



## Fluctuation of *Phorticella striata* in mango plantations of Dharwad District.

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### Abstract

Seasonal variation of *P. striata* was studied from May 2010 to April 2013 in five mango plantation sites of Dharwad District. It revealed that there was an increase in population with respect to the fruiting season of mango (May and June), and it decreased after the fruiting season. The fluctuation is due to the changes in the microhabitat of the collection sites.

### Introduction

Drosophilidae are considered as model organisms in ecological studies, because they show variations in their population sizes and they have diverse species distribution. They also possess an enormous amount of intra- and interspecific variation which enables to study the evolutionary relationship of this group of insects (Parsons, 1973). Studies on the community composition of the species over time have now become an important criteria for ecologists because of widespread changes in climate that are now taking place (Markow and O' Grady, 2006). In most of the habitats, plant communities provide the physical structure of the environment, and, hence, it plays a considerable role on the distribution and interactions of animal species (Tews *et al.*, 2004).

*Drosophila* flies are generally attracted to fruits especially fallen fruits under natural conditions. *Phorticella striata* is a non-drosophilid genus of the family Drosophilidae which is endemic to South India. They are large yellow flies with two distinct longitudinal chalky white striations extending from the base of antennae to tip of scutellum (Sajjan and Krishnamurthy, 1975). Seasonal changes in *P. striata* populations have been studied with reference to altitude, rainfall, and temperature in the forests of South Western Ghats and Mysore region. It was found to be one of the dominating species at all the seasons (Guruprasad and Hegde, 2006; Prakash and Ramachandra, 2008; Pranesh and Harini, 2012).

Dharwad district lies in the north western sector of Karnataka state with varied climate consisting of rugged foothills (part of Western Ghats) and plain lands (maidan). It lies between the latitudinal parallels of 15° 15' and 15° 35' North and longitudes of 75° 00' and 75° 20' East. There are no reports on *P. striata* population fluctuation or variation with respect to a particular fruit plantation at different seasons. In view of this, it is planned to study the populations of *P. striata* in different mango plantations.

### Materials and Methods

**Collection:** *Drosophila* flies were collected in five different sites of mango plantations of Dharwad district from May 2010 to May 2013 using bottle trapping and net sweeping methods. These sites were named as site 1, site 2, site 3, site 4, and site 5. Site 1 and site 2 are considered under western ghat belt which receive more rainfall (more than 713 mm), whereas site 3, 4, and 5 come under the plain lands, which receive scanty rainfall (less than 713 mm). The distance from site 1 to

site 2 is about 30 km west, site 3 is 20 km south, site 4 is 45 km east, and site 5 is 45 km north. In trapping method, 250 ml capacity bottles containing about 1 cm of smashed over-ripened banana fruit sprayed with yeast were tied to the twigs of mango trees about 2½ feet above the ground. Bottles were collected after 48 hours by plugging the mouth with cotton and brought to the laboratory. Net sweeping was also done for collecting the flies using rotting banana fruits, which were placed beneath the shaded areas of mango trees. The flies attracted to the fruits were swept using insect collecting net in the early morning after two days and were transferred to fresh media bottles. The flies collected were transferred to the fresh bottles containing wheat cream agar medium prepared as per the procedure of Shivanna *et al.* (1996). They were identified according to their characters as described by Bock and Wheeler (1972), Sajjan and Krishnamurthy (1975), and Markow and O'Grady (2006).

## Results

Figure 1 depicts the seasonal variation of *P. striata* of five sites in different months. Average population size calculated for three years showed maximum number of flies during the mango harvesting season (May and June), whereas there was decline in its population after the month of June and by the time of winter (January and February) it reaches zero. But again from the month of April, there is an increase in its population, which reaches its maximum level during May and June. Figure 1 also revealed the variations of average population size among five different sites. Sites 1 and 2, on an average, receive more rainfall (more than 713 mm) and had maximum (392.1 and 160) flies, whereas sites 3, 4, and 5 receive lesser rainfall (less than 713 mm) and had maximum (34.6, 92, and 69.7) flies. There was a steep decrease in population size of *P. striata* after the month of June in case of site 1, whereas in site 2 there was a gradual decrease in population size during monsoon, and it was more when compared to site 1. In sites 3, 4, and 5 similar observations were made as that of site 1, but there was a difference in the number of flies obtained.

