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F R U I T J O U R N A L

Update on Pest Management
and Crop Development

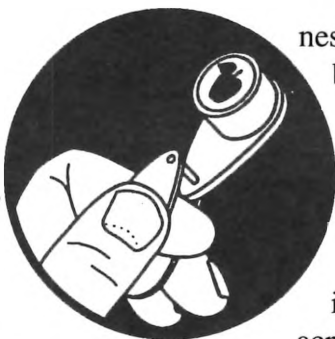
April 25, 2005

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Geneva, NY

ATTA BEE!

BEE TEAM:
HONEY BEES
AND
POLLINATION
(Nick Calderone,
Entomology,
Ithaca)



nesting sites for solitary bees and bumble bees. In addition, the flight range of solitary bees is not generally sufficient to ensure coverage of the interior portions of large plantings. Growers with large blocks of apples and other tree fruits may wish to increase the number of hives to one per acre. Modern cultivars with high blossom densities, such as trellised apples, also

require more pollinators. If your fruit set has been lower than expected in the past, or your fruits are lopsided or misshapen, you probably need to use more bees. Remember, if your fruit set is too high, you can always thin, but if it is too low, you are just out of luck. Move bees into apples, regardless of variety, right as the king blossoms begin to open.

Special requirements

Most other crops are adequately served by a single strong colony per acre; however, some crops have special requirements. **Red Delicious** apples have a flower structure that is different from that of most other common varieties such as McIntosh. The anthers on Red Delicious flowers

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PART I: GETTING THE MOST POLLINATION FOR YOUR DOLLAR

❖❖ Tree fruits, small fruits, and many vegetable crops, especially many of the vine crops, all require pollinating insects for a successful harvest. Remember! Not only is pollination important for a high yield, it is just as important for fruit size, shape and sweetness! A number of insects pollinate crops; but, for several reasons, the honey bee is the most versatile pollinator. Honey bees are available in large numbers throughout the growing season, they pollinate over 90 commercial crops, they are easily transported by truck, and they can be easily distributed throughout large plantings. In addition, they restrict their foraging activities to a single species on any given trip to the field. Compared with other pollinators, honey bees are very cost effective. A single strong, two-story colony provides 15–25 thousand foragers.

How many colonies?

New York growers have traditionally used about one colony of bees per three acres for apple pollination. This number may have been adequate in small orchards visited by feral honey bees and by solitary bees and bumble bees from adjacent hedgerows and woods. However, feral honey bee populations have been greatly reduced by parasitic bee mites, and modern agricultural practices have eliminated many natural

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are widespread, and bees learn to insert their mouthparts between them to obtain nectar. Consequently, the bees do not contact the flower's sexual parts and pollination does not take place. Since it takes time for bees to learn to obtain nectar in this way, you can counteract this problem by using more colonies per acre to increase the number of inexperienced bees in the orchard. Up to two colonies per acre may be needed in large stands of Red Delicious apples.

Pollination of **pears** will probably always be a problem because pear nectar contains only about 15% sugar versus 40% for apples, dandelions, and yellow rocket. The answer is to move the bees into the center of the pear block when the pears are at 50% bloom. It will take some time for the bees to discover better sources farther away, and in that time, the pears may be adequately pollinated. An alternative is to use more colonies per acre, which will increase the number of bees foraging within the orchard. **Sweet cherries** should be pollinated soon after they open. Therefore, bees should be moved in the day before bloom. Since sweet cherries require a high fruit set for a commercially viable crop, and since they bloom early in the season when the weather is often unfavorable for foraging, two colonies per acre may be required. Recent research at the Geneva Experiment Station has shown that **strawberries** benefit substantially from having hives of bees in the field during bloom.

Hive Placement

To obtain maximum benefit for your pollination dollar, always select good locations for the bees you rent. A good location slopes slightly to the south, is protected from the prevailing winds, is dry, and has as much exposure to sunlight as possible. It is important that colonies of honey bees be kept in full sunlight in order to warm the hives rapidly in the morning and entice the workers out of the hives on chilly spring mornings. Entrances should face south to southeast whenever possible.

Keep colonies on pallets or cinder blocks to keep the bottom boards 3–6 inches above the ground. Hives with wet bottom boards will be cooler and

have less foraging activity than dry colonies. A hive stand will also keep colonies above tall grass, which may shade or block the entrance. Place colonies in groups of 4–6 to take advantage of good locations. In large orchards and fields, groups of 10–20 hives can be used to take advantage of prime locations. It is best to locate hives near pollinizer rows where that consideration applies, such as with apples and sweet cherries.

