

Effect of Some Vegetable Plants Host on the Biology of *Brevicoryne brassicae* (L.) and *Aphis gossypii* (Glover)

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ABSTRACT. *Brevicoryne brassicae* and *Aphis gossypii* were recorded to be the two most important insect pests of vegetables grown in Qatar. The present studies revealed that out of cabbage, radish and garden rocket, the first one proved to be the most preferred host for *Brevicoryne brassicae* (L.) followed by garden rocket. Radish, however, did not prove conducive to the development of this pest. On the other hand, *Aphis gossypii* was found to develop equally on squash and cucumber. Snake cucumber, however, proved to be the least preferred host out of the three.

Brevicoryne brassicae and *Aphis gossypii* are two important pests of vegetable crops in Qatar. The former infests cabbage (*Brassica oleracea* var. *capitata*), cauliflower (*Brassica oleracea* var. *botrytis*), radish (*Raphanus sativus*), garden rocket (*Eruca sativa*) and certain ornamental plants and is responsible for causing considerable damage to all crops. The latter (*Aphis gossypii*) however, is more important than the former and has been recorded on all vegetable plants, fruit plants, ornamental plants and other crops. Very high infestation of this insect was found on certain vegetables throughout the year except a few summer months. The vegetables which are mainly infested by this pest are tomato (*Lycopersicon esculentum*), carrot (*Daucus carota*), cantaloupe (*Cucumis melo* var. *aegyptiacum*), water melon (*Citrullus vulgaris*), cucumber (*Cucumis sativus*), snake cucumber (*Cucumis melo* var. *flexuosus*), squash (*Cucurbita pepo melopepo*), onion (*Allium cepa*), lettuce (*Lactuca sativa*), okra or ladies fingers (*Hibiscus*

esculentus), pepper (*Capsicum annum*), pumpkin (*Cucurbita pepo*) and some other vegetable and fruit plants including citrus fruits, grapes and ornamental plants. In general, insects of family Aphididae represent the most important pests at all agricultural farms of the State of Qatar.

Keeping in view the importance of these two species of insects, it was considered necessary to study the impact of some vegetable hosts on the biology of these pests. No such studies have so far been conducted in the State of Qatar. However, some work has been done in other parts of the world on the biology of different species of Aphids in relation to certain plant hosts.

Cartier (1960) studied the growth, reproduction and longevity in one biotype (*Acyrtosiphon posum*) of the pea aphid and reported interesting results on the pre-reproduction, reproduction and post-reproduction stages of this biotype; Metcalf and Flint (1962) reported that in cool wet season, when their natural enemies cannot work against them so well, aphids may become abundant, but in hot weather they practically disappear. Bernardo (1969) studied the effect of different host plants on the biology of the black aphids and reported that certain hosts proved more favourable for development and reproduction as compared to others. Lowe (1973) made some studies on the intraspecific variations of the *Myzus persicae* on sugar beet (*Beta vulgaris*) and reported differences in inherited resistance among seven sugar beet stocks. Robert (1978) also discussed the behaviour of various species of Aphids with regard to the effect of different hosts on their development. Nayar *et al.* (1979) discussed the host plants and life history of the two pests.

The present investigations were undertaken to study the effect of hosts like cabbage, radish and garden rocket on the development of *Brevicoryne brassicae* and those of squash, cucumber and snake cucumber on *Aphis gossypii*. The results of these investigations are presented in this paper.

Material and Methods

Six individuals of the same age were chosen from the progeny of mature adults during the first 30 minutes of their production to ensure homogenous stock of the new generations. Each of the six selected nymphs was placed inbetween two fresh leaves of each host plant and kept separately in a 12 cm diameter petri-dish covered with muslin. The diet was changed daily by a simple touch with a small brush to make the insect to withdraw its mouth-parts from the tissues of the old leaf so as to transfer it gently to the new fresh leaf. Observations were recorded after every 12 hr on the number of moultings, nymphal period, number of progenies per day, pre-reproduction, reproduction and post-reproduction periods and on adult longevity. Temperature and relative humidity (R.H.) in the reading laboratory were recorded twice daily with the help of a thermometer and a thermohygrograph. The observations were recorded on two generations of the pest, and the data presented in this paper are based on these observations.