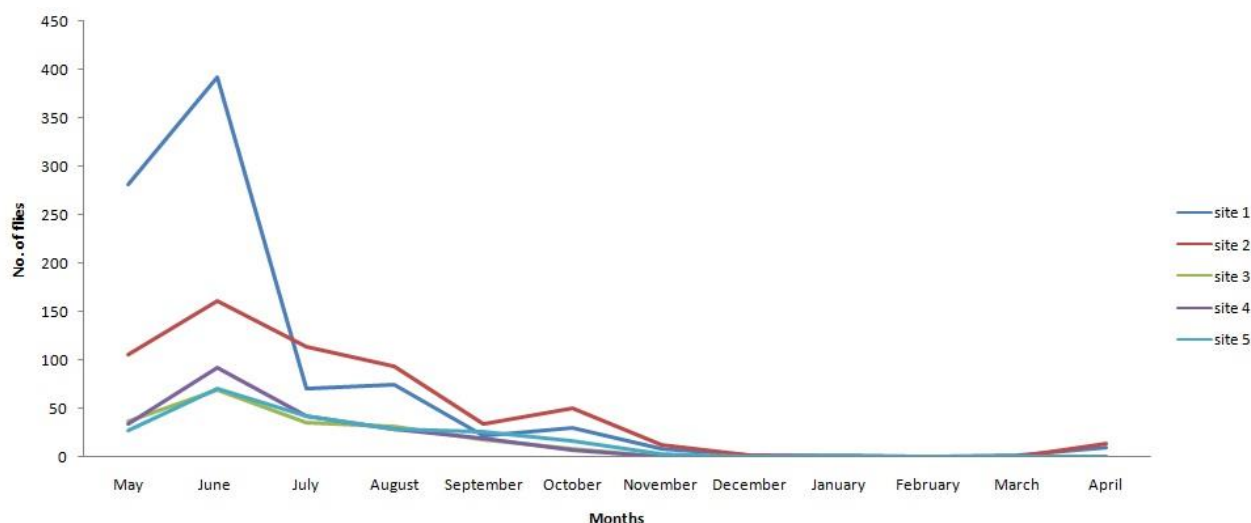


Figure 1. Average population size of *P. striata* in five different sites of mango plantations from May 2010 to April 2013.

## Discussion

*Mangifera indica*, which is the major horticultural crop in Dharwad district, is grown in an approximately 3136 ha area with 5450 tonnes of yield. May and June is the mango fruit harvesting season; during this period maximum yield is obtained. The review of Parsons (1973) states that population expansion of *D. ananassae*, *D. hypocausta*, and *D. anuda* in a tropical wet climate (Moen Island, Truk, eastern Caroline Islands) is due to the presence of fruit-trees. The range of species is determined by the availability of its host plant range (Barker *et al.*, 2005). The present study reveals that *P. striata* predominantly depends/ is found in mango fruiting season (Figure 1). Population variation of *P. striata* between sites is also because of their physiographical conditions. Sites 1 and 2 are located at the edge of hilly regions of Western Ghats and receive more rainfall, whereas sites 3, 4, and 5 come under the arid zones, which are plain lands receiving less rainfall. Sites 1 and 2 are known as vibrant mango growth regions with higher yield, site 3 comes under medium mango growing regions, whereas sites 4 and 5 are low mango growing regions (Dharwad District Profile, 2011). Species belonging to the genus *Drosophila* were found to be abundant during monsoon and post-monsoon seasons and were found less during winter and summer (Prakash and Reddy, 1978; Prakash and Ramachandra, 2008; Guruprasad *et al.*, 2010). Monsoon season provides sufficient rainfall, which also provides moisture to the soils, and in post-monsoon season this moisture is retained till winter and hence provides enough resources for *Drosophila* species to survive (Hegde *et al.*, 2001). The present study on *P. striata* contradicts the earlier studies on *Drosophila* variation during different seasons. Even though *P. striata* was predominantly found in mango plantations during its fruiting season, it is not considered as a pest of mango as they are not primary infectors like other fruit flies (*Bactrocera dorsalis*, *B. correcta*, and *B. zonata*) in India (Verghese *et al.*, 2006). There are no reports of *P. striata* species being considered as pest of mango fruit. During most of the seasons, *P. striata* species were found to be feeding on fallen fruits. Hence, it cannot be considered as a pest of the mango fruit.

