



## Pest Management Tactics–A Major Challenge in Hydroponics Systems

(\* Chandan Kumar Panigrahi<sup>1</sup> and Simran Mahapatra<sup>2</sup>)

<sup>1</sup>Department of Entomology, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

<sup>2</sup>Department of Entomology, Faculty of Agricultural Sciences, Siksha 'O' Anusandhan, Deemed to be University, Bharatpur, Bhubaneswar, Odisha

\*Corresponding Author's email: [cpanigrahi99@gmail.com](mailto:cpanigrahi99@gmail.com)

### Abstract

Hydroponics represent a viable method for crop production, particularly where soil resources are diminished, or where land is not available. Merits of Hydroponics System over the Irrigating traditional system includes the efficient use of water, in Hydroponics farming, the water is re-circulated and allows plants to absorb what they require, then the remaining water go back to the system while in irrigating plants, only about 0.1 percent of the water is taken in the root system of a crop. Some are then released into the air through evapo-transpiration and the rest wasted down deep into the surface. It is essential that the grower become familiar with the commonly occurring pests in the area and with the recommended control measures. Some of the more common insects and diseases found that can adversely affect a growing crop are aphids, spider mites, thrips, whitefly, fungus gnats, shore flies, tomato leafminer, American serpentine leafminer, tomato pinworm, caterpillars, corn earworm, tomato fruit worm, cabbage looper, army worms, and hornworms.

### Introduction

Hydroponics (Greek words 'hydro' - water and 'ponos' - labour) is a method of growing plants using mineral nutrient solutions without soil. It is also called as "Controlled Environment Agriculture" (CEA). There are primarily two types of hydroponics systems viz. i) solution culture and ii) medium culture.

In solution culture, there is no solid medium for the roots to support, just the nutrient solution while the medium culture has a solid medium for the roots and is named for the type of medium being used.

Besides the advantage of growing crops in a controlled environment it also has several limitations like that of effective management of pest which hold the potential to cause blunders in crop production. The effective pest management refers following of several practices and is being listed. The kinds of pest problems a grower may confront and their control vary considerably from one geographic area to another.

The water footprint evaluated that it takes about 68 litres of water to produce a kg of lettuce through traditional methods and 1 kg of tomatoes required 100 litres of water to produce. Also, for every 1 kg of potato we consume, 136 litres of water is required in the growing process

**Management of insects and their respective steps**

S.No.	Steps	Description
01	Exclusion	Keeping insects out of the greenhouse
02	Sanitation	Keeping source material for insect breeding out of the greenhouse
03	Cultural	Engaging in practices that minimize insect infestations
04	Biological	Use of predator insects and other biological methods
05	Scouting	Use of yellow sticky boards and daily plant observations to judge insect types and populations
06	Insecticides	Use of recommended and approved chemicals for foliage application, chemigation, or fogging



**Fig 1. Steps involved in Management of Insecticides against hydroponic condition**

**Factors affecting the Incidence of Pest under Hydroponic Condition**

Daily monitoring procedures must be developed and routinely. It is important to be familiar with those levels of pest incidence considered damaging and therefore economically important to control. Every grower must be able to recognize at what level a pest can be tolerated and therefore requires no treatment.

- Effect of Light on incidence of pest :-** Light can have a significant effect on pests. Light can be used to attract insects to a control device or adjustment of light wavelengths can be used to keep pests, both insects and diseases, under control.
- Site Sanitation:-** Sanitation is by far the simplest and most important pest control procedure one can adopt. Since most pest problems are brought to the crop, preventing their entrance lies at the root of a good pest management program. Prevention includes using “clean” or sterilized containers, plants, water, growth media, etc. It means keeping the growing area free of foreign plants. Tools, equipment, materials (including clothing), hands, and footwear must be kept free of disease organisms.
- Prevention Procedures :-** Chemical-based prevention procedures are also important when dealing with pest problems known to be of common occurrence. For example, the best practice may be to keep plants “covered” with a pesticide to prevent commonly occurring insect or diseases from gaining a foothold. Maintaining specific spray or fumigation schedules may also be good practices in order to keep insect populations under control. An equally common practice is to vary the type of chemicals applied to prevent the development of pest immunity. Today, the trend is toward “natural” control of insect pests using predators, measures, such as “yellow sticky boards” and insect traps,

can be used to provide some degree of control as well as to alert the grower to what is present and at what population level. Because some diseases are carried by insects, plant infection can be prevented by controlling the insect vector.

4. **Cultivar Selection** :- Another very important means of pest control is the selection and use of resistant cultivars. They offer one of the best means of disease control (Bacterial and viral) as well as insects.

#### 5. Environmental Conditions and Cultural Practices

Control of pest problems that occur as a secondary effect becomes difficult or ineffective until the primary cause is identified and corrected. Older plant tissues become easy targets for some types of plant diseases and a desirable habitat for insects so it becomes important to determine the primary cause of a developing pest problem. Complete sterilization of the entire system between crops with steam or a chemical sterilant can eliminate disease. Control measures are devoted to keeping plant foliage dry and avoiding extremes in temperature. Dense plant canopies make an ideal habitat for many insects and diseases and inhibit the entry of pest chemicals resulting in ideal condition for the regeneration and rapid growth of pests. By keeping the plant canopy open, proper plant spacing, staking, and pruning, providing air movement up through the plant canopy, and reducing humidity provides a strong resistance against the insect pest.

### Conclusion

The warm and humid climate aimed at high crop production is also very conducive for the development of pests and diseases. Due to the high crop value and the high level of production costs the grower cannot afford to lose part of the crop, thus effective management of pests and diseases is crucial for economical operation.

Main pest management strategy is in prevention, The cultural practice has to include the immediate removal of plant debris and must include the prevention of spreading pests and diseases by carefully handling the crop without unnecessary movement, by using disinfected tools for pruning, cutting or harvesting causing wounds as entrance for infection. For the detection of flying pest insects sticky cards are used, blue for adult stages of thrips and yellow for whitefly and other flying insects. Each week the cards must be replaced and inspected on number and type of insects and this must be recorded for tracking the population trends. The leaf underside must be examined. For pest management biological control is a very good option for many insects but this option must be chosen at the start of the cultivation period. It is a good option to overcome the problem of resistance of harmful insects to chemical pesticides.

### References

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