

## SEASONAL INCIDENCE OF INSECT PESTS ON CUCURBITS IN RAJASTHAN

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### ABSTRACT

Seasonal incidence of insect pests on ten cucurbit species was studied in semi-humid (Udaipur) and semi-arid (Jobner) agro-climatic zones of Rajasthan during 1979 to 1981. The insects observed on different cucurbit crops were red pumpkin beetle (*Aulacophora foveicollis*), fruit fly (*Dacus cucurbitae*), jassids (*Amrasca biguttula biguttula*), whitefly (*Bemisia tabaci*) and grasshoppers (*Attractomorpha crenulata* and *Chrotogonus trachypterus*). In addition, black pumpkin beetle (*Aulacophora atripennis*) at Udaipur and aphids (*Aphis gossypii*), epilachna beetle (*Henosepilachna vigintipunctata*), white grub (*Holotrichia consanguinea*), red hairy caterpillar (*Amsacta moorei*) and gram pod borer (*Heliothis armigera*) at Jobner were also recorded. Pumpkin beetle, fruitfly, aphid and epilachna beetle caused severe damage to cucurbit crops. The red pumpkin beetle damaged the crop at all times, the peak incidence being during April-May and August-September both at Udaipur and Jobner. The maximum activity of black pumpkin beetle was found during middle of April and third week of August. The fruit fly infestation started in second week of April and peak period of infestation was in May-June on long melon, musk melon, round gourd and bitter gourd at both the places. The aphids were recorded only in initial stage of the crops and major damage of epilachna was observed only at fruiting stage.

### INTRODUCTION

Cucurbits constitute the largest group of vegetables and are cultivated extensively throughout the country. The state of Rajasthan provides maximum potential for the production of cucurbits because of its best suited agro-climatic conditions. Several insect-pests attack these crops throughout their growing period and are the main limiting factors in their profitable cultivation. Srivastava *et al.* (1976) had reported that pumpkin beetles (*Aulacophora* spp.) cause considerable damage to cucurbits in Rajasthan. The fruit fly, *Dacus cucurbitae* Coquillett has been found to cause losses ranging from 50 to 72 per cent (Lall and Sinha, 1959; Narayanan and Batra, 1960 and Kushwaha *et al.*, 1973). In addition to above, epilachna beetle (Tewari, 1986), aphid (Ayyar, 1940), jassid, *Amrasca biguttula biguttula* (I) (Pareek and Noor, 1980), vegetable mite (Sharma and Pande, 1986) and cutworm (Kushwaha *et al.*, 1972) are also reported to cause damage to cucurbits.

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Scanty information is available on the seasonal incidence of insect pests of cucurbits in Rajasthan. Therefore, studies were undertaken to work out pest incidence in two different agro-climatic regions viz., semi-humid with clay loam soil (Udaipur) and semi-arid with sandy loam soil (Jobner-Jaipur) on ten commonly grown cucurbit species.

#### MATERIAL AND METHODS

The recommended varieties of cucurbits (Table 1) were grown in *ziad* (March-June) on the farms of the colleges of Agriculture, Udaipur and Jobner (Jaipur), to study seasonal incidence of different insect-pests during 1979 and 1981 at Udaipur and during 1980 and 1981 at Jobner. Randomised block design with three replications was used in field lay out. The plot size was 5 x 4 m<sup>2</sup>. The seeds were sown by dibbling 2-3 seeds at a place, about 0.5 m apart on opposite sides of 0.7 m wide irrigation channel on one side of the plots. The seeds were soaked in distilled water for 24 hours before sowing to hasten but uniform germination. In order to collect the data throughout the year, the crops of bottle gourd and ridge gourd were also raised during rainy season (kharif). Only one strong and healthy seedling was left at one place after removing the other germinated ones. Required agronomic practices were given from time to time to raise good healthy crop.