Results

The data obtained on *Brevicoryne brassicae* and *Aphis gossypii* are given in Table 1, and Table 2, respectively.

Table 1 revealed that the nymphal period of this pest recorded on cabbage and garden rocket was 7.20 and 7.50 days, respectively, as against 8.42 days on radish. The first nymphal instar was found to be 2.14, 2.0 and 1.95 days on cabbage, radish and garden rocket, respectively. There was variation in second nymphal instar, from 1.50 days on radish to 1.63 days and 2.10 days on cabbage and garden rocket, respectively. The third and fourth larval instars also showed variation on different hosts.

Table 1. Rate of reproduction and mean duration in days of various developmental stages of *Brevicoryne brassicae* reared on different hosts.

| Hosts | Nymphal period | Nymphal instars | | | | Pre-reproduction period | Reproduction period | Post-reproduction period | Mean duration of adult stage | Longevity period | Average number of progeny per female |
|---------------|----------------|-----------------|------|------|------|-------------------------|---------------------|--------------------------|------------------------------|------------------|--------------------------------------|
| | | 1st | 2nd | 3rd | 4th | | | | | | |
| Cabbage | 7.20 | 2.14 | 1.63 | 1.45 | 1.99 | 0.60 | 21.00 | 5.50 | 27.20 | 36.10 | 70.25 |
| Radish | 8.92 | 3.00 | 1.50 | 1.88 | 2.40 | 0.88 | 10.18 | 2.10 | 14.00 | 22.00 | 11.50 |
| Garden Rocket | 7.50 | 1.95 | 2.10 | 1.91 | 1.54 | 0.14 | 6.13 | 1.00 | 8.30 | 15.11 | 22.00 |

Table 2. Rate of reproduction and mean duration in days of various developmental stages of *Aphis gossypii* reared on different hosts.

| Hosts | Nymphal period | Nymphal instars | | | | Pre-reproduction period | Reproduction period | Post-reproduction period | Mean duration of adult stages | Longevity period | Average number of progeny per female |
|----------------|----------------|-----------------|------|------|------|-------------------------|---------------------|--------------------------|-------------------------------|------------------|--------------------------------------|
| | | 1st | 2nd | 3rd | 4th | | | | | | |
| Squash | 8.10 | 2.20 | 2.00 | 2.10 | 1.80 | 0.65 | 13.55 | 0.85 | 15.75 | 23.08 | 45.20 |
| Cucumber | 5.50 | 1.60 | 1.20 | 1.30 | 1.40 | 0.40 | 15.61 | 0.75 | 15.00 | 22.12 | 43.00 |
| Snake Cucumber | 7.75 | 2.71 | 1.75 | 1.70 | 1.61 | 0.61 | 9.98 | 1.45 | 11.5 | 19.48 | 21.11 |

Pre-reproduction period

The pre-reproduction period of *B. brassicae* was recorded to be 0.14 days on garden rocket as against 0.60 days and 0.88 days on cabbage and radish, respectively.

Reproduction Period

Cabbage proved to be the most suitable host as the reproduction period was recorded to be 21 days. On the other hand, garden rocket proved to be the least suitable host as the reproduction period in this case was 6.13 days. The reproduction period on radish was 10.18 days.

Post-reproduction Period

It was found to be one day, 2.10 days and 5.50 days on garden rocket, radish and cabbage, respectively.

Mean Duration of Adult Stage

Cabbage proved to be the most suitable host with 27.20 days as mean duration of adult stage. On the other hand, garden rocket proved to be the least suitable host with 8.30 days as mean duration of adult stage. The adult stage took 14 days on radish.

