Mass production of BC Agents

- Mass production of BC Agents aims at increasing directly no. of & population size of NE.
- Why done?
  - Collecting from natural habitat & redistribute NE is impossible in large scale.
  - Permits release of sufficient number at any chosen time especially immediate request.
  - Allows multiple colonisations in space & time.

- So, success of BC... either through introduction OR augmentation depends largely on ability to mass produce BC agents... economically & efficiently.
- Efficiently? Sometimes difficult to propagate on natural hosts....
- Use factitious host... works quite well for egg parasitoids.
- The ideal goal... mass culture NE on artificial diet.

- Major concerns in mass culture (2):
  - Provision of abundant host... Must have proven technique to mass produce & continuous supply of pest’s host plant... then only can the pest be mass cultured.
  - Development of technique to assure... maximum reproductive capacity + optimum development + high survivorship of NE.

- So, ample supply of pest (host) is imperative.
- Called triple-phased programme... involving sequence of plant-pest-NE
- Facilities...
  - Short of excellent... labs., equipments, modular rooms, bioclimatic cabinets, walk-in environ. chambers, cold rooms, stores, etc.
  - Insectaries... with separate rooms for mixing diets, holding insects during oviposition, various developmental stages, etc. Also... air cleaning machines & exhaust hood for handling potentially contaminated cultures, planthouse for plant propagation, etc.

- Quarantine reception facility... well trained staffs, laboratories working in collaboration (foreign), detect intro. of noxious species... danger of intro new pest, parasites, pathogens of NE themselves, eg hyperparasites, biosystematist... to avoid poor identification... can lead to wrong intro.
- Successful set-up can even provide potential NE to other countries.
- Objective... simplicity of rearing... so that can easily raise the desired no. of NE quickly & as inexpensive as possible.
- Success... assembly line strategy realised.
What are the requirements for success?

• Scientist must fully understand... physical &
  chemical stimuli that mediate mating &
  oviposition; types of substrate & texture of
  surface... how they are placed... vertically, 
  horizontally, hanging, natural or artificial, etc.
• Avoid conditions leading to cannibalism, 
  superparasitism & host-mutilation, resorption 
  due to over-crowding or long holding time, etc.
• Care not to allow incidence of insect diseases... 
  thorough cleaning, protection from pest insects 
  like ants, hornets & scavangers.

• Artificial diets for NE...
  † Must be attractive & reasonably inexpensive.
  † Formulation must imitate natural food in terms of
    nutrition, palatability, chewability, etc.
  † To cut cost...a blend of artificial diet + stored
    natural(cold) food also acceptable.
  † Some ladybirds raised on artificial diet will not lay
    eggs...need to be fed natural hosts like aphids at later 
    stages of larval development
• In case of pathogens...
  † Virus must be cultured on host tissue.
  † Most bacteria & fungi can be cultured on non-host
    media... PD, SD, liquid media, selective media, 
    various other fermentation technology 
    (biofermenters).

• Cleanliness is of paramount importance.
• Modern laboratory facility...insect tissue culture 
  available...can obtain 100% pure culture of NPV...
  a technique adopted from cancer research...
  oncogene cell culture & biophsiology study.
• Good production... accompanied with suitable 
  formulation for field application...
• A new area of study... even application 
  technology may be different from chemical
  application... and storage ???

• Trouble-free Insectary !
• Constant awareness & vigilance...
• Routine inspection... preventative.
• Sanitation immaculately maintained... vacuum
  cleaning, antiseptics, free of possible pests &
  disease contamination... sterilise utensils.

• Have many small units...
  † facilitates detection of incipient invasion, minimise
    spread to other units, facilitates cleaning &
    disinfecting.
• Unit must be cleaned thoroughly after every
  turnover of culture... immediately destroy
  remainder of culture to avoid build up of
  secondary infestation of disease infection,
• Have contingency plan...
  † closure and condomwhen threatened with disease,
    invaders, etc.