



# Plant Archives

Journal homepage: <http://www.plantarchives.org>  
doi link : <https://doi.org/10.51470/PLANTARCHIVES.2021.v21.S1.062>

## THE EFFECT OF PLANT HOST SPECIES ON RESPONSE OF LEGUMES APHID TO SOME INSECTICIDES

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### ABSTRACT

The results of the current study show a clear variation in the effect of the plant host type on the response of a legume insect *Aphis craccivora* to the effect of the pesticides used in the study.

As the pesticide Pridaben showed clear efficacy in killing aphids since the first day of treatment with the pesticide, which varied with the plant host type, as the killing rate ranged from 17.10-89.10% on the fenugreek plant, while it reached 93.30% on the Peas plant and on the Cowpea 89.50% and on the Chickpeas 97.70%. While it reached 97.50% on Broad Beans, while it reached 98% on Common Beans after 15 successive days. As for the effect of Fenozquin, there was also a clear variation from the first day of treatment with the pesticide in aphids, as the percentage of killing on Fenugreek was 97%, Peas 100%, Cowpea 91.5%, Chickpeas 97%, while it reached on Broad Beans 100% and the Common Beans is also 100% in a row after a 15-day period of treatment with the pesticide.

While the percentage of killing aphids with pesticide Abamectin varied with the variation of the type of plant and the periods of treatment with the pesticide, as it ranged between 19-100% on Fenugreek and 33.30-100% on Peas. On Cowpea, it ranged between 72.20-100%, Chickpeas ranged between 57.50-100%, on Broad Beans it ranged between 43-100%, and on Common Beans it reached between 57.60-100%, respectively.

As for the pesticide Dimethate, the percentage killing varied according to the type of pesticide, the plant and the treatment periods, as it ranged between 8.33-100% on Fenugreek and on Peas it ranged between 7-100% and for Cowpea between 19-100% and on Chickpeas between 24.21-100% and the same for Broad Beans and Common Beans, where the killing percentage after 15 days reached 100% for both, respectively.

**Keywords:** Plant; pesticide; host species; materials activity

### Introduction

Legumes belong to the Leguminaceae family, which is one of the plant families known for its economic importance, and the most important crops of this family are cowpeas, broad beans, peas, common beans, lentils, chickpeas, fenugreek and others known to contain a very small amount of fat and a high level of fiber that reduces the increase in the increase in blood glucose, which is recommended to people with diabetes (Al-Ramahya and Temur, 2013; Hassan, 2002).

Recently, a widespread spread of *Aphis craccivora* legumes has been observed in fields planted with legumes. Infection with legume aphids leads to severe damage that sometimes leads to stopping the growth of the plant permanently and then its death (Drees, 1996; Abro *et al.*, 2016).

The possession of adult phases and nymphs from these insects piercing and sucking mouth parts greatly helped them in their ability to puncture the vegetative tissue of the leaf or any other part of the plant and absorb the plant sap, which leads to an imbalance in the growth and development of the plant because of this effect on the physiological activities of the plant, especially when the amount of absorbed vegetable juice is large, and this condition occurs when severely affected by aphids (Moussa, 2005; Agarawala, 2007).

The other harm caused by many types of aphids is the possibility that these types play an important role in transmitting certain types of plant viruses, as aphids spread the diseases caused by these viruses among the plant hosts that aphids attack. In this aspect of the damage, researchers sometimes confirm that this type of damage may be more dangerous than other damages, especially when taking into account the seriousness of viral diseases resulting from the rapid spread and lack of specialized control means for these diseases and the inefficacy of many of the means used in the control (Georgior, 2002; Kant *et al.*, 2017).

The study aimed to find out the effect of the plant host type on the response of a legume insect to some pesticides.

### Material and Methods

This experiment was carried out during the successive fall seasons of 2019 at the field in the farm in Mosul, Iraq.

Seed of local variety cultivar of Fenugreek, Peas, Cowpea, Beans, Common bean and Chickpea were sown in the period 1 to 30 October. In each experiment, a randomized completes blocks design (R.C.B.D.), with three replicates each plot consisted of 6 rows, 5m long and 100cm wide and the plant were allowed to grow at 50cm spacing area .