Table 1. Cucurbit varieties selected for studies

Vegetable	Variety
1. Pumpkin, <i>Cucurbita moschata</i> Dutch. ex Poir	Arka suryamukhi
2. Bottle gourd, <i>Lagenaria siceraria</i> (Mol.) Standl.	Pusa summer prolific long
3. Ridge gourd, <i>Luffa acutangula</i> Roxb.	Pusa nasdar
4. Sponge gourd, <i>L. cylindrica</i> (L.) Roem	Pusa chikni
5. Bitter gourd, <i>Momordica charantia</i> L.	Pusa'domousami
6. Long melon, <i>Cucumis utilisimus</i> Duthie and Fuller	Lucknow
7. Round gourd, <i>Citullus vulgaris</i> var. <i>fistulosus</i> Duthie and Fuller	Arka tinda
9. Musk melon, <i>Cucumis melo</i> L.	Durgapura madhu
9. Water melon, <i>Citrullus vulgaris</i> Schrad ex Eckl. and Zeyh.	Sugar baby
10. Cucumber, <i>Cucumis sativus</i> L.	Khira-75

Five plants in each replicate were selected to record the insect pest population. The population was recorded in morning hours (upto 8 AM) at weekly intervals. The crop was kept under constant observation, after the appearance of cotyledonous leaves, for the attack of beetles. All plants, except those exposed to the beetle attack, were covered individually with cloth cages (0.20 x 0.15 m x 0.12), to protect them from the damage in initial stage. The cloth cages were removed when plants attained four

leaves. The population of beetles was recorded on 5 plants/plot on visual basis at weekly intervals until the crop was harvested.

The grubs and adults of epilaichna beetle were counted visually on all the leaves of each plant in the initial stage of the crop, but later on the population counts were made only on three leaves *i. e.*, basal, middle and terminal of each tagged plant.

The populations of aphid, jassid and whiteflies were recorded on whole plant in early growth period as described by Heathcote (1972) and Jotwani and Sarup (1963) while the basal, middle and terminal leaves were taken as a single composite unit in later stage as suggested by Satpathy (1973) and Rawat and Sahu (1973). All the stages of nymphs and adults of aphids and jassids were taken into consideration. The populations of cutworm larvae were estimated by digging 1 m long, 0.7 m wide and 0.1 m deep area at two places from 5 m long irrigation channel on the side of the plot. The damage to the seedlings was also recorded.

The incidence of the fruit fly was judged on the basis of percentage of fruit infestation on number basis (Nath, 1966). The fruits of pumpkin, bottle gourd, musk melon and water melon on ten tagged plants were examined twice a week. The number of total and infested fruits were counted and the percentage infestation was calculated. The fruits of ridge gourd, sponge gourd, bitter gourd, long melon, round gourd and cucumber were also examined twice a week. All fruits, whether healthy or with fly punctures, were harvested and separated. The percentage of fruit damaged on number basis was then worked out. The observations on other insects damaging the crops during the period were recorded regularly.

