

Intensive Workshops in Insect Artificial Diets: Theory and Practices

This workshop will be limited to 8 participants and will include 20 hours of lecture/theory and 25 hours of hands-on practice.

Major foci of the workshop:

1. Functions of diet components
2. Interactions of diet components
3. Quality control (QC) and process control (PC) of diet components and diets
4. Proper use of diet equipment
 - a. Sterilization/heating equipment
 - b. Equipment for measuring pH, water activity, water content
 - c. Grinding equipment
 - d. Filtering techniques
 - e. Freeze dryers
 - f. Video microscopy for development and QC
 - g. Balances
 - h. Volumetric equipment
 - i. Rheological equipment (measuring textural and liquid characteristics)
 - j. Spectrophotometers and other analytical equipment
5. Examples of each major type of diet (includes practice in making diets and feeding them to selected insects)
 - a. Liquid diets (xylem sap-, phloem sap- and nectar-feeding insects such as leafhoppers, aphids, and whiteflies)
 - b. Slurry diets (phytophagous plant bugs and stink bugs and predatory insects such as lacewings and big-eyed bugs)
 - c. Solid diets (such as mealworms honey bees)

- d. Gelled diets (most Lepidoptera larvae)
- 6. Rheology of insect diets (the nature and role of textural characteristics)
- 7. Developing new diets
- 8. Developing and managing SOPs (standard operating procedures)
- 9. Other topics as requested by participants

The workshops will be limited to 8 people, so that we can include intensive, hands-on practices in insect diets. We will investigate all the major variations of insect artificial diets: solid mixtures (such as mealworm diets), gelled diets (typical Lepidoptera diets), slurry diets (such as the Cohen *Lygus* diet and one of several of the Cohen predator diets), liquid diets (such as aphid and whitefly diets), and diets that must include plant materials such as those for several weed-eating insects. We will study the theoretical aspects of diets, including basic nutrition, hydrocolloids (and other aspects of texture), phagostimulation, diet stability, bioavailability, microbial contamination, etc. And we will teach the specifics of such practical things as diet processing (grinding, milling, mixing, heating, pH, water activity, moisture content, etc.)

Participants will get complete hands-on learning of freeze drying, measuring diet contents of protein, lipids, carbohydrates, minerals, antioxidants, as well as the science and technology of measuring diet texture (rheology). We will also have a comprehensive "how to" section on developing a statistically-based quality control/process control (QC/PC) program using the chemistry/ physical properties/ microbial characteristics knowledge learned in the workshop for you to take home to your lab. The QC/PC section will be taught by an industrial engineer who consults with IDRR on development of statistically-driven QC programs.

The workshop will be held in the Insect Diet & Rearing Workshop Laboratory, an adjacent (comfortable) meeting room, and in the labs of cooperators in Food Science, Microbiology, Forest Entomology, the NCSU Insectary, and several other rearing labs on campus.