Longevity Period

The total development period was found to be 15.11, 22.0 and 36.10 days on garden rocket, radish and cabbage, respectively.

Average Number of Progeny Per Female

The highest mean number of individuals produced per female was 70.25 on cabbage which proved to be the most suitable host for rearing *B. brassicae*. This number was found to be 22 on garden rocket and 11.50 on radish, showing thereby that there was significant difference with regard to suitability of cabbage, garden rocket and radish for the development of this insect species on the three hosts.

The data tabulated in Table 2 with regard to the impact of three hosts, squash, cucumber and snake cucumber on the development of *Aphis gossypii* revealed that nymphal stage on snake cucumber and squash was 7.75 and 8.10 days, respectively, as against 5.50 days recorded on cucumber. Variation in the four nymphal instars was also recorded on the three hosts.

Pre-reproduction Period

Pre-reproduction period was recorded to be 0.65, 0.41 and 0.40 days on squash, snake cucumber and cucumber, respectively.

Reproduction Period

The longest reproduction period for this insect was found to be 15.61 days on cucumber followed by 13.55 days on squash and 9.98 days on snake cucumber.

Post-reproduction Period

The longest post-reproduction period was 1.45 days on snake cucumber followed by 0.85 days on squash and 0.75 days on cucumber.

Mean Duration of Adult Stage

The longest duration of adult stage was recorded to be 15.75 days on squash followed by 15 days on cucumber and 11.5 days on snake cucumber.

Longevity Period

The total developmental period was found to be 23.08, 22.12 and 19.48 days on squash, cucumber and snake cucumber, respectively.

Number of Individuals Per Female

The highest number of individuals developed per female was 45.20 on squash, 43.0 on cucumber and 21.11 on snake cucumber, showing thereby that squash proved to be the most suitable host, followed by cucumber. This number was reduced to 21.11 on snake cucumber.

With regard to the effect of temperature and humidity on the development of this insect species, 20°C, and 70% relative humidity proved better than 25°C, and 75% relative humidity.

Discussion and Conclusion

The present investigations clearly revealed that cabbage proved to be the most preferred and radish as the least preferred host for *B. brassicae*. Garden rocket, was found to hold second position from amongst the three hosts.

Squash and cucumber, on the other hand, proved to be the most suitable hosts for the development of *Aphis gossypii*, whereas snake cucumber did not give good results in comparison to the other two hosts. These results cannot be compared in the strict sense with those of Cartier (1960), Metcalf and Flint (1962), Bernardo (1969), Lowe (1973), Robert (1978) and Nayar *et al.* (1979) for the reason that the aphid species and the hosts selected in the present studies were different than those selected by the previous authors. The present investigations, however, clearly revealed the trend of preference of the two insect species on different hosts.

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(Received 28/7/1982;
in revised form 9/1/1983)

تأثير بعض نباتات الخضر (كعوائل) في دولة قطر على بيولوجية حشرتي مَن الكرنب ومَن البطيخ

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قسم علم الحيوان - كلية العلوم - جامعة قطر - قطر

تمَّ التأكدُ في هذا البحث أن آفتي مَن الكرنب *Brevicoryne brassicae L.* ومَن البطيخ *Aphis gossypii, Glover* هما أهم آفتين تصيبان محاصيل الخضر في دولة قطر. وقد أوضحت الدراسة أن الكرنب (الملفوف) هو العائل المفضل لآفة من الكرنب: يلي ذلك الجرجير، أما الفجل فقد أثبتت الدراسة أنه غير مناسب لنمو هذه الحشرة. كما أوضحت هذه الدراسة أن مَن البطيخ ينمو بصورة متساوية على كلِّ من الكوسة والخيار، أما القثاء فقد أثبتت الدراسة أنه أقلِّ العوائل الثلاثة ملائمة.