The insecticides were sprayed by sprinkler at a rate of 100 liter per 2500 m<sup>2</sup> in at 2019 seasons. Control plate were

sprayed only by tap water (Abdaljabar, 2020), names and rates used in this study are presented table 1.

The different od tested insecticides was by counting number of target insects (*Aphid carccivora*) on the Fenugreek, Peas, Cowpea, Beans, Common bean and Chickpea leaves.

Per each replicate, per and post treatment counts were done in early morning, leaves were collected in paper bugs and transmitted to the laboratory for insect counting. The

insects were done before and after 1, 3, 5, 7, 10, 12, 15 day from application.

Reduction percentage were calculated according to Henderson and Tilton equation (1955). The statistical analyses of all there corded date were conducted by the standard method of the randomized complete blocks design as illustrated using co-stat statistical the Least Significant Difference test (L.S.D.) was used one was Anova with LSD 0.05.

**Table 1 :** Names and rates of the tested insecticides.

	Name	Description
1.	Pyridaben	It is called Sanmite and is in the form of a preparation that is able to be wetabout 20% wp. It is used at a concentration of (1%) and it is a specialized insecticide, its effect is fast, stagger and long on insects, especially white flies, aphids and thrips
2.	Fenazaquin	It is called Magister, an insecticide that affects by contact. Its effect is fast and long on the moving phases of insects, and it works to inhibit the transmission of electrons within the respiratory chain of mitochondria inside insect tissue cells, leading to rapid death. It is found in the form of SC 200 and is used at a concentration of (1%).
3.	Abamectin	It is also called Abamectin commercially and it is used at a concentration of (1.2%). There is a 1.8% Ec form of a specialized insecticide that affects by contact and through the stomach, and works to prevent the transmission of nerve signals to the nerve joints of insects, so the insects stop moving and die.
4.	Dimethoate	It is a systemic insecticide in the form of Ec 40% and is used at a concentration of (1%). It has a contact and infectious effect. It is rapidly absorbed and transported within plants and it inhibits the action of Choline Esterase.

**Result and Discussion**

The efficacy of Pridaben according to Table (2) was close on the first day of readings, and it ranged between 17.10 and 26.20% on all plant hosts. The mean effect scores did not reach 50% on the third day after treatment on any of the plant hosts, and the differences remained apparent between the values recorded except for Peas 47.50% compared with fenugreek 28.62% and cowpea 30.09%.

The efficacy value transcend both lentils and broad beans on the fifth day, which reached to 67.04% and 67.05%, in a significant indication of the fenugreek about 47.51%, while it reached 67.05% for broad beans and 55.90% on the common beans.

The degree of effect during the seventh day after the treatment reached the highest value on lentil about 81.65%,

compared to fenugreek 65.18%, and common beans 55.90%. The differences remained apparent between the other values on the various factors.

The killing rates on the tenth day of the readings ranged between 89.13% for broad beans and 84.90% for lentils, and on the twelfth day, the percentage was 93.20% and 93.10% for each of the broad beans and lentils, respectively.

The degree of effect did not reach the largest limit of 100% on any of the families at the end of the experiment, and significant differences were found between the values recorded for the families of lentils, broad beans and common beans on their side, and between the values with fenugreek, peas and cowpea.

**Table 2 :** The effect of plant host species on the efficacy Pridaben (1%) insecticide as a percentage on insect aphids legumes

	1	3	5	7	10	12	15	LSD 5%
Fenugreek	17.10	28.62	47.51	65.18	79.20	85.94	89.10	25.30
Peas	26.20	47.50	64.17	77.86	83.40	89.75	93.30	
Cowpea	16.65	30.09	53.15	76.45	80.60	84.40	89.50	
Chickpeas	21.17	36.73	67.04	81.65	84.90	93.10	97.70	
Broad Beans	18.40	38.17	67.05	86.59	89.13	93.20	97.50	
Common Beans	21.90	38.18	55.90	68.10	73.63	80.14	98.00	
LSD 5%	9.75	16.10	16.60	11.40	12.20	11.70	6.75	

Table (3) shows the achievement of the pesticide Fenazaquin for a primary efficacy that exceeded the average value on each of Peas and common beans 52.87 and 54.30%, followed by chickpeas 33.21%. It was statistically proven that there were significant differences between the values of peas and common beans with killing rates on families of fenugreek, cowpea and broad beans. The differences

remained apparent between the degrees of effect of the pesticide on the other hosts.

