

## Influence of abiotic environmental factors on incidence of melon fruit fly (*Bactrocera cucurbitae* Coq.) on bittergourd

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Bittergourd (*Momordica charantia* L.) is an important vegetable crop cultivated extensively in the subtropical and tropical countries. For cucurbits, especially bitter gourd, the melon fruit fly (*Bactrocera cucurbitae* Coq.) damage is the major limiting factor in obtaining good quality fruits and high yields (9). Extent of yield loss caused by the pest to cucurbitaceous vegetables ranged from 30 to 100% depending upon cucurbit species and the season in different parts of the world (4). The melon fruit fly activity varies a lot depending mostly on the prevailing climatic conditions and the diversity of other hosts in a particular agro-ecosystem (3). In view to determine the appropriate time of action and suitable management practices to be adopted regular crop pest surveillance and monitoring needs to be developed. Keeping these facts in mind, study was carried out on periodicity of occurrence of melon fruit fly in relation to various abiotic environmental factors as a help to evolve an effective and economical strategy of management. The experiment was conducted at the Incheck farm, 'C' Block, Bidhan Chandra Krishi Viswavidyalaya (BCKV), Kalyani, Nadia, West Bengal which was located at 22.5° N latitude and 88.22° E longitude at an elevation of 9.75m above sea

level during two consecutive years i.e. 2010-2011 and 2011-2012 from the December fortnight to March fortnight. Local variety, Medinipore Garbeta was replicated two times of plot size 8m<sup>2</sup> (2m×4m) with a plant spacing 100cm × 40cm following all agronomical practices excluding plant protection. Observations on incidence of melon fruit fly was recorded on the basis of number of fruits damaged by the pest at seven days interval at early hours during the whole period of crop growing season. Maggots per infested fruits were counted. These data were later converted to maggot population per fruit with formula used by Barma and Jha (2).

$$\text{Maggot population per fruit} = \frac{\text{No. of infested fruits} \times \text{No. of maggots per infested fruit}}{\text{Total no. of fruit sampled}}$$

Meteorological data viz., Average maximum and minimum temperature (°C), total rainfall (mm) and average maximum and minimum relative humidity (%) were collected from the Department of Agricultural Meteorology and Physics, BCKV, Kalyani, Nadia, West Bengal. Pooled correlation was done with the incidence of pest using SPSS software. Fruit fly (*B. cucurbitae*), one of the most serious pests of bittergourd along with all members of family Cucurbitaceae occurred from first week of

February, 2011 when the average maximum and minimum temperature varied from 28.2<sup>0</sup> C to 9.8<sup>0</sup> C and average maximum and minimum relative humidity (RH) ranged from 96% and 31%, respectively with no rainfall and continued till the crop was finally harvested (second week of March) during 2010-11 (Fig. 1). Whereas during 2011-12, pest recorded from fourth week of January, 2012 when the average maximum and minimum temperature varied from 28.7<sup>0</sup> C to 9<sup>0</sup> C and average maximum and minimum RH ranged from 95% and 38%, respectively with no rainfall (Fig. 1). During 2010-11, maggot incidence was gradually increased up to the fourth week of February, 2011 and subsequently reached to its peak level (17.8 maggots/fruit) during the first week of March, 2011 with corresponding highest fruit damage of 88% during the same week (Fig. 1) when the average maximum and minimum temperature varied from 36<sup>0</sup> C to 11<sup>0</sup> C and average maximum and minimum RH ranged from 93% and 29%, respectively with 1.0mm total rainfall. Then during last part (*i.e.* March second week) incidence was found to be declined. In the next year of observation (2011-12), certain fluctuation in maggot incidence and infestation has been observed as it started one week earlier from previous year of observation (2011-12). From the fourth week of January, 2012 maggot incidence was gradually increased up to third week of February, 2012, and reached to its peak level (15.6 maggots/fruit) during fourth week of February, 2012 with corresponding fruit damage of 47%

