

Alfalfa Pollinators

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Idaho alfalfa seed growers realize they must have pollinating bees in sufficient numbers working in the right fields at the right time to produce a commercial seed crop. Growers can make some cultural mistakes and still produce fair alfalfa seed crops, but poor judgment relative to pollinators guarantees less profit.

Four major groups of pollinators are found in Idaho: honeybees, alkali bees, alfalfa leafcutter bees, and miscellaneous wild bees. This Current Information Series publication is designed to acquaint the grower with each.

HONEYBEE (*Apis mellifera* L.)

In the arid areas of the southwestern United States, Arizona, California and Nevada, honeybees actively collect alfalfa pollen. In Idaho and other northern states, nectar collectors instead of the more valuable pollen collectors, make up almost the entire field force of honeybees in blooming alfalfa. Their activity in a field producing 1000 pounds of seed per acre generally accounts for over 10% of those pounds even though they pollinate by "tripping" on the average fewer than 2 out of every 1000 blossoms visited. Fortunately, beekeepers in Idaho have been extremely cooperative in locating bee yards near blooming alfalfa fields. They are encouraged by profitable honey crops and reasonable assurance that insecticides used for the control of lygus and aphids will be properly applied to safeguard their bees.

ALKALI BEE (*Nomia melanderi* Cock.)

This ground nesting bee is the most important native pollinator of alfalfa in Idaho. Each female is a solitary queen in her own right. However, an instinct for aggregating in large nesting colonies makes possible management practices that can greatly increase the concentration and usefulness of these bees.

Nesting sites, whether natural, improved-natural, or artificial can be managed by seed grow-

ers to help increase bee populations. A moisture content of 18 to 25 percent by weight in the top 12 inches of the soil where new nests are to be constructed is of utmost importance. This is especially critical during the nesting period of June and July.

On many sites, water and/or salt must be added to bring the nesting soil up to optimum surface firmness. Provision should be made for sites to have adequate slope and ditches to drain away excess water runoff from unexpected rains during the nesting period. Moisture-robbing annual weeds should be eliminated by using 2 pounds of 80 percent Simazine plus 2 pounds of 80 percent Atrazine per acre of bee site each winter. During emergence and nesting of new adult bees, the nesting site should be patrolled each morning to drive away bee eating birds and to destroy the two principal bee parasites: the large, grey "Bomber fly,"* and the reddish-brown and yellow conopid fly.**

Alkali bees freely fly to attractive nectar and pollen sources within two miles of the nesting site. This habit suggests the need for growers within an area to consider improving and maintaining all bee sites as community projects. Everyone living within the flight range of alkali bee sites should agree upon and coordinate the application and use of all insecticides applied to alfalfa seed fields. They must select materials least toxic to alkali bees.

Since one acre of alkali bee bed that averages only 25 overwintering larvae per square foot will effectively pollinate 100 acres of alfalfa, it is extremely important to encourage and protect this valuable bee in all alfalfa seed producing areas.

ALFALFA LEAFCUTTER BEE (*Megachile rotundata* F.)

This bee originated in the general western Asia-southwestern Europe area. Within the last ten years it has become the most important pollinator of Idaho alfalfa in areas deficient in alkali bees. In contrast to other alfalfa pollinators, the alfalfa leafcutter bee flies only short distances to gather nectar and pollen. This flight pattern enables a grower to manage his own bee force and helps him maintain seed purity under the Idaho Seed Certification Program.

Under natural field conditions in southwestern Idaho, the new generation of bees begins emerging sometime during the first 10 days of June. The emergence reaches a peak about 20 days later and finishes by late July or early August. By the end of the first day following emergence, a female bee has usually selected a nest site and started construction. For the next 20 to 35 days she will construct, furnish with nectar and pollen, and deposit an egg in one to two cells per day. Again, depending on the weather, from 1 to 50 percent of the bees in the earlier

* *Heterostylum robustum* (O.S.)

** *Zodion obliquefasciatum* (Macq.)

constructed cells will begin to emerge sometime in late July as a second generation. Occasionally an extremely small number of bees appear in late summer as a third generation. The remaining, non-emerging bee larvae change into overwintering prepupal forms to emerge the following year.

Approximately 75,000 alfalfa flowers must be tripped to produce one pound of seed. Pollen and nectar from this number of flowers will provision 25 leafcutter bee cells. One female can construct from 20 to 40 cells during a normal lifetime.

Growers ideally should have the equivalent of five or six 2000 hole filled boards (see below), which should produce 15,000 to 35,000 female bees, for each acre of seed. This number of bees would appear to be much greater than needed to pollinate the field. However, this large number is necessary because of the high mortality of adult bees from such diverse causes as insecticides, weather, magpies, black birds, pheasants, mice, toads, etc.

Growers should provide empty holes throughout the summer as needed so the females will have readily available places to begin new nests. Satisfactory nesting materials include, in descending order of preference, holes drilled in wood (identified by seed growers as "boards"), grooved boards, and soda straws. The holes themselves should be approximately 7/32 inch in diameter and, ideally, from 3½ to 5½ inches in depth. Field shelters for these bees range in size from those holding a few standard four foot boards up to large units holding over 100 boards with numbers of bees having the capacity of pollinating up to 10 acres of seed. The larger units seem preferable. All field shelters must protect the nests from heat of much over 100° F by providing shade after 8 or 9 o'clock in the morning. Shelters also protect the nests from rain and wind.

Nesting materials should be removed from field shelters in mid-October after all larvae have had time to change into the overwintering prepupa stage and placed in cold storage at 35° F and 50 percent relative humidity. Nest destroying insects are kept inactive during the winter dormant period at temperatures below 40° F.

In the spring, nests taken from refrigerated storage should be incubated at 85° F and 50 to 65 percent relative humidity. Pans of water should be placed on the floor of the incubation room to act as traps for emerging bee parasites,

(see Idaho Current Information Series No. 25, "Parasites, Predators and Nest Destroyers of the Alfalfa Leafcutter Bee" for detailed information). A light, which acts like a magnet by drawing insects toward it, should be suspended about ½ inch above the water level in the center of each pan. Combinations of incandescent and black lights in the incubator room are best. Parasites will begin to emerge on the 9th or 10th day of incubation, male bees on the 19th day and females on the 21st day.

If the fields are in bloom bees can be removed from the incubator on the 20th or 21st day and placed in field shelters. If the fields are not quite in bloom on the day the first male appears, the incubator temperature can be lowered to 65° F and bees safely held at this temperature for six or seven days. Bees should always be moved and handled gently.

Leafcutter bee nesting materials become uneconomical to keep after two or three seasons because of the accumulation of nest destroying beetles, dead bee larvae, unconsumed pollen balls, etc. At the same time good bees are removed from the incubator and taken to the field shelters, those uneconomical nesting materials should be removed and placed in bee excluder containers (see Idaho Current Information Series No. 97, "Alfalfa Leafcutter Bee Excluder—Beetle Trap" for details). After all bees have been salvaged, the contaminated nesting materials remaining in the excluder should then be burned.

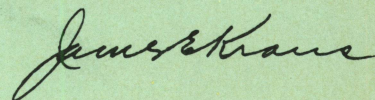
MISCELLANEOUS WILD BEES

There are many species* of these pollinating bees. Bees from these groups rarely appear in large numbers, but they do add substantially to the total amount of alfalfa pollination. If nesting sites can be located, the bees can be protected if they appear to be in danger. These wild bees will be directly benefited if growers protect honeybees, leafcutter bees and alkali bees from improper insecticide applications. For more information and assistance in your choice of insecticides see Idaho Current Information Series No. 67, "Toxicity of Insecticides to Insect Pollinators," and No. 80, "Insect Control for Alfalfa Seed Production."

* Many are included in the following genera: *Agapostemon*, *Bombus*, *Colletes*, *Lasioglossum*, *Megachile*, and *Melissodes*.

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