

**Topic: Maintenance and measurement of
microclimatic conditions**

Subject: Research Methods in Entomology

Class: MS (Replica)

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Microclimatic conditions

- Microclimate is the suite of climatic conditions measured in localized areas, near the earth's surface.
- It is define as the climate that an organism actually experiences and, therefore, has to be able to tolerate.
- Organisms in the natural environment have been acclimatized to their microclimatic conditions.
- However in the lab special types of equipment and strategies used to control these microclimatic conditions.

Maintained the microclimatic conditions for rearing the insects

- Maintenance of microclimatic conditions in the lab is vital to the reliable operation of equipment and to the reliable production of quality insects.
- Appropriately qualified engineering personnel, and adequate stocks of supplies and replacement parts for filters and equipment, are essential.
- A regular programme of maintenance activities must be scheduled and adhered to rigorously.
- It is important that the equipment and building components selected for the facility are easy to maintain using locally available expertise.
- Computer-controlled monitored environmental equipment should be equipped in the lab as they can automatically detect changes in the rearing rooms and give the signals.

Important microclimatic conditions

- Insects are cold-blooded organisms, the temperature of their bodies is approximately the same as that of the environment. Therefore, temperature is probably the single most important environmental factor influencing insect behavior, distribution, development, survival, and reproduction. Insect life stage predictions are most often calculated using accumulated degree days from a base temperature and biofix point. Some researchers believe that the effect of temperature on insects largely overwhelms the effects of other environmental factors.

- The best system of temperature control is to heat/cool air by passing it over heating or cooling coils (using a refrigeration system) and then forcing it with fans into each room and area. Such a system has the capability to change the temperature rapidly. Temperature has great effect on the hatching on insect eggs. sunlight also very important for some insects while harmful for other insects ,so care should be taken during raring of insects.

Moisture content of the Air

- As the temperature of forced air is being controlled moisture can be added with steam, or removed. Dehumidification tends to be expensive, but is sometimes essential for incoming air; it is done by passing the air over cold coils and draining the water that collects. The RH in a rearing room decreases from 75 to 55% during the larval rearing period, and this dehumidification must be regulated by the environmental equipment.

Light intensity

- The light intensity is not critical, the main concern is to regulate the photoperiod to prevent (or induce) diapauses in developing larvae.
- The light source should illuminate all trays of diet in a larval rearing room; vertically positioned fluorescent tubes are appropriate for vertically stacked trays of diet on carts.
- Since lights produce heat, the tubes can be located within an air plenum behind clear plastic barriers.

Air pressure and movement

- Positive and negative air pressures are created by balancing inlet and outlet fans
- Air movement is needed to exchange air at a predetermined rate appropriate to each room. Air speed and the number of air exchanges/hour are important to control microbial contaminants especially when the diet dries out slowly during larval development.
- Horizontal (laminar) air flow between vertically stacked trays is absolutely necessary to control the rate of drying of the diet and to suppress growth of mould. This horizontal air flow is provided by air entering the room from many small holes in the side walls each tray receives air from a row of holes just above.

Air Cleanliness

- The air-handling system must contain filters to remove microbial contaminants, Virus particles and moth scales The 1st and 2nd filters should capture larger particles such as scales. The last filter must be a HEPA filter for very small particles (300 nm or larger).
- Filters must be changed as needed, and a programmed of checking and replacing
- Filters is vital. Air cleanliness must be monitored by periodic use of plated media.

Sanitation and Cleaning Equipments

- Sanitation is the control of microbial contamination. Proper sanitation reduces losses caused by spoilage of an insect diet, increases the efficiency of plant operation, results in easier maintenance of equipment and develops better employee relationships. The purpose of sanitation is to suppress microbial contamination to desired levels.
- Sanitation is vital for successful rearing of lepidopterans, especially when artificial diet is used. The diet-dispensing area and rearing rooms must be very clean. Besides clean air, the exposed surfaces of equipment and the surfaces of the rooms (ceiling, walls and floor) must be kept clean.

- At the end of the work day, floors must be washed and cleaned with a disinfectant. Walls and floors can be cleaned weekly with household ammonia or detergent or with 5% NaOCl and UV lamps.
- Prior to diet being dispensed, utensils and work surfaces must be cleaned with disinfectant or autoclaved.
- Ovens can be used to sterilize glassware (180°C for 2 h).
- Used diet trays are cleaned and autoclaved at 115.5°C and 18–20 psi for 1 h.