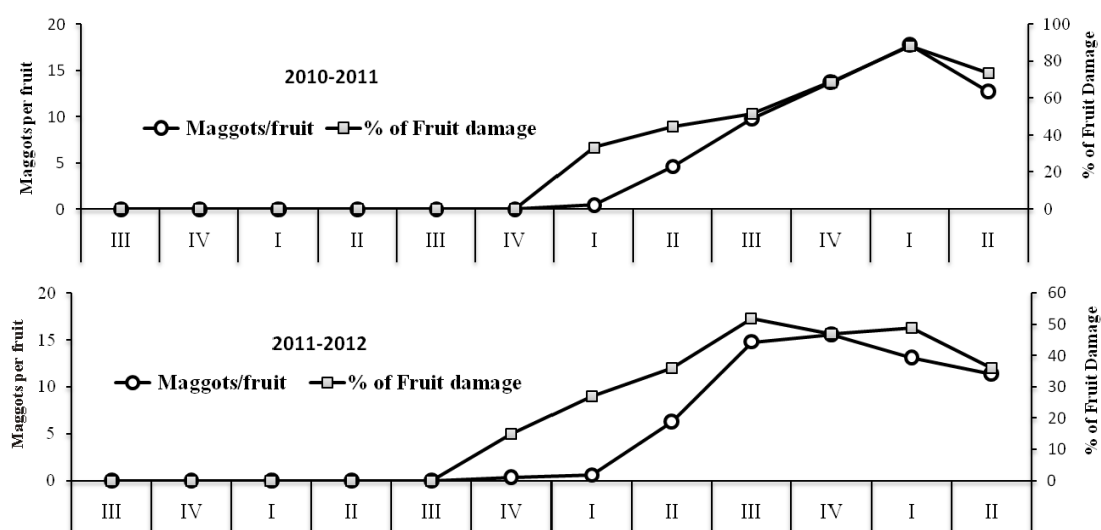
when the average maximum and minimum temperature varied from 31<sup>0</sup> C to 11<sup>0</sup> C and average maximum and minimum RH ranged from 95% and 27%, respectively with 1.3mm total rainfall (Fig. 1). On the other hand, the highest fruit damage of 52% was noticed during third week of February, 2012. In present study, the prevalence activity of fruit fly was observed during the two months *i.e.* February and March. The observations was in conformity with Patel and Patel (7) who reported that fruit infestation by melon fly starting from the month of February reaching peak during March. Banerji *et al.* (1) studied incidence and reported highest infestation of melon fly on bitter gourd during kharif season followed by summer season and lowest in *rabi* sown crop. Krishna Kumar *et al.* (6), reported maximum infestation on bittergourd (77.03 %), followed by on ridge gourd (75.65 %), and cucumber (73.83 %). Relating the weather factors with incidence of maggots revealed significant positive correlation with both maximum ( $r = + 0.928$ ) and minimum ( $r = + 0.854$ ) temperature whereas, minimum RH ( $r = -0.857$ ) showed negatively significant correlation. Maximum RH ( $r = -0.354$ ) was negatively non-significantly correlated. Total rainfall ( $r = +0.518$ ) had no any significant effect on incidence of the pest. The present findings are in similar to Laskar and Chatterjee (6) who studied the effect of meteorological factors on the population dynamics of melon fly in the foot hills of Himalaya and observed the same findings in their studies that the mean maximum, minimum tempera-

ture showed positive and significant correlation, whereas relative humidity negatively correlated with fruit fly incidence. Results are also very close to that reported by Raghuvanshi *et al.* (8).

Infestation of melon fruit fly is found to be a key factor in reducing the quality and quantity of the bitter gourd. So it was essential to know the peak period of occurrence of this pest in view of getting higher yield. Keeping these facts in mind, current investigation was conducted on population fluctuation and effect of abiotic environmental factors to evolve an effective and economical strategy of management of this pest. In this study, population of fruit fly found to be active during February to harvesting stage of crop. Variability in abiotic factors found to be responsible for certain changes in fruit fly incidence and abiotic factors such as temperature (both maximum and minimum), rainfall and RH had significant association with fruit fly incidence on bitter gourd.

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**Fig. 1** Incidence and infestation of melon fruit fly on bitter gourd during 2010-2011 and 2011-2012