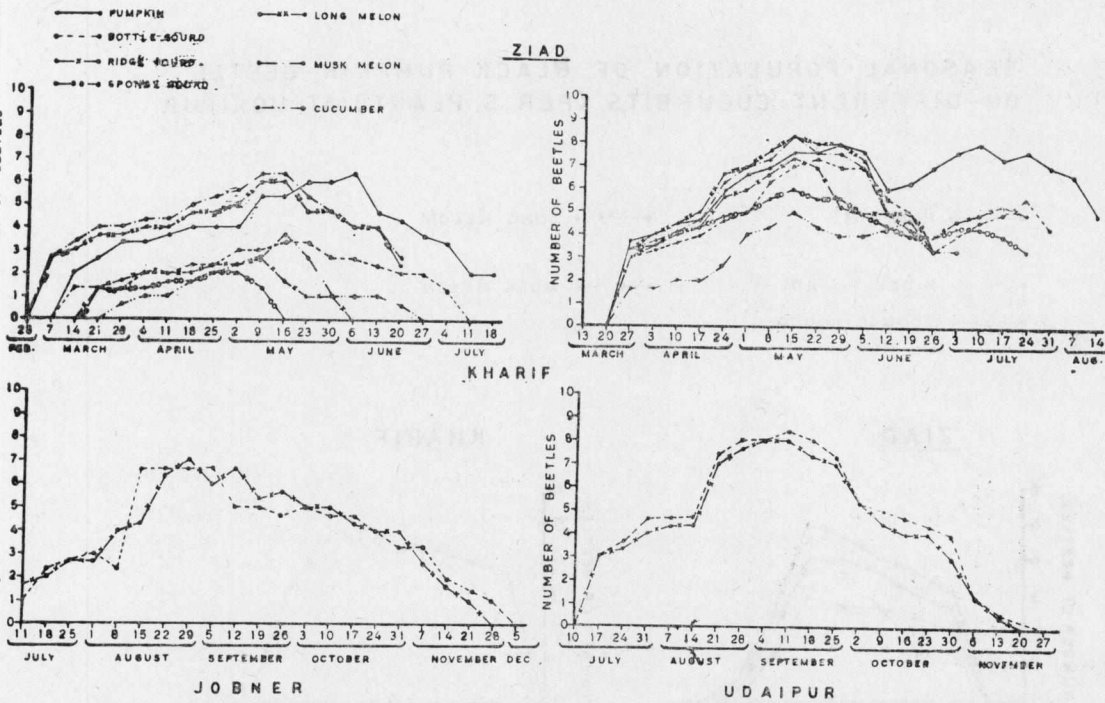
## RESULTS AND DISCUSSION

*Cutworm* : Only two species of cutworm *viz.*, *Agrotis ipsilon* Huffmanagel and *A. spinifera* Hubner were found to attack cucurbits at Udaipur but crops at Jobner were free from its attack. The infestation of cutworm started in the middle of March on pumpkin, bottle gourd, ridge gourd, sponge gourd, long melon, musk melon and cucumber in seedling stage and the pest disappeared in the first week of April. No damage was, however, observed on bitter gourd, round gourd and water melon. The average population of the cutworm larvae estimated per running metre of the irrigation channel ranged from 13.2 to 19.5. Kushwaha *et al.* (1972) and Pareek and Noor (1982) also reported heavy infestation of cutworm on cucurbits in March-April at Udaipur. Thus the present findings corroborate the previous ones.

*Pumpkin beetles* : Both, red [*Aulacophora (Raphidopalpa) foveicollis* Lucas] and black (*A. atripennis*) Fab. pumpkin beetle were recorded at Udaipur but only red pumpkin beetle was observed at Jobner.

(a) Red pumpkin beetle : The beetle first appeared in the middle of March and remained active throughout the growing season on both *ziad* and kharif crops except bitter gourd, round gourd and water melon (Fig. 1). Its highest population was recorded twice in April-May and August-September both at Udaipur (8.33/5 plants) and Jobner (6.33 and 7.00/5 plants). The beetles population started declining in last week of October and disappeared totally in the last week of November. Earlier reports show activity of beetle from March to October with maximum in April to June (Butani, 1975) and in July to September (Pandey and Shandilya, 1979).

Seedlings were damaged by red pumpkin beetle at 7 to 15 days at Udaipur and at 21 days at Jobner after germination in *ziad* whereas, right from the germination in kharif season. Sandhu and Bhalla (1974) reported its severe damage at scedling stage in Punjab while Noor and pareek (1978) found its attack during Marh-April at Udaipur.



SEASONAL POPULATION OF RED PUMPKIN BEETLE ON DIFFERENT CUCURBITS (PER 5 PLANTS)

Fig. 1

No activity of beetle was seen from the last week of November to middle of March and they were found to hide under dry leaves, cucurbit vines, weeds, cracks and crevices in soil. Similar observations were also reported by Butani (1975) and Paney and Shandilya (1979). Mukherjee and Choudhary (1959), however, reported no hibernation in the insect.

(b) Black pumpkin beetle : This species appeared simultaneously with the red pumpkin beetle in Udaipur on pumpkin, ridge gourd, sponge gourd, long melon and musk melon only. It was active from middle of March to first week of May on *ziad* crop and mid July to mid September on kharif crop with maximum intensity (5.0/5 plants) in mid April and third week of August (Fig. 2). The activity of this species of beetle as compared to the red one, was however, limited. The sudden rise of temperature and hardness of leaves of certain cucurbit species could be the possible reasons of such limited activity.