The best results were recorded during the third day after treatment with Peas and common beans, with values of 77.09 and 74.45%, compared to the killing values of the rest of the plant families.

The degree of effect of the best pesticide was on the fifth day of Peas as it reached 85.20% and for common beans also 83.83% compared to the rest of the other plant families.

The results of the seventh day came after the treatment with the highest effect of the pesticide on the families of Peas were 94.78% and Beans reached 93.41%, followed by the common beans 85.20%. 64.10% compared to 56.42% fenugreek. The results of the analysis showed that there were significant differences between the effect scores of the three mentioned families and the value recorded on each of the cowpea 68.75% and the chickpea 64.10% compared to the fenugreek 56.42%.

The killing percentage of insects during the tenth day after the start of the experiment reached its highest value of 100% on Beans 100%, followed by Peas 94.78%, with a

significant difference from what was recorded on Fenugreek 63.27% as the lowest value.

Significant differences were found between the killing percentage shown by the pesticide on both cowpea 75.60%, chickpea 75.15% and common beans 88.04%.

The effect of 100% of the pesticide was also achieved on the twelfth day of the experiment on each of the peas 100% and Beans 100%, with significant differences from the values with each of the beans 87.77% and common beans 89.16%.

The results of the fifteenth day after treatment showed significant differences between the efficacy values of the pesticide on the families of Peas 100%, Beans 100%, common beans 100%, chickpeas 97%, cowpea 91.5% and fenugreek 87%, respectively.

**Table 3 :** The effect of plant host species on the efficacy Fenozquin (0.75%) insecticide as a percentage on insect aphids legumes

	1	3	5	7	10	12	15	LSD 5%
Fenugreek	24.30	42.20	44.84	56.42	63.27	75.27	87.00	18.87
Peas	52.87	77.09	85.20	94.78	94.78	100	100	
Cowpea	23.00	53.05	61.15	68.75	75.60	87.77	91.5	
Chickpeas	33.21	40.09	42.73	64.10	75.15	91.22	97.00	
Broad Beans	25.60	55.65	76.01	93.41	100	100	100	
Common Beans	54.30	74.45	83.83	85.20	88.04	89.16	100	
LSD 5%	15.90	23.02	18.81	12.80	12.02	9.00	3.50	

Table (4) showed a difference in the initial killing percentage achieved by the pesticide Abamectin on the first day after treatment, where the best results were recorded on Cowpea with a value of 72.20%, followed by Chickpeas 57.50% and common beans 57.60%. The results showed significant differences between each of the three mentioned plant hosts and between the data recorded on fenugreek 19% and Peas 32.30%, as well as between Beans 43% and fenugreek. The highest degree of effect of the pesticide on the third day to start the experiment came on Cowpea 85.60% and Chickpeas 71%. Significant differences were found between the efficacy values shown by the pesticide on Peas 61.65% and Beans 59% compared to 33.60% of fenugreek.

The best results remained for the fifth day on Cowpea 94.83%, followed by common beans 93.32% and Peas 92.13%.

The differences were statistically significant between the values recorded on the mentioned hosts, compared with the data on fenugreek 74.56% and Beans 84.12%.

The degree of effect during the seventh day reached a clear difference between the killing percentage of different plant hosts, as it reached 99% for Cowpea and common beans compared to Peas 97.51% and Chickpeas 92.02%, while the killing rates for Beans were 87.70% and fenugreek 85.20%, respectively.

The significant differences came between the killing percentages of the pesticide effect on common beans, Peas, Cowpea, Chickpeas and Beans at the tenth day, compared to the fenugreek.

