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RESEARCH ARTICLE

ROLE OF ABIOTIC FACTORS AND FARMING METHODS IN THE MANAGEMENT OF THE PEST *LEUCINODES ORBONALIS* (GUENEE) ON *SOLANUM MELONGENA* L

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ABSTRACT

Brinjal (Eggplant) is one of the important vegetables which contributes 9% of total vegetables in India. It occupies an area of 5.10 lakh hectares with an annual production of 88.00 million tonnes in India. Brinjal (*Solanum melongena* L.) is one of the most popular and economically important vegetables among small-scale farmers and low-income consumers of Karnataka. The Brinjal Shoot and Fruit Borer (BSFB), *Leucinodes orbonalis* (Guenee) has been identified as the most destructive pest which causes serious damage during the fruiting stage and it is the primary limiting factor in brinjal production. Yield losses as high as 95% due to BSFB infestation has been reported. By habit, BSFB is an internal borer which damages the tender shoots and fruits. The normal measures like spraying pesticides do not solve the problem. The use of highly systemic chemicals at a high frequency makes the vegetables unfit for human consumption, ecologically unsafe and economically unviable leading to the exploration of physical and botanical methods. A survey was conducted in two major brinjal growing areas of Karnataka, namely, Magadi and Chikkabalapura to assess the available facilities for farming, extent of yield loss caused due to BSFB infestation, to understand the role of abiotic factors and pest management methods in practice and their efficiency. The survey results revealed that the variety Mysore Badane is most resistant to pest infestation. Cropping and irrigation methods can be used as tools to combat spread of pest infestation in an Integrated Pest Management (IPM) module. Statistical analysis has strengthened the understanding of the effect of abiotic factors on pest infestation. Ongoing laboratory experiments have shown that phytoextracts of commonly grown plants like Marigold are effective in suppression of the insect pest population and can be used in an IPM module.

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INTRODUCTION

Vegetables are an important constituent of human diet. Brinjal is an important dietary vegetable crop. Under sustainable farming it provides regular daily income to meet the day-to-day expenditure like wages for the labour, service charges for the machinery etc. Brinjal (*Solanum melongena* L.), also known as Eggplant, is one of the most popular and economically important vegetables among small-scale farmers and low-income consumers of South Asia and this region accounts for nearly 60% and 53% of world's area and production respectively. It is native of India and is grown throughout the country. It is an important vegetable due to its nutritive value, consisting of minerals like iron, phosphorous, calcium and vitamins A, B and C, unripe fruits are used primarily as vegetable in the country.

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In the world, brinjal is cultivated in an area of 1.128 m ha with a production of 1.7415 m t with an average productivity of 15,434 kg/ha. In India, brinjal is grown in almost all states with an area of 5.10 lakh hectares under cultivation and production of 88.0 lakh tons (Singhal, 2003). In Karnataka, it is cultivated on an area of 1, 21,241 ha with a production of 33,324 metric tonnes. The major brinjal growing districts are Belgaum, Dharwad, Bijapur, Hassan, Magadi and Mysore (Chamber *et al.,* 2005). Though brinjal is a summer crop, it is being grown throughout the year under irrigated condition due to its growing demands. Hence, it is subjected to attack by number of insect pests right from nursery stage till harvesting (Regupathy et al., 1997). Among the insect pests infesting brinjal, the major one is the Brinjal Shoot and Fruit Borer (BFSB), *Leucinodes orbonalis* (Guenee.). It is considered as the major pest of brinjal plant as it damages the crop throughout the year. This pest is reported from all brinjal growing areas of the world including Germany, Burma, USA, Srilanka and India. It is known to damage shoot and fruit of brinjal in all stages of its growth.

The yield loss due to the pest is to the extent of 70-92 per cent (Eswara Reddy and Srinivas, 2004). In early stage of the crop growth, larva bores into the shoots resulting in drooping, withering and drying of the affected shoots. During the reproductive stage of the plant, tiny larva bores into the flower buds and fruits, the bored hole is plugged with excreta. The infested fruits become unfit for consumption due to loss of quality and lose their market value. It is also reported that there will be reduction in vitamin C content to an extent of 68 per cent in the infested fruits (Hemi, 1955). As the insect spends majority of its life cycle inside the fruit it is difficult to completely understand the way in which it affects the fruit and to study its state inside the fruit.

A survey was conducted in two major brinjal growing areas of Karnataka, namely, Magadi and Chikkabalapura to assess the available facilities for farming, extent of yield loss caused due to BSFB infestation, to understand the role of abiotic factors and pest management methods in practice and their efficiency. Cropping and irrigation methods can be used as tools to combat spread of pest infestation in an Integrated Pest Management (IPM) module. Statistical analysis has strengthened the understanding of the effect of abiotic factors on pest infestation. The current survey was aimed at understanding the role of abiotic factors and farming methods in the management of the pest *Leucinodes orbonalis* (Guenee) on *Solanum melongena* L.