Pesticides

Overall, pesticides are less of a problem to bees and beekeepers today than they were 10 and 20 years ago. Nevertheless, serious poisoning incidents still occur. It is important to read the pesticide label and to avoid using materials that are especially toxic to bees when there is a safer alternative available. Sevin (carbaryl) and Guthion (azinphosmethyl) are especially toxic to bees.

You can eliminate most damage to bees by following a few simple rules. Do not apply pesticides to flowers in bloom, as this will con-

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taminate the pollen and nectar sought by the bees. Unfortunately, pesticides often drift onto non-target crops and weeds, and honey bees are poisoned when they ingest the contaminated pollen and nectar. Keep flowering ground-cover plants mowed if you are going to spray in an orchard during the summer. Clover and dandelions are common problem for bees on orchard floors. Keep them mowed or use an herbicide.

Bees can also be poisoned when they collect water from sources that have been contaminated by drifting pesticides. Standing water in wheel ruts or old tires near your fields are prime sources of contaminated water. Provide a source of clean water near the hives. A wash tub filled with fresh water and straw works well. The straw gives the bees a place to land and drink without drowning.

You can minimize the dangers from drift by restricting spraying to periods when the winds are less than 5 mph. If possible, begin to spray in the evening, about an hour before sunset, because there is generally little wind at that time. Always use the largest droplet size possible when spraying, and check out the use of spray stickers to help minimize drift. Always dispose of empty pesticide containers in an appropriate manner. Remember! If too many bees are killed, your crops will not be adequately pollinated, and it may be necessary to rent more bees.

General Recommendations

Bees should be moved at night, and once the hives have been placed on location, they should be left there until the job is done. Moving bees in the daytime and moving them short distances at any time (less than 3 miles as the crow flies) will result in a serious loss of foragers and seriously damage the colony. Always contact the beekeepers if the need arises to move the bees. If you live in an area with known bear problems, use an electric fence to protect the bees. Keep nearby flowering plants mowed to reduce competition for the bees' attention.

The Beekeeper

I recommend establishing good working relations with several beekeepers to ensure that you have a ready supply of bees for pollination. Any individual beekeeper's situation may change over time, but if you work with several beekeepers, you should always have ready access to an adequate supply of colonies.

Availability and Pollination fees!!!!

During the past 5–6 years, beekeepers have learned a lesson all too familiar to most farmers: eventually, pests become resistant to pesticides. Today, honey bee colonies are often infected with strains of parasitic mites that are resistant to one or more pesticides, making control unpredictable or impossible. This fact has undoubtedly contributed to the high losses being reported this winter. Almond growers in California are desperately trying to attract beekeepers for pollination. In addition to the \$100.00+ offerings per colony, some growers are also willing to pay trucking fees to bring in bees from around the country. Conversations with New York beekeepers also indicate high winter losses. Adding to high winter losses, wholesale honey prices have been relatively high the past couple of years, and that shifts more of the surviving colonies from pollination to honey production. Finally, migratory beekeeping is highly dependent on trucking, and the rising cost of fuel will undoubtedly creep in to the fees charged for hives. Growers should expect to pay a premium for colonies this year.

It is wise to make payment schedules contingent on colony strength, with stronger colonies commanding higher rental fees than weaker ones. A good method is to specify a base price to be paid for a colony of a specified strength — measured in terms of combs of bees and combs of brood. Bonuses and penalties can be based on deviations from those specifications. Remember! The best deal may not always be the cheapest deal.

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Expectations

Remember! Bees are an essential part of your crop production system, but they are only one part. In many ways, they are like the fertilizers and chemicals that you buy. Each is essential, but none of them, by themselves, can guarantee a crop. Many things influence the quantity and quality of your crop. One is the weather. Bees will visit flowers and pollinate only if they can fly. Cool, rainy, and windy weather will delay, slow, or stop flight, and the beekeeper cannot do anything about the weather. Excessive heat during the summer can cause problems with fruit set in certain crops, like pumpkins. Again, this is beyond the beekeeper's control. Be clear up front about your expectations concerning the strength of the colonies you rent, and satisfy yourself that you have received what you expected. This will eliminate misunderstandings down the road.

TIP

Planning a new orchard? Be sure to determine if your main cultivars are self-sterile – like McIntosh and Red Delicious apples — or, worse yet, self-sterile and inter-incompatible like many popular cultivars of sweet cherries. If so, be sure to plant an adequate proportion of pollinizer cultivars. Be sure you select compatible pollinizers that bloom at the same time as your main variety. If you do not have pollinizers in your self-sterile stands, you can purchase compatible pollen and hive inserts, and let the bees you rent for pollination distribute the pollen from the hive to the blossoms.