The degree of effect achieved the highest limit of 100% for all plant factors studied on the twelfth and fifteenth days of the experiment.

**Table 4 :** The effect of plant host species on the efficacy Abamectin (1.2%) insecticide as a percentage on insect aphids legumes

	1	3	5	7	10	12	15	LSD 5%
Fenugreek	19.00	33.60	74.56	85.20	92.04	100	100	19.02
Peas	32.30	61.65	92.13	97.51	99.00	100	100	
Cowpea	72.20	85.60	94.83	99.00	99.00	100	100	
Chickpeas	57.50	71.00	83.37	92.02	96.20	100	100	
Broad Beans	43.00	59.00	84.12	87.70	97.51	100	100	
Common Beans	47.60	61.21	93.32	99.00	99.00	100	100	
LSD 5%	15.18	8.70	6.23	2.71	1.65	0	0	

The results in Table (5) show that there is a difference in the degree of the initial effect of Dimethoate on the plant hosts on the first day after treatment. The highest killing

percentage was recorded on the host of common beans 5% and the lowest killing value was recorded on the Peas 7%.

The results of the third day came with the continued investigation of the best killing rate on common beans 73.60%, which significantly transcend the rest of the families, and no significant differences were found between other families.

The highest degree of effect of the pesticide on the fifth day on common beans reached 84.20%, followed by Chickpea 69.60% and Beans 69.50%. The differences between the degree of effect of the pesticide came with statistical significant indication for both fenugreek compared with Cowpea 59% and Fenugreek 57.60 %, while the differences remained apparent between the killing rates of the other plant hosts.

The effect of the pesticide continued with the highest killing percentage on common beans 97.60% for the seventh day in a row since the beginning of the experiment, followed by Cowpea 92.30% and Chickpeas 91%, where significant differences were found during the seventh day in the degree of effect of the pesticide on each of the common beans, Cowpea and Chickpeas with the results on fenugreek about 76.30%.

As for the results of the tenth day of the experiment, the value of common beans was 100% compared to Beans 98.30%, Cowpea 96.20% and Chickpeas 96.10%, while the killing percentage of Peas reached 91% and fenugreek 83%, respectively.

The highest effect of the pesticide was achieved at 100% on the twelfth day after treatment on the studied host plants only, against the lowest value on the fenugreek which reached 96%, when all plant hosts significantly transcend the fenugreek, and the differences were significant between the values recorded on the fenugreek.

There was no significant difference between the recorded percentage of killing of the pesticide on the studied plant hosts at the end of the experiment on the fifteenth day when the highest effect of the pesticide was achieved 100% on all plant hosts.

It can be said that the results were good in their effects, especially in the field of nutrition and absorption of sap, as the symptoms of the apparent infection are generally directly proportional to the rate of feeding and their negative harm with the efficacy of the pesticide and the effect of the pesticide on aphids. The symptoms of infection are strongly affected by the insect on the one hand, and by the type and quantity of the pesticide during its feeding, and by the reaction of the plant host towards the pesticides and the damage on the other hand. It means that it can be said that the results confirmed and to a large extent the results of the study and strongly supported a strong relationship of the plant host type with the efficacy of the pesticides on Aphids (Tomczyk and Kielkiewicz, 2000).

**Table 5 :** The effect of plant host species on the efficacy Dimethoate (1%) insecticide as a percentage on insect aphids legumes

	1	3	5	7	10	12	15	LSD 5%
Fenugreek	8.33	29.50	57.60	76.30	83.00	96.00	100	33.60
Peas	7.00	29.60	68.30	87.00	91.00	100	100	
Cowpea	19.00	41.50	59.00	92.30	96.20	100	100	
Chickpeas	24.21	39.00	69.60	91.00	96.10	100	100	
Broad Beans	16.30	25.50	69.50	89.60	98.30	100	100	
Common Beans	51.00	73.60	84.20	97.60	100	100	100	
LSD 5%	17.24	16.10	24.10	9.90	6.90	1.15	0	

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