



Beekeeping: Watermelon Pollination¹

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Watermelons are big a business in Florida. Keys to producing a profitable watermelon crop are numerous, but it is generally recognized that growers who harvest early, quality melons have the most chance of being successful. Several things must happen in order to produce a good crop. The grower needs to ensure optimum growing conditions and the weather must cooperate, although there is little a producer can do about the weather. Consequently, the watermelon grower is also at the mercies of climatic vagaries.

Many conditions in the field besides the weather; are under the control of the watermelon producer. Such things as pH and fertility of the soil, as well as control of insect pests and other pathogens often can be regulated by the grower (http://edis.ifas.ufl.edu/topic_watermelon). Within this decision-making mix, one of the most critical is whether or not to employ honey bees in pollinating the crop.

The best review on the subject of watermelon pollination by honey bees is found in: Crop Pollination by Bees - Keith S. Delaplane and Daniel F. Mayer. Of primary importance to the watermelon grower are pages 275-277 which present an overview of the watermelon pollination requirements and

practices. In addition, the introductory material on honey bee management and particularly the section on pollination agreements and services should be of interest to all persons in many realms of agriculture. In this document, we present an overview of the sections mentioned above in an effort to more widely disseminate information on optimizing watermelon pollination.

It has been universally recognized that watermelons are insect pollinated, even as far back as the turn of the century. Of utmost importance in watermelon pollination is the fact that at least 1000 grains of pollen must be evenly deposited on the tree lobes of the stigma if a uniform melon is to result. Because the pollen grains produce pollen tubes directly downward with very little lateral movement, an insufficient amount of pollen on one stigma lobe will result in an asymmetrical melon. Thus, saturation pollination is an important consideration if uniform melons are to be produced.

Other considerations also influence fruit set, according to S. E. McGregor in his Agricultural Handbook "Insect Pollination of Cultivated Crop Plants".. "It...appears that number of bee visitors (eight or more), time of bee visits (6 to 10 a.m.), length of ovary at time of pollination (28mm or

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longer), plant vigor, and number of melons already set on the vine, all contribute to the greatest percentage of fruit set." Most honey bees visit melon fields in the morning when the highest percentage of fruit set is expected. Given that mornings are also the times of greatest variability in weather conditions, can a producer ignore the possibility that natural pollinators will not be available during this critical period? As such, honey bees are a necessary component of any watermelon production endeavor and pollination must be left solely to managed pollinator populations (honey bees)?

Although it is recognized that honey bees are important for watermelon pollination, there is a great variance in recommendations concerning bringing bees in to pollinate crop. Estimates vary from one to five colonies of bees per acre as being necessary for adequate melon pollination (the literature average is 1.8 hives per acre or 4.5 hives per ha). Other conditions like placement of colonies in discrete groups within the field versus on the perimeter will also affect resulting pollination.

Recommendations for numbers of colonies are not precise because conditions can vary within a colony which can have as little as 10,000 and more than 60,000 individuals at any particular time. Some recommend a bee population that will provide one bee for each 100 flowers in the field.

Unfortunately, watermelon flowers are not always attractive to honey bees. If certain types of other plants are blooming in the area, honey bees will shift from visiting watermelons to visiting the other plants. Consequently, watermelon growers may need to resort to other methods of increasing honey bee visits to target flowers. The best way to accomplish this is to increase the number of bee colonies per acre of watermelons grown. Other growers have used bee attractants in an effort to encourage bees to visit the flowers. However, most studies on bee attractants and honey bee pollination of watermelons have not shown a benefit of using bee attractants.

A standard pollination recommendation for watermelons grown in Florida does not exist. Like recommendations for many beekeeping practices, there is no good "cookbook" formula that works well for every producer under the extreme variety of

possible conditions found at any particular time. In the long run, it will be best for the grower to work with a beekeeper in determining the best possible population of bees and their placement for optimum watermelon pollination.

To that end, it is important to use a written contract which details the expectations of both parties--grower and beekeeper. It is extremely important that the grower gain knowledge of beekeeping practices and bee biology to help in developing such a contract. It cannot be assumed that Each colony or unit must necessarily have a queen, adequate food supplies and a generous population of worker bees for doing the pollinating work. It is important to remember that although bees may be collecting pollen and nectar from a watermelon field, they will not be able to sustain themselves solely on this source of nutrients. A supplementary source in the form of stored honey and pollen will be needed or the colonies will lose populations and become ineffective pollinating units.

A primary concern of beekeepers when involved in contracting their bees for pollination is the use of pesticides by the grower. The Florida Cooperative Extension Service publishes Circular 534, "Protecting Honey Bees From Pesticides," which provides important pointers on this subject.