PART II: Honey bees, Rental Fees, and Pollination Contracts

Making a decent living from farming demands close attention to costs, and it is only reasonable that a grower should seek out the best price for each of the inputs that go into his or her crop production system. When it comes to honey bees, however, most growers understand the need for quality hives, but they don't have the expertise to assess that quality. Most growers don't look inside the hives to see what they are renting, and even if they did, most

wouldn't know a good hive from a bad hive. The result is that the emphasis is usually on unit cost or number of boxes, rather than the actual value of the hive. This is not the best strategy for ensuring adequate pollination.

The best way to ensure the quality of the hives you rent is to spell out specifications for colony strength, payment fees and schedules, bonuses and penalties in a contract with the beekeeper. When you get the bees, take the time to inspect them to make sure that they meet the agreed upon specifications. You may need to hire an independent beekeeper to do this. The other thing you can do to ensure a sustainable supply of high quality honey bees for pollination is to pay well. That's right! Don't shop the bargain basements. It pays to pay top dollar for the top hives. If you make it possible for a beekeeper to make a living without cutting corners, you both win in the end.

It's always best to spell out the understanding between the grower and the beekeeper in a simple contract. This is less a matter of trust and more a matter of memories, which often fade after a few months. A contract should be drawn up several months before the bees are needed and should, at a minimum, address the following items:

1. Arrival/departure dates
2. Delivery locations (if the beekeeper is not familiar with your operation, specify that a grower representative will meet the beekeeper at the delivery site and see to it that the bees are placed at the right locations using reasonably well maintained roads)
3. Responsibility for setting up electric fences, if needed, to protect against bear damage
4. Responsibility for the cost of bear damage
5. The % of hives the grower will inspect (beekeeper is encouraged to participate)
6. Bonuses for hives placed in areas that are hard to reach
7. Accommodations for helping with trucks that

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become stuck

8. Legitimate problems, like truck breakdowns, that arise from time to time (ask that the beekeeper stay in communication with the farm starting at least a month before anticipated delivery date)

9. Definition of a base unit and a fee for a base unit. A reasonable base unit is a colony with 6–7 deep frames of brood and 8 deep frames of bees. The base rate for a base unit has been between \$40.00 and \$50.00 the past few years, depending on the crop.

10. Fee schedule:

0–3 frames brood = \$0.00

4–5 frames brood and bees = 20% less than base

4–5 frames brood with a full box of bees = base rate

6–7 frames of brood and 8 combs of bees = base rate

8–10 frames of brood and full box of bees = 20% above base rate

11. Bear fences if supplied by grower: deduct set amount per fence.

12. Bear fence if supplied by beekeeper: add set amount per fence.

13. Bonus for placing hives in hard to reach locations: set rate per hive.

14. Payment schedule: e.g., pay 1/3 upon delivery, 1/3 within 2 weeks of departure, and 1/3 within the next 30 days.

15. Penalty schedule for late payments: e.g., if grower fails to pay on time, add 1/2% interest per month to the balance.

Remember! You can hold the beekeeper to a high standard if you pay a reasonable fee, and, in return, the beekeeper will be more than happy to do whatever it takes to keep your account. That is all part of sustainability. ♦♦

PEST FOCUS

Geneva: 1st **spotted tentiform leafminer** caught today.



PHENOLOGIES

Geneva:

Apple (McIntosh): Tight cluster

Apple (Red Delicious): Early tight cluster

Apple (Empire): Tight cluster

Sweet cherry: White bud

Tart cherry (Mont.): Bud burst

Pear: Bud burst

Plum: Bud burst

Peach: 1/2 inch green

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UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1-4/25):	196.9	92.4
(Geneva 1/1-4/258/2004):	195.7	86.2
(Geneva "Normal"):	218	96
(Geneva 5/2 Predicted):	249	115

Coming Events:**Ranges(Normal± StDev):**

Comstock mealybug 1st gen. crawlers	215-441	80-254
European red mite egg hatch	231-337	100-168
Green fruitworm flight peak	94-200	34-92
Oriental fruit moth 1st catch	202-382	78-204
Redbanded leafroller 1st flight peak	230-380	103-193
Lesser appleworm 1st catch	239-537	104-286
Rose leafhopper nymphs on multiflora rose	239-397	96-198
STLM 1st oviposition	143-273	58-130
Green apple aphid present	111-265	38-134
Rosy apple aphid nymphs present	134-244	56-116
Obliquebanded leafroller larvae active	158-314	64-160
Pear thrips in pear buds	118-214	50-98
Pear psylla 1st egg hatch	174-328	60-166
McIntosh at pink	275-313	127-157
Red Delicious at pink	300-384	140-186
Peach at pink	187-251	78-118
Pear at green cluster	210-262	88-124
Plum at white bud	195-269	86-122
Sweet cherry at bloom	240-302	104-150
Tart cherry at white bud	234-298	103-143
Tart cherry at bloom	303-395	145-211

NOTE: Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide.

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