SEASONAL POPULATION OF BLACK PUMPKIN BEETLE  
ON DIFFERENT CUCURBITS (PER 5 PLANT) AT UDAIPUR

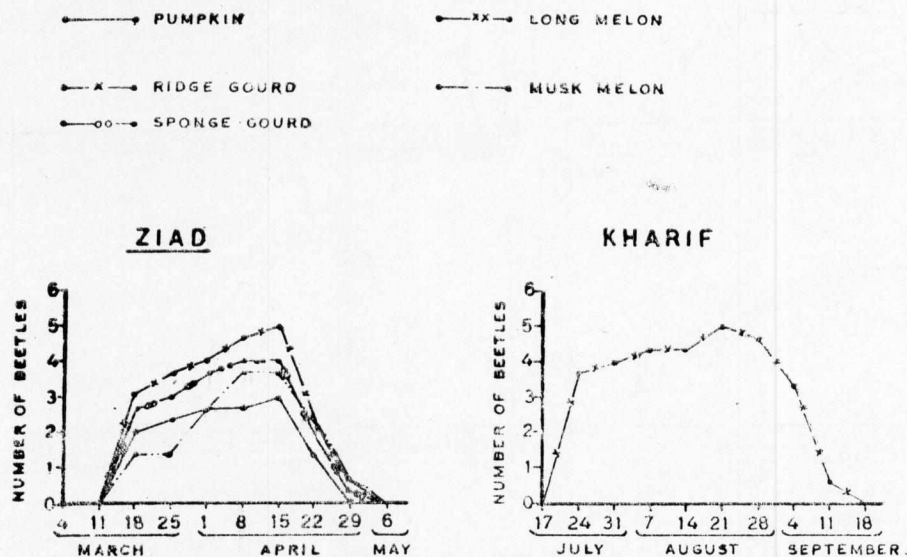


Fig. 2

*Epilachna* beetle : *Henosepilachna vigintipunctata* (Fabr.) (*Epilachna vigintipunctata* Fabr.) was recorded only in *ziad* season at Jobner. The pest was not recorded on any crop except long melon, musk melon and bitter gourd. The beetles appeared in the first week of March on long melon and first week of April on

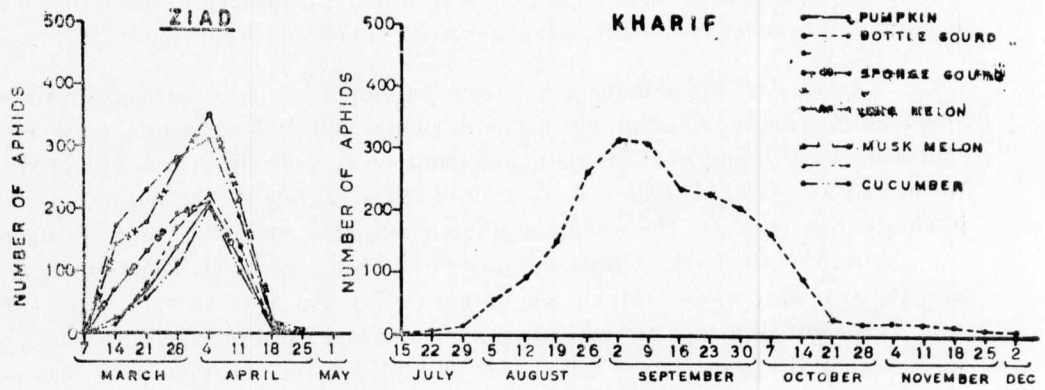
bitter gourd and continued until mid of May (Fig. 3), thus coincide with fruiting stage of the crop. The pest disappeared completely in the middle of June. The maximum damage (97 insects/5 plants) of the pest was found during April-May, which also confirmed the observations of Ramzan and Singh (1974) and Anonymous (1980).

*Aphids* : No aphid damage was seen at Udaipur but *Aphis gossypii* Glover was observed to attack pumpkin, bottle gourd, sponge gourd, long melon, musk melon and cucumbe at Jobner. The infestation of aphid was recorded from first week of March to the end of April in *ziad* and from third week of July to the end of November in kharif crop (Fig. 3). The maximum population (350 and 320/5 plants) of the pest was observed in first week of April and first fortnight of September. These observations also support earlier observations of Butani (1975) and Chahal and Mann (1977) who had reported maximum activity of the pest from April to June on melons, and in middle of March on musk melon. The pest disappeared completely in first week of May, probably due to the excessive heat.

