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Instrumental Insemination of Honey Bees Short Course

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My MS project is a practical and comprehensive training module for the advanced breeding technique of instrumental insemination of honey bee queens. Instrumental insemination allows for control over mating. Honey bee queens typically mate with 15-20 different drones in the air, making specific trait selection quite difficult. II is invaluable for concentrating specific traits in breeding stock, especially host pest resistance.

The commercial bee industry has become overly reliant on chemical solutions to control varroa mites in their IPM programs. With recent evidence of mite resistance to popular miticides, breeding for host resistance is critically important to sustain the industry. II is the top tier of three training modules I have submitted for advanced curriculum in UNL's master beekeeping program. "The Great Plains Master Beekeeping Program will provide training, education, outreach, and mentoring for beginning and advanced beekeepers that will improve colony survival and drive economic success."

The first module is queen rearing. Queen rearing is the functional cornerstone any breeding program or commercial producer relies on for economic success and sustainability. A steady supply of choice queens is vital to make up new colonies to replenish losses, retain for breeding stock, and for sale. The second is a training module for the testing of VSH (varroa sensitive hygiene.) VSH is the most powerful and effective set of host resistance traits that we are currently aware of. VSH enables the host to effectively mitigate the reproduction of their primary pest and improve colony health and survival. Since VSH is a hygiene mechanism, it is also highly effective in mitigating major brood diseases. The instrumental insemination training module(https://youtu.be/WBBQyYfNQFw)is the capstone to the three-part series. It will train queen producers to concentrate highly valuable traits like VSH in commercially viable honey bee stocks. Furthermore, it will encourage the production and use of host resistant stocks to increase the sustainability of honey bee IPM programs.

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Saline formulation for Instrumental Insemination of Honeybees

Simple Saline Solution- 100 ml.

100 ml. distilled water
1.0 g. sodium chloride
0.25 g. dihydrostreptomycin or gentamicin

Water Source

The water source used to make up solutions is important. Use double distilled water. When mixing or storing semen it is best to use HPLC (high pressure liquid chromotography) water.

Ph

The pH should be adjusted to 8.6. If the pH is too high use dilute HCL to adjust. If the pH is too low use NaOH to adjust.

To Sterilize

Bacteriological filtering is recommended. Use filter with a pore size of 0.2 um. Solutions can also be sterilized by heating to 350 F for 30 minutes. Note that heating will denature the antibiotic, add this after the solution has cooled.