

## DIVERSITY OF TYPHLOCYBINE LEAHOPPERS AFFECTING FRUIT PLANTS IN PAKITAN\*

Manzoor Ahmed and Rukhsana Naheed

*Department of Zoology, University of Karachi, Karachi 32*

M. Shafiq

*Department of Statistics, University of Karachi, Karachi 32*

(Received March 29, 1979; revised October 7, 1979)

A brief survey of typhlocybine leafhoppers was carried out to ascertain the species affecting fruit plants in Pakistan. Two hundred and eighty-six standardised samples were collected from different areas of the country, which showed forty-three species of leafhoppers harboured by twenty species of fruit plants. Leafhopper species turned out to be important included *Empoasca punjabensis*, *Typhlocyba quettensis*, *Typhlocyba javedi*, *Empoasca persicae*, *Erythroneura vinealis* and *Zygina rubronotata* affecting plants like apple, grape vine, peach, apricot and grewia in the country.

### INTRODUCTION

As with typhlocybine leafhoppers in general, the species affecting fruit plants in Pakistan have been very little known. Ahmed [1, 2] and Samad *et al.* [3] described