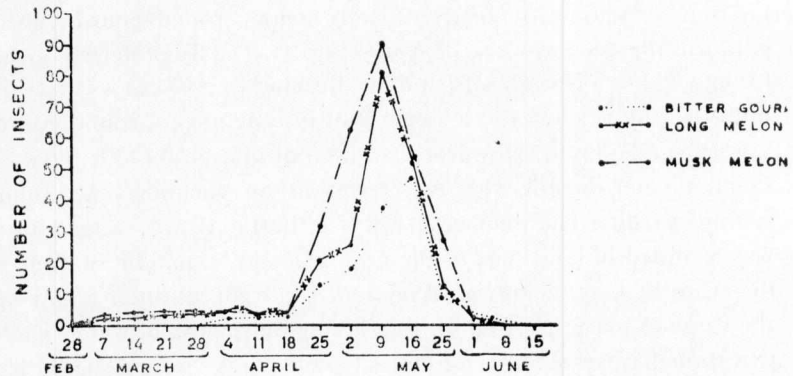
*Fruit fly* : *Dacus cucurbitae* Coquillet was recorded as one of the most serious pest of cucurbits at both Udaipur and Jobner. The infestation was observed from the time of setting of fruits of long melon, round gourd, musk melon and bitter gourd in the second week of April (Fig. 4). The fly preferred green and tender fruits for egg laying. The peak period of infestation (100%) was recorded in May-June at both the places when not a single fruit of long melon, round gourd and bitter gourd was left undamaged. However, low level of infestation (30%) was recorded on pumpkin and water melon. The fly infestation on cucumber was found one month after setting of fruits. The damage to fruits of bottle gourd, ridge gourd and sponge gourd was recorded in later part of the crop season i. e. middle of June to end of July when the crops of long melon, musk melon, ridge gourd, bitter gourd and cucumber are on the verge of maturity (Fig. 4). Egg laying on pumpkin, water melon and bottle gourd was though observed but no losses to the fruits were noticed. This may probably be attributed the thickness and hardening of the rind in due course of time, which might have prevented the development of maggots and their easy exit. Narayanan and Batra (1960) reported that this fly is unable to pierce the hard rind of the fruits.

In case of kharif cucurbits, incidence of fruit fly started first on ridge gourd, just on setting of fruits (i. e. third week of August to end of November) and then on bottle gourd from October to December) at both the places. Thus, the fly was found active from April to December. The fly has been reported active throughout the year (Anonymous, 1980) except January-February in winter (Shah *et al.*, 1949; Batra, 1953 and Narayanan and Batra, 1960). However, Fletcher (1916) reported the activity of fly in hot weather and hibernation as adult during the cold months. Against present finding of the maximum activity of the fly in May-June and October-November, Narayanan and Batra (1960) reported it to be in July-August. After November, this pest declined in activity which was also reported by Lall and Singh (1969).

