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Influence of physico-chemical traits of bitter gourd, *Momordica charantia* L. on larval density and resistance to melon fruit fly, *Bactrocera cucurbitae* (Coquillett)

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Abstract: Melon fruit fly, *Bactrocera cucurbitae* (Coquillett) is one of the most important pests of bitter gourd, *Momordica charantia* L. Because of the difficulties associated with chemical control of this pest, it is important to identify the traits associated with resistance and their influence on pest multiplication. There were significant differences in test genotypes for fruit infestation and larval density/fruit. The wild accessions, IC 256185, IC 248256, IC 213311, IC 248282, IC 256110 and IC 248281 were identified as resistance sources to melon fruit fly. There was a significant and positive correlation ($r = 0.96$) between percentage fruit infestation and larval density/fruit. Percentage fruit infestation and larval density/fruit were positively correlated with depth of ribs, flesh thickness, fruit diameter and fruit length, and negatively associated with fruit toughness. Flesh thickness and fruit diameter explained 93.0% of the total variation for fruit fly infestation, and flesh thickness and fruit length explained 76.3% of the variation for larval density/fruit. Ascorbic acid, nitrogen, phosphorus, potassium, protein, reducing sugars, non-reducing sugars and total sugars were negatively correlated, while the moisture content showed a positive association with fruit fly infestation and larval density/fruit. Moisture, potassium and reducing sugar content explained 97.4% of the total variation in fruit infestation, while moisture, phosphorus, protein, reducing and total sugars explained 85.7% variation for larval density/fruit.

Key words: *Bactrocera cucurbitae*, *Momordica charantia*, bases of resistance, bitter gourd, physico-chemical traits

1 Introduction

Bitter gourd (*Momordica charantia* L.) is a popular vegetable cultivated throughout Asia, especially India, Pakistan, Sri Lanka and China. It is also grown as an ornamental crop in other parts of the world (Walters and Walters, 1988). Each and every part of this plant has nutritive or medical significance, and has a long association with human beings (Morton, 1967). Insect pests are a major constraint for increasing the production and productivity of this crop. Forty-three species have been described under the genus *Bactrocera*, which are distributed throughout the temperate, tropical and sub-tropical regions of the world, especially Asia, Africa and Australia, but India is considered as its native home (Syed, 1969; Cavalloro, 1983; Drew and Hooper, 1983; Munro, 1984; Fletcher, 1987). Amongst these, *Bactrocera cucurbitae* (Coquillett) (Dipt., Tephritidae) is a major threat to cucurbits (Shah et al., 1948). The melon fruit fly has been observed on 81 host plants, but bitter gourd is one of the most preferred hosts and has been a major limiting factor in obtaining good quality fruits and high yield (Srinivasan, 1959; Lall and Singh, 1969; Mote, 1975; Rabindranath and Pillai, 1986). The extents of losses vary between 30 and 100%, depending on the cucurbit species and the season.

It prefers young, green and tender fruits for egg laying. The females lay the eggs 2–4 mm deep in the fruit pulp and hatch in 1.0–5.1 days (Koul and Bhagat, 1994; Hollingsworth et al., 1997). The maggots feed inside the developing fruits and complete its larval development in 3–6 days (Gupta and Verma, 1995). Young larvae leave the necrotic region and move to healthy tissue, where they often introduce various pathogens and hasten fruit decomposition. The fruits attacked in early stages fail to develop properly, and drop down or rot on the plant. The full-grown maggots move to the soil from 0.5 to 15 cm deep for pupation, and pupal development is completed in 7–13 days depending on the temperature and host (Hollingsworth et al., 1997). The melon fly remains active throughout the year on one or the other host and the adult females live longer (65–249 days) than the males (27.5–133.5 days). During the severe winter months, they hide and huddle together under dried leaves of bushes and trees. During the hot and dry season, the flies take