UNIVERSITY OF FLORIDA
EXTENSION
Institute of Food and Agricultural Sciences

RF-AA091

Beekeeping: Watermelon Pollination[1]

Malcolm T. Sanford[2]

Watermelons are big business in Florida. Keys to a profitable watermelon crop are numerous, but it is generally recognized that those who harvest early, quality melons have the most chance of being successful. In an effort to produce a crop, several things must happen. The grower needs to ensure optimum growing conditions and the weather must also cooperate. There is little a producer can do about the weather. Like the old saying commonly attributed to Mark Twain, "Everybody talks about the weather, but nobody does anything about it," so the watermelon grower is also at the mercies of climatic vagaries.

Many conditions in the field besides the weather, however, 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. 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 what has been referred to as the "pollinator's bible," Agriculture Handbook Num. 496, "*Insect Pollination of Cultivated Crop Plants*," authored by S.E. McGregor and published by the Agriculture Research Service, USDA, in 1976. Unfortunately, this valuable reference is out of print and no longer available. Of primary importance to the watermelon grower are pages 372 thru 375 which present an overview of the watermelon pollination requirements and practices. In addition, the introductory material on honey bee management and particulary the section on pollination agreements and services should be of interest to all persons in many realms of agriculture. This paper presents an overview of the sections mentioned above in an effort to more widely disseminate information on optimizing watermelon pollination.

According to the Handbook, 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 invariably result in an asymmetrical melon. Thus, saturation pollination by insects becomes an important consideration if uniform melons are to be produced.

1. This document was published December 1992 as RF-AA091, Florida Cooperative Extension Service. For more information, contact your county Cooperative Extension Service office. Please visit the EDIS Web site at http://edis.ifas.ufl.edu.
2. Extension Beekeeping Specialist, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville.

Other considerations also influence fruit set, according to the Handbook. "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 longer), plant vigor, and number of melons already set on the vine, all contribute to the greatest percentage of fruit set." Of more than passing interest is the fact that 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 variablility in weather conditions, can a producer ignore the possibility that natural pollinators will not be available during this critical period and pollination must be left soley 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. 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. Of more relevance, according to the Handbook, would be a recommendation as published by the Arizona Agricultural Experiment Station in 1970. It recommended a bee population that will provide one bee for each 100 flowers in the field.

A standard pollination recommendation for Florida does not exist. Like recommendations for many beekeeping practices, there can be 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.

The best advice is to employ 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 because a beekeeper brings in a number of white boxes, that they are adequate pollinating units. Each colony or unit must necessarily have a queen, adequate food supplies and a generous population of worker bees for doing the pollinating work. In addition, it is important to remember that although bees may be actively 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 are a series of "Hints for the Hive" and the monthly newsletter, "APIS-Apicultural Information and Issues." Any of the above should be readily available from county Cooperative Extension Offices.

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

POLLINATION AGREEMENT

This agreement is made _____ 19_____ between

_____,hereinafter called the grower

and _____,hereinafter called the beekeeper.

1. Term of Agreement.

The term of this agreement shall be for the _____ growing season.

2. Responsibilities of the Beekeeper

a. The beekeeper shall supply the grower with _____ hives (colonies) of bees to be delivered to the

(Cucumber, watermelon field, etc)_____as follows:
(Fill in the appropriate line or 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 location(s):_____

_____
(if additional space is needed, attach separate sheet dated and signed by both parties.)

The beekeeper shall locate said bees in accordance with directions of the grower, or, if none are given, according to his judgement so as to provide maximum pollination coverage.

b. The beekeeper agrees to provide colonies of the following minimum standards:

A laying queen with the following: _____ frames with brood with bees to cover.

_____ pounds of honey stores or other food.

_____ story hives.

The grower shall be entitled to inspect, or cause to be inspected, each colony of bees after giving reasonable notice to the beekeeper of this intent.

c. The beekeeper agrees to maintain the bees in proper pollinating conditions by judicious inspection and supering or honey removal as needed.

d. The beekeeper agrees to leave the bees on the crop until:(Fill in the appropriate line or lines and cross out those that do not apply)

Approximate date: _____
Time in relation to amount of crop bloom: _____
_____ days after written notice from the grower.
Other: _____

3. Responsibilities of the Grower

a. The grower agrees to provide a suitable place to locate the hives. The site must be accessible to a truck and other vehicles used in handling and servicing the colonies. The grower shall allow the beekeeper entry on the premises whenever necessary to service the bees, and the grower assumes full responsibility for all loss and damage to his fields or crops resulting from the use of trucks or other vehicles in handling and servicing such bees.

POLLINATION AGREEMENT (Continued)

3. Responsibilities of the Grower (Continued)

b. The grower agrees not to apply highly toxic pesticides to the crop while the bees are being used as pollinators nor immediately prior to their movement if the residue would endanger the colonies. The following pesticide materials, other agricultural chemicals, and methods of application are mutually agreed to be suitable while the bees are on the crop:

The grower agrees to notify the beekeeper if hazardous materials not listed are to be used. The cost of moving the bees away from and back to the crop to prevent damage from highly toxic materials shall be borne by the grower.

c. The grower agrees to pay for _____ colonies of bees at the rate of $_____ per colony. Payment shall be made to the beekeeper as follows:

$_____ per colony on delivery and the balance on or before _____ of said year. Additional moves or settings shall require $_____per hive per move.

d. The grower agrees to provide adequate watering facilities for the bees if none are available withing one-half mile of each colony used in pollinating the crop.

4. Performance.

It is understood and agreed that either party to this agreement shall be excused from the performance hereof in the event that, prior to delivery of the colonies, such performance is prevented by causes beyond the control of such party.

5. Arbitration.

If any controversy shall arise hereunder between the parties hereto, such controversy shall be settled by arbitration. Each party within 10 days shall appoint one arbitrator, and the two so named shall select a third, and the decision by any two such arbitrators shall be binding upon the parties hereto. The cost of such arbitration shall be divided equally between the parties.

6. Assignment or Transfer.

This agreement is not assignable or transferable by either party, except that the terms hereof shall be binding upon a successor by operation of law to the interest of either party.

IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year above.

_____	_____
Grower	Beekeeper
_____	_____
By	By
_____	_____
(address)	(address)
_____	_____