# APHID

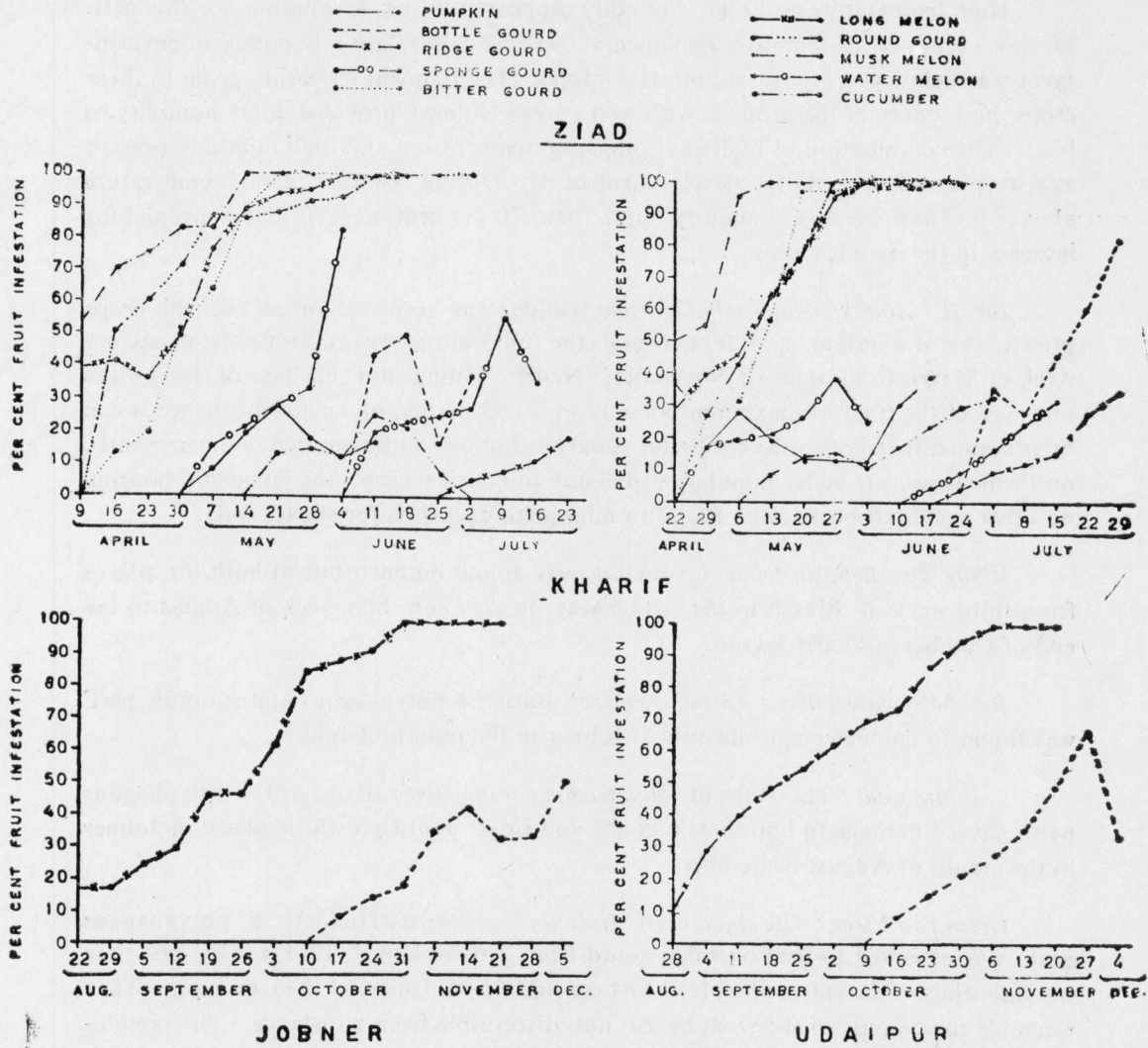


# EPILACHNA



SEASONAL POPULATION OF APHID AND EPILACHNA BEETLE ON DIFFERENT CUCURBITS (PER 5 PLANT) AT JOBNER

Fig. 3



**FRUIT FLY INFESTATION ON DIFFERENT CUCURBITS (PER 10 PLANT)**

Fig. 4

High temperature and high humidity appeared to be favourable for this pest. During summer, temperature remained above 37°C but relative humidity in environment was below 40 per cent at both the places. The frequent irrigation given to these crops and cover of the ground with well spread foliage provided high humidity to fruits. The combination of high environmental temperature and high humidity present near to plants favoured the development of fly. During kharif season, temperature above 30°C and relative humidity more than 70 per cent were found congenial for increase in the fly infestation.

*Jassid* : *Amrasca biguttula biguttula* (Ishida) was recorded on all cucurbit crops grown both at Udaipur and Jobner and the infestation was observed from second week of March to the end of November. Neither wilting nor curling of leaves was observed at the time of maximum population (71/5 plants) on cucurbits, hence it can be presumed that jassids do not prefer cucurbits but pass unfavourable summer months on them. However, under population pressure in kharif season, the jassids harbouring on other preferred hosts, were found to migrate to cucurbits for shelter only.

*White fly* : *Bemisia tabaci* Gennadius was found on cucurbits at both the places from third week of March to the end of May in *ziad* and first week of August to the end of October in kharif season.

*Red hairy caterpillar* : *Amsacta moorei* Butler, a polyphagous and sporadic pest was found to damage cucurbits only at Jobner in the month of July.

*White grub* : The grubs of *Holotrichia consanguinea* Blanchard, a polyphagous pest, caused damage to both bottle gourd and ridge gourd grown in kharif at Jobner in the month of August-September.

*Gram pod borer* : The larvae of *Heliothis armigera* (Hubner), a polyphagous pest, was observed to feed on ridge gourd fruits only in kharif, 1981 for the first time in Rajasthan. The caterpillars feed first on rind of the fruit and then on pulp. They resemble the colour of the rind, hence not discernible from a distance. The population was, however, not much: 8 larvae on 30 plants.

*Grass hoppers* : Surface grass hoppers, *Atractymorpha Crenulata* (Fabr.) and *Chrotogonus trachypterus* Blanchard were found to cause damage to leaves of the cucurbit plants at both places.

*Vegetable mite* : *Tetranychus neocaledonicus* Andre (*T. cucurbitae* Rahman and Sapra) was found to damage long melon in seedling stages in the vicinity of Jobner only. However, Sharma and Pande (1986) reported it on bottle gourd at Udaipur.

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