The Courtship of Honeybees, Buckwheat and Watermelon Blossoms

Increasing Pollinator Activity in Your Crop

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SOAP Presentation
There are many fruit and vegetable crops we consume that require pollinators to produce fruits and seeds.
With better understanding in crop production sciences, growers have managed their cropping activities to ensure a predictable outcome—successful crop yields. Cropping activities such as:

- Use green manure crop
- Construct deer fence
- Apply soil amendments
- Execute pest management strategies
But when it comes to crop pollination and pollinators most growers depend on nature’s generosity to provide insects to do the job for them and taken the task of pollination for granted.
However in the last 7 years, one of nature’s main pollinators for our crops, honeybee, has come under attack by pests that have threaten their population in wild and in managed hives. Small Hive Beetle, Varroa Mites and Wax Moth have gained a foothold in hives in our environment and endangered the health of our hives.
It has been projected that the wild unmanaged honey bee hives that many growers depend on will be impacted the most by their invasive pest.
It has been projected that the decline in honeybee population will affect our food production system. We may see an increase in shapen fruits a symptom of the lack of pollination activity.
Impact on crops may come gradually and symptoms like late fruit maturity may be mistakenly attributed to cool temperature or loss of early fruits to wind or fruit fly damage. Watermelon growers on Moloka‘i have complained about late fruit maturity up to 110 to 118 days after seeding for normal 84 to 96 days crop. Lateness in harvest increase opportunity and exposure to crop losses.
While it is not new with farmers to place honeybee hives to their field, it has become important that we develop cropping methods that include using multi-cropping systems to manage our pollination activities to insure predictable results. Initial trial failed because of mistiming of honey bee attraction to blossoms of buckwheat and watermelon, but showed potential. There was a needed to determine the relationship between bee and buckwheat to increase management precision.
This project attempted to develop an understanding in the relationship or the “courtship” between honey bees and buckwheat blossoms. Buckwheat is a fast maturing plant that produces seeds within 30 days and attract pollinators and other beneficial insects.

Planted 4 replicated 10 X10 plots of Buckwheat

Monitor and count honeybees to determine when they visit, for how long in the day and how long in the crop.
What determination made?

**Summer and Winter Day-Time Average Population of Bees per Square Foot of Buckwheat Blossoms**

- **Winter Avg Bee Population per Square Foot of Buckwheat at Time of Day**
- **Summer Avg Bee Population per Square Foot of Buckwheat at Time of Day**
Relationship Between Bee Day's Peak Population, @ 8:30 am for Summer and 9:30 am for Winter, to Cumulative Day Hours after Seeding

Winter Average Bee Population per Square Foot of Buckwheat Between Dec 27 to Jan 16

Summer Average Bee Population per Square Foot of Buckwheat Between Aug 26 to Sep 18

Cumulative Winter Day-Hour from Seeding

Cumulative Summer Day-Hours from Seeding
Relationship of Day's Peak Bee Population, 8:30 am for Summer and 9:30 for Winter, to Average Day Temperature

Winter Average Bee Population per Square Foot of Buckwheat Between Dec 27 to Jan 16

Summer Average Bee Population per Square Foot of Buckwheat Between Aug 26 to Sep 18

Temperature Data: USDA/PMC-Moloka‘i
Observations and recommendations from trial results:

• On the peak day, potentially a population of 64,000 honeybees could be attracted to an acre of summer buckwheat blossoms.

• On the peak day, potentially a population of 29,000 honeybees could be attracted to an acre of winter buckwheat blossoms.

• During the summer days, honeybee population peaks at 8:30 am.

• During the winter days, honeybee population peaks at 9:30 am.
• As a guide, in the summer, buckwheat should be seeded 21 to 27 days before early flowering of cucurbit crops.

• As a guide, in the winter, buckwheat should be seeded 24 to 31 days before early flowering of cucurbit crops.

• Do not conduct field activities that might disturb honeybee pollinating activities before noon.

• During the winter honeybees stay in the buckwheat field later than the summer.

• Honeybees appear on buckwheat blossoms plus or minus minutes of sunrise.

• Do not apply overhead sprinklers before noon as trial observation indicates that honeybee field activity is reduced or ceased during rainy periods.
• Both day length and ambient temperature influences the rate of buckwheat maturity, thus affect the timetable of honeybees in the field blossoms.

• It was observed that different plants attract honeybees at different time on the day. For example, population on honeybees on Sun Hemp, Crotolaria juncea, is the highest around 3:00 p.m.. Therefore it will be an ideal pollinator attractant for crops that are receptive to pollinators in the afternoon and not for cucurbit that is receptive for pollination in the morning.
Applying the Knowledge to a Watermelon Crop Production Management System

Knowledge Gained

- Honey bee attraction peak on buckwheat blossom at 27 DAS
- First female flower on watermelon appears at 48 DAS

Management Action

- Plant buckwheat seeds at least 21-27 days after watermelon is seeded