MATERIALS AND METHODS

The survey was conducted in two major brinjal growing areas of Karnataka, namely, Magadi and Chikkabalapura by means of questionnaire method. The survey aimed at achieving the following objectives:

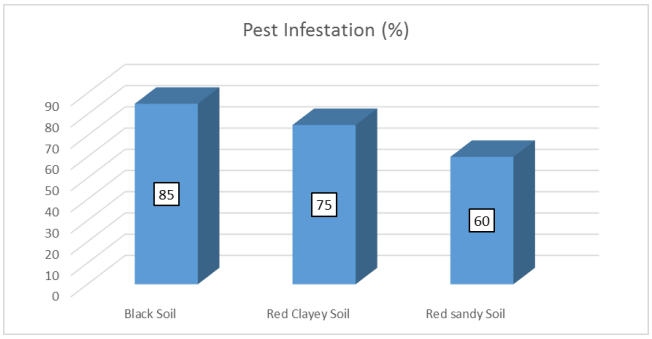
- Assessment of the available facilities for farming.
- Extent of yield loss caused due to BSFB infestation.
- Understanding the role of abiotic factors in the spread of pest infestation.
- Pest management methods in practice and their efficiency.

The survey was carried out by interviewing brinjal growers and farm owners in two prominent brinjal growing regions of Karnataka, namely, Motaganahalli (Magadi Taluk) and Chintamani (Chikkabalapura Dist.) by means of questionnaire method. A questionnaire was prepared to support efficient recording of the data collected after speaking to the farmers and owners. The survey also aimed at understanding the effect of various abiotic factors on the pest infestation. The survey was carried out in three different seasons of the year so as to be able to understand the variation in the effect of various abiotic factors on the pest infestation.

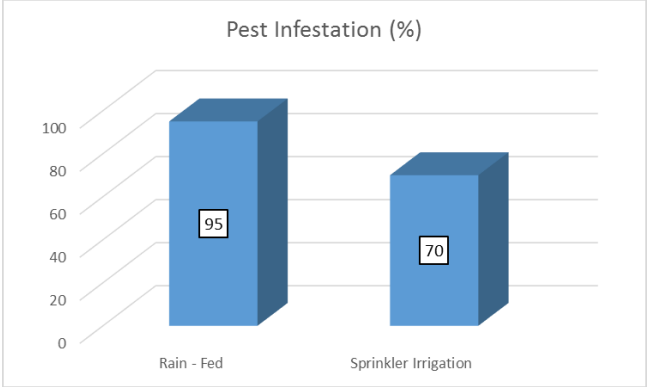
RESULTS

Effect of abiotic factors on pest infestation

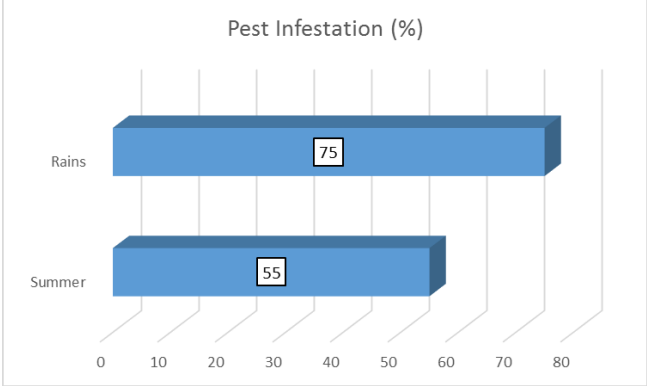
High moisture favours propagation of the insect pest. The survey revealed that three different soil types were almost uniformly distributed in the region of the survey. Crops grown on Red Sandy Soil showed comparatively lesser pest infestation than soils with higher moisture content.



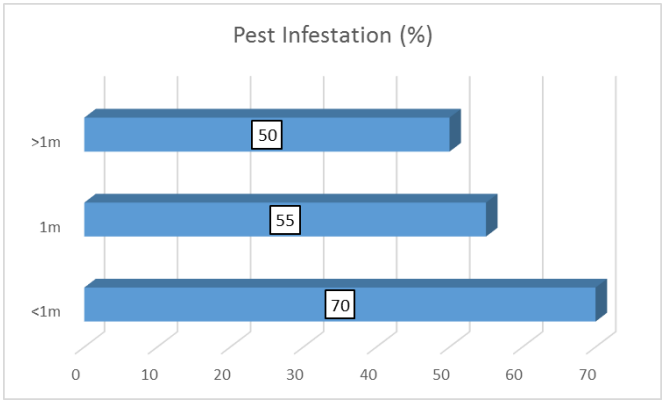
Rain fed Brinjal farms were more susceptible to pest infestation as compared to irrigated farms (sprinkler irrigation).



Pest infestation comes down in the summer



Spacing of plants at a distance of 1 metre apart or more was effective in checking the spread of pest infestation.



DISCUSSION

The survey indicates that high moisture content in the atmosphere and soil favours the propagation the insect pest *Leucinodes orbonalis* (Guenee) on the host plant *Solanum*

melongena L. This is in accordance with the fact that there has been a rise in infestation of the insect pest *Leucinodes orbonalis* (Guenee) in brinjal, a summer crop, which is being cultivated throughout the year owing to the growing demand for its fruits. Also, the insect pest *Leucinodes orbonalis* (Guenee) is an internal borer by feeding habit which makes studies on this insect more challenging and thus, it becomes difficult to combat the pest by means of insecticides only. Therefore, Integrated Pest Management (IPM) strategies are now being employed to combat the pest. The data collected by means of relevant survey greatly contributes in designing an IPM strategy to combat a pest. The present survey indicates that maintenance of low moisture level environment in brinjal growing areas minimizes the spread of pest infestation among the host plants. Low moisture conditions along with the use of suitable insecticides have been able to bring down the pest population significantly. Thus, reducing the yield loss due to pest infestation in brinjal.

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