The comparison of the population showed that in site 1 the number of flies is more (392) than at other sites, wherein site 3 has the lowest of 69 flies. This shows that there is variation in the number of flies among the sites; it is due to physiogeographic variations. During harvesting season of mango the flies are more frequent in all the sites. After the season in some sites it drastically drops in number, whereas in other sites it gradually decreases. The variations/ fluctuations in number of flies are due to variations in the surrounding microhabitats of the plantations. Further studies on micro habitats may provide information on complexity of species interaction and biodiversity of *Drosophilids*.

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### **Sex comb size in *Drosophila melanogaster* males maintained on carrot and banana substrates.**

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Sex comb in *Drosophila melanogaster* male represents one of the secondary sexual traits. It is located on prothoracic legs and is composed of dark, strong bristles, usually referred to in the literature as “teeth” (Figure 1). This species possesses one row of sex combs, with an important role during courtship and copulation (Spieth, 1952). The relationship between size and symmetry of this trait and male mating success was reported for different sophophorans (Markow *et al.*, 1996; Polak *et al.*, 2004; Ng and Kopp, 2008; Pavković-Lučić and Kekić, 2011; Vishalakshi, 2011; Pavković-Lučić *et al.*, 2013a). Sex comb differs in the number of rows, bristle orientation, their color, size, and shape; these are of taxonomic importance (Mishra and Singh, 2006; Tanaka *et al.*, 2009). Besides, there is variability in teeth number in different strains of the same species. Phenotypic and genotypic variation underlying sex comb teeth number were thoroughly studied (Ahuja *et al.*, 2011), as this quantitative trait is determined by both genes (see for review Nuzhdin and Reiwitch, 2000; Kopp, 2011) and environmental factors during development.

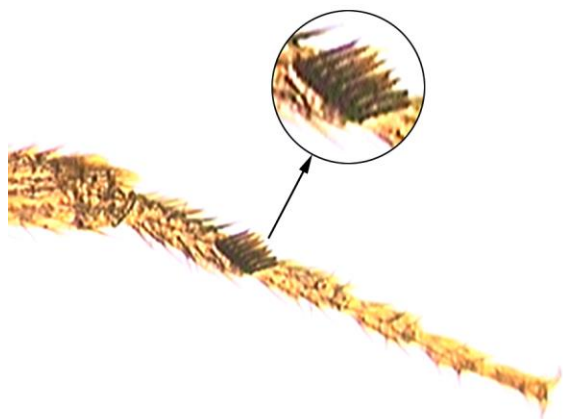


Figure 1. Foreleg of *Drosophila melanogaster* male with sex comb.

In this note, we investigated effects of long-term maintenance of flies on two substrates on male sex comb teeth number. Flies were reared more than twelve years, over 300 generations, on two substrates prepared with carrot and banana (for recipes see Kekić and Pavković-Lučić, 2003), in laboratory conditions optimal for the species (at a temperature

of approx. 25°C, relative humidity of 60%, 300 lux of illumination, and 12 h:12 h light/dark cycle). Fifty males from both substrates were randomly taken and their front legs were carefully removed