Minireview Article

Efficacy of Abiotic Factors on larval and pupal Population Dynamics of Fruit Fly (Bactrocera dorsalis)

Abstract

The fruit fly B. dorsalis is a serious fruit and vegetable pest in South-East Asia. Causes 25-100% loss of horticultural crops by laying eggs under the skin of mangoes, peaches, guava, apricots and figs. Gardens were randomly selected and installed with methyleugenol pheromone traps to study the population dynamics of Bactrocera dorsalis and correlate with abiotic factors. Bactrocera dorsalis populations are greatest at high temperatures and low humidity.

Keywords: Bactrocera dorsalis, Fruit fly, Abiotic factors, Methyl eugenol

Introduction

Pakistan is endowed with vast agricultural resources. In 2019, Pakistan's total cropped area was 22.1 million hectares. Of this, food crops are limited to 65.8%, cash crops to 24.4%, legumes to 6.7%, edible oilseeds to 3.3%, vegetable planted area to about 0.62, and 3.1% of the total planted area to occupy. Pakistan produces a wide variety of fruits with a total production of 9.83 tons on an area of 743.6 thousand hectares. From this production, 768,200 tons of fruit were exported to other countries. Pakistan produces a wide variety of fruits with a total production of 9.83 tons on an area of 743.6 thousand hectares. From this production, 768,200 tons of fruit were exported to other countries. Citrus is Pakistan's top crop in terms of value in international trade. Pakistan is the world's largest producer of a special kind of reticular variety (KINNOW) and oranges, with an annual harvest of 2.4 million tons. Fruits and vegetables are of great importance to humans in many diseases (Kader, 2001; Oguntibeju et al., 2013). Rich in nutrients, minerals, vitamins and enzymes. In addition, they have high medicinal properties. Unfortunately some pests, such as fruit flies, are considered major pests of fresh fruits and vegetables and have successfully adapted their life cycle to most cultivated fruits with unique consequences. Drosophila is the most serious agricultural pest, exerting economic impacts on tropical and subtropical agriculture in many parts of the world and posing a growing threat to colonization of new areas (Mishra et al., 2012). It is a highly destructive fruit pest. Drosophila are the most serious pests of all tropical and subtropical horticultural crops. They damage fruits and vegetables by laying eggs under the skin where the eggs hatch in order to feed the larvae that feed on the flesh of rotting fruits and vegetables. Infected fruits and vegetables rot quickly, and inedible crops fall to the ground prematurely, greatly reducing production. It is also called Oriental fruit fly. Oriental fruit flies acquire destructive status only in subtropical habitats (John and Armitage, 1949). Under these conditions, 1200-1500 eggs can be laid per female. West Pakistan's pears, peaches, apricots, figs and other fruits show 50-80% infection. Fruit flies lay eggs inside the fruit, which hatch inside the larvae. The larvae feed on fruits and rot the pulp of fruits and vegetables. Sanitation is the most effective way to combat fruit fly infestations. To reduce populations and disrupt reproductive cycles, infected fruits and vegetables must be removed from orchards and buried in fields. The purpose of this study was to determine the correlation between variations in B. dorsalis populations in different seasons and biological pressures as Temperature and Humidity.

Materials and Methods

The purpose of this study is to estimate the population dynamics of Drosophila (larvae and pupae) in different host plants. Installation of pheromone traps in different orchards using methyleugenol as the sex-attractant chemical. Temperature and humidity data were collected by field thermometers and hygrometers. The objective was to investigate the population dynamics of Drosophila (Bactrocera dorsalis) and to observe the effects of temperature and humidity on Drosophila larvae and pupae.

Results

The lowest mean fruit fly larvae were recorded at the lowest mean temperature and highest mean humidity, and the highest mean temperature and lowest mean humidity recorded the highest mean larval populations for both. Highest mean fruit fly pupal populations in various orchards recorded when the yard experienced the highest temperature and humidity. The lowest average pupal population was observed in the same yard with the lowest average temperature and highest average humidity.

Discussion

The world's largest B. Dorsalis population is present in almost every orchard, making it challenging to grow fruits and vegetables. It has been noted that the number of fruit flies increased in the summer and declined in the autumn as a result of the drop in temperature and humidity. According to reports, the ideal temperature ranges between 18°C and 30°C, whereas the best temperature ranges between 15°C to 34°C for the reproduction and development of Bactrocera dorsalis (Vayssieres et al.,2009). When temperatures drop below the threshold temperature of 18°C, larvae and pupae continue to develop and the ratio of adults emerging from the ground decreases. Most larvae and adults die when temperatures rise above 34°C or fall below 15°C.

The population of B. dorsalis is seen to increase with rising temperatures, but only up to a certain point. It demonstrates a positive association between the number of fruit flies and the highest temperature. While observing humidity (%), it was found that during low humidity, egg population and development were high. Fruit flies were shown to be significantly correlated with temperature and rainy days.

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