INTRODUCTION
SUGARCANE CROPS

COTTON CROPS
CHAPTER-1

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India is well known as a basic agricultural country with many agro based industries forming the key to its economic development. Cotton crop with textile industries and its by-products and sugarcane crop with sugar industry and its by-products hold the primary and the secondary position respectively in agricultural economics. Sugarcane crop and cotton crop are frequently grown in rotation with one another by the farmers specially in tropical areas of Andra Pradesh, Gujarat, Maharastra and Tamil Nadu.

India is world’s largest producer of sugarcane and occupies about four million hectares of agricultural land with an average productivity of 70 tonnes of sugar per hectare. India stands first in the world in terms of sugar production by producing 14.5 million tonnes of sugar annually.

Cotton is a very important commercial crop grown in rotation with sugarcane in the tropical eco-zones of India. It sustains the textiles industry, a very well organized segment of the agro based industries in the country. During 1999 the area under cultivation of cotton was 8.53 million ha in India and a total production of 2.84 million tonnes was recorded with average yield of 333 kg/ha. Though India has largest area under cotton in the world, the production per unit area is considerably induced by the influence of various biotic and abiotic stresses. Losses caused by insect pests are one of the major factors for this low productivity.

The productivity of the cane is markedly influenced by several biotic and abiotic factors. Among the various factors, pests play a predominant role causing considerable losses to cane yield as well as to sugar output. David and
Nandagopal (1986) listed 264 insects infesting sugarcane in India. Of the listed, nine species of lepidopterous pests are considered as important to sugarcane. The shoot borer, *Chilo infuscatellus*, stalk borer, *C. auricilius* Ddgn. internode borer, *C. sacchariphagus indicus* (Kapur), top borer, *Scirpophaga excerptalis* Wlk. are the major pests spread almost all over the country.


Control of insects pest using pesticides often leads to complex problems such as insecticidal resistance, elimination of natural enemies, pest resurgence, toxic hazards to non-target insects and disruption of agro-ecosystem due to environmental pollution. These problems warrant development of newer technologies that are safe to the ecosystem, well being of mankind and dependent species of living organism.

Currently an interest has thus developed for eco-friendly biological control methods utilizing the entomopathogenic nematodes, of the families steinernematidae and heterorhabditidae in pest management systems (Gaugler and Kaya, 1990). Entomopathogenic nematodes are widely distributed in soils throughout the world (Kaya, 1990). These nematodes have potentialities in the bio-control of various insect pests. These nematodes have many positive attributes including ease of mass multiplication, application, inherent capacity to search for their hosts, safety to non-target organisms and exemption from registration with the environmental protection agency (Gaugler and Kaya, 1990). Also these nematodes have the ability to carry and introduce symbiotic
bacteria into the body cavity of insects and kill them within 48 h forming a durable infective stage which can be stored for long periods and persist in the natural environment (Poinar, 1990).

To explore the possibilities of using three important entomopathogenic nematodes, *H. indicus* Poinar, Karunakar and David (1992) *H. bacteriophora* Poinar (1976) and *S. glaseri* Steiner (1929) as biological control agents against important lepidopterous pests infesting sugarcane and cotton, studies were conducted with the following objectives:

1. Survey for occurrence of entomopathogenic nematodes in sugarcane and cotton fields of different areas of Tamil Nadu,
2. Identification of the nematode isolates through morphological and molecular studies,
3. Mass multiplication of symbiotic bacteria associated with entomopathogenic nematodes,
4. Study on the susceptibility of different lepidopterous pests of sugarcane and cotton to entomopathogenic nematodes,
5. Testing the efficacy of *H. indicus*, *H. bacteriophora* and *S. glaseri* specially against two selected pests such as *C. infuscattellus* and *H. armigera* in potted plants of sugarcane and cotton,
6. Determining the impact of different temperatures on infectivity and productivity of entomopathogenic nematodes,
7. Investigation on the growth pattern of symbiotic bacteria isolated from entomopathogenic nematodes at different temperatures,
8. Determining the effect of antidesiccants on the survival of *H. indicus*, *H. bacteriophora* and *S. glaseri* and
9. Studying the compatibility of different insecticides to entomopathogenic nematodes.

The results are presented here under and discussed.