

15. Bumble Bee Pollination in Greenhouse Vegetable Crops (HortReport, June 2002)

Proper pollination is needed for optimal fruit set and production. In the past, greenhouse tomato growers have relied on manual pollination, which can be very time consuming. Using bumble bees for pollination is an effective alternative and can completely replace manual pollination. In addition to saving on labor, bumble bee pollination has many advantages. These advantages include:

- Active at low temperatures (41°F), and windy and cloudy conditions.
- Effective in greenhouses, high tunnels and in open air.
- Higher yields and large, high quality fruit in crops such as tomatoes, peppers and blueberries.

According to Richard Gerhart, distributor of bumble bee colonies, (International Technology Services, Biobest), greenhouse bumble bee pollination started when Dr. Roland de Jog, a medical doctor in Belgium, had a hobby of raising bumble bees. To enhance his colonies, he placed them in a friend's tomato greenhouse, and the rest is history. Roland is the founder and principal owner of Biobest Biologicals, a distributor of biological controls and bumble bees. Kopperts, another producer of natural enemies also began producing bumble bees. Biobest rears in Belgium, Spain, and Lamington, Ontario, and has joint ventures in other areas. Kopperts rears in Holland, New Zealand, and Detroit, and has joint ventures in other areas. Several species are used throughout the world. *Bombus impatiens* is used east of the Rockies, *B. occidentalis* in the west, and *B. terrestris* is used in most other areas of the world.

Bumble bee colonies are shipped to growers in completely maintenance-free hives. The housing is made of solid, recyclable cardboard with a moisture resistant coating. The hive has two flight openings. The standard flight opening is used under normal conditions. A tapered tube is attached to hole no. 2 which creates a lock in system. When this valve is open, the bumble bees can enter, but are unable to get out. This is a convenient option if the hive needs to be removed from the greenhouse. The hives are supplied with sugar water for the total life expectancy

of the hive, since crops such as tomatoes have blossoms that do not produce nectar.

Tomato Pollination

Tomato blossoms require slight movement for sufficient pollen from the stamens to fall onto the stigma of the flower. Bumble bees cause movement by hanging upside down on the flower, fastening their jaws onto the staminal tube, and then setting the flower into vibration by activating their flight muscles. This is called "buzz pollination." These jaw marks will soon appear as a brown discoloration on the blossom assuring the grower that flower has been visited and "set." Bumble bees are most active in the morning and in the afternoon at temperatures between 50 and 86°F. They function best at temperatures between 59 and 77°F.

Bumbles bees can be used to pollinate other crops such as peppers, cherry tomatoes, eggplants and blueberries.

Consider these factors when using bumble bee pollination:

- Use pesticides selectively since many of the traditional classes of insecticides will have a negative impact on the hive. Contact a bumble bee distributor for specific information about persistence and compatibility of specific compounds.
- Systemic pesticides (pesticides that are absorbed through the roots) may damage the bumble bee population.
- Bumble bees perform best when used with natural enemies to control pests.
- Remove blue sticky cards since they may attract the bumble bees.
- Keep ants away from the hive.

- Do not put ornamental hanging baskets treated with systemic insecticides in houses with bumble bees.

Informative Websites:

<http://www.koppert.nl> – Koppert Biologicals, (734) 641-3763, MI.

<http://www.biobest.be> – Biobest Biologicals, (303) 661-9546, CO.

Directions for constructing a bumble bee nest box can be found at <http://tomclothier.hort.net/page38.htm>



Figure 10. Bumble bee pollinating watermelon blossom.
(USDA Photo)