and clean the nest. Eventually, they too will become field bees. House bees are usually poisoned by contaminated pollen which is collected in the field, brought back and stored in the hive. As house bees are killed, there are fewer bees to tend the brood and further decline in population results.

**Field bees:** These bees are workers twenty-one to approximately forty-two days of age. There appears to be no greater risk in bee society than to be a field bee. Should the insect avoid all the potential pitfalls due to predators like spiders, toads or skunks, it is still vulnerable at all times to the numerous pesticides applied in commercial agriculture, mosquito control, and home gardens. Most times, field bees are killed by contact with pesticides in the field, but other times they collect contaminated nectar and pollen and contribute to poisoning their sisters in the colony. If field bees are killed, then young bees are forced into the field earlier than normal, disrupting and thus disorienting the colony.

While foraging, field bees may range as far as two to five miles from a colony. They usually seek nectar and pollen systematically, not randomly, and once a food source is found, bees prefer to work that particular source to exhaustion before changing plants. This kind of resource partitioning by bee colonies accounts for the inconsistency observed many times between colonies undergoing pesticide poisoning in the same location. The bees are not all working the same plants and so some are affected more than others. Often it is those bees with established flight patterns located in an area before a pesticide is applied that are most damaged. Those placed in a field immediately after application are less affected by the pesticide because it takes some time for the bees to scout an area and locate food sources.

## Recognizing Bee Kills

Pesticides can affect honey bees in different ways. Some kill bees on contact in the field; others may cause brood damage or contaminate pollen, thus killing house bees. Before dying, poisoned bees can become irritable (likely to sting), paralyzed or stupified, appear to be 'chilled' or exhibit other abnormal

behavior. Queens are likely to be superseded when a colony is being poisoned. Sometimes solitary queens, banished as if they were somehow "blamed" for poisoning, may be found near a colony. These symptoms are not always distinct and they cannot be taken as definite signs of pesticide poisoning. Many chronic management problems such as starvation, winter kill, chilled brood or disease may result in the same symptoms. Often these problems may be caused by pesticides in an indirect manner. So it is difficult in many instances to categorically state that bees have been poisoned.

Only one readily recognized symptom is good evidence of pesticide damage; the presence of many dead or dying bees near a colony's entrance. In a short period of time, however, these dead bees may dry up and the remains be blown away and eaten by ants or other scavengers. A beekeeper, therefore, who visits his yards only occasionally may not see these dead bees and thus not be aware that his colonies have been poisoned.

## Reporting Bee Kills

Although it is sometimes difficult to detect poisoning of bees by pesticides, those cases that are "clear cut" or "borderline" should be reported. In the past, there have been few commonly accepted or uniform reporting procedures for bee kills, and this lack has contributed to the small amount of good data on bee kills which the industry can point to in justifying its concern about such incidents.

At the present time every bee kill can and should be reported using the pesticide incident report (see page 15). The form is self-explanatory. The main rule to follow when filling it out is to be as specific as possible. Section II is particularly important; therefore, include as much as is known, even if nothing else than a garden spray trade name is available.

Besides sending in the aforementioned form to the Environmental Protection Agency (EPA), it would be valuable to send a photocopy or duplicate copy to: Extension Apiculture, IFAS, University of Florida, 202 Newell Hall, Gainesville, FL 32611. In cases where dead and dying bees are observed, a sample of dying insects (more than a cup if possible) and a 2 x 2 inch square of comb containing pollen should be collected and frozen. Indicate on the form that samples have been taken. Information should be requested about where and how to send samples in order to be tested. It is usually suggested that "uninterested" third parties be asked to actually take samples of bees suspected of being killed by pesticides. These persons may include County Extension Agents, Agriculture Stabilization and Con-