The Service also publishes a number of aids to beekeepers including: Circular 537, "A Florida Beekeeping Almanac;" Circular 686 "Florida Bee Botany;" Circular 766, "Diseases and Pests of the Honey Bee;" and Circular 722, "A Study in Profitability for a Mid-Sized Beekeeping Operation." Also available from the Extension Apiculturist is the "Melitto Files", a quarterly newsletter that can be found at Ufhoneybee.com. Any of the above should be readily available from county Cooperative Extension Offices.

A sample pollination agreement adapted from Agriculture Handbook 496 is included at the end of this publication.

References

Delaplane, K.S., Mayer, D.F. 2000. Crop Pollination by Bees. CABI Publishing, New York, NY, pp. 344.

McGregor, S.E. 1976. Insect Pollination of Cultivated Crop Plants, Agriculture Handbook Number 196, ARS-USDA (out of print).

Sample Pollination Contract

Sample Beekeeper / Grower Contract

(From Delaplane and Mayer, 2000)

This agreement is made _____
 between _____ (date)
 _____, afterwards called grower, and
 (grower's name)
 _____, afterwards called beekeeper.
 (beekeeper's name)

1. **TERM OF AGREEMENT:** This agreement involves the 20____ growing season.

2. RESPONSIBILITIES OF BEEKEEPER

- Beekeeper will supply grower with _____ bee hives delivered to _____ (name or orchard or field) for pollination during the applicable growing season as follows: (Fill in appropriate lines and cross out those that do not apply.)

Approximate date: _____

_____ days after written notice from the grower.

Time in relation of amount of crop bloom:

Description of hive placement in field:

- Beekeeper will provide hives of the following minimum standards:

A laying queen and:

_____ frames with brood and bees to cover

_____ pounds of honey stores or other food

_____ -story hives

Grower may inspect hives after giving reasonable notice to beekeeper of his intent.

- Beekeeper will maintain hives in proper pollinating condition by inspecting, feeding, medicating, or treating for mites as needed.
- Beekeeper will leave bees on the crop until: (Fill in appropriate lines and cross out those that do not apply.)

Approximate date: _____

_____ days after written notice from the grower

Time in relation to amount of crop bloom:

Other: _____

Beekeeper will, absent any other notice, remove hives no later than midnight on _____ (date).

- Beekeeper is not responsible and, as a condition of this agreement, will be held harmless for inherent risk of bee stings to people, animals, or livestock.

. RESPONSIBILITIES OF GROWER

- Grower will provide a suitable place to locate hives. The site must be accessible to beekeeper's vehicles. Grower will allow beekeeper entry whenever necessary to service the bees, and grower assumes full responsibility for all loss and damage to his fields or crops resulting from the use of vehicles over agreed routes in servicing bees.
- Grower will not apply **highly** toxic pesticides to the crop while the bees are being used as pollinators nor immediately before their arrival if residues will endanger the hives. The following agricultural chemicals and methods of application are mutually agreeable while bees are on the crop: _____

Grower will notify beekeeper 24 to 48 hours in advance if hazardous materials not listed above will be used. Grower will pay for the cost of moving bees away from and back to the crop to prevent damage from highly toxic materials on the crop being serviced or on adjacent crops.

- Grower will compensate beekeeper in full for hives destroyed or severely weakened by pesticides or other action by the grower at a rate per hive to be determined by arbitration (see section 5), or,

if loss is undisputed, beekeeper will be compensated by grower at the rate of \$ _____ per hive.

- Grower will pay for pollination services of _____ hives of bees at \$ _____ per hive. Payment will be made to the beekeeper as follows: \$ _____ per hive on delivery and the balance on or before _____ (date). Additional moves will cost grower \$ _____ per hive per move.
- Grower will provide adequate sources of water for the bees if none is within one-half mile of each hive.
- As a condition of this agreement, grower agrees to hold beekeeper harmless from any and all claims of injury or damage to person or property which might arise from beekeeper's performance of this agreement between beekeeper's placement and removal of hives from grower's fields or orchards.

4. PERFORMANCE Either party will be excused from obligations of this contract if, before delivery of hives, performance is prevented by events beyond their control. Notification will be given to the other party as soon as reasonably possible.

5. ARBITRATION If any controversy arises between parties, it will be settled by arbitration. Each party, within 10 days, will appoint one arbitrator, and the two arbitrators will select a third, and the decision of any two arbitrators will be binding on the parties. Cost of arbitration will be divided equally between the two parties.

6. ASSIGNMENT OR TRANSFER This agreement is not assignable or transferable by either party, except that the terms will be binding on a successor by operation of law.

IN WITNESS WHEREOF, the undersigned parties have made this agreement,

Grower	_____
By	_____
Address	_____
Beekeeper	_____
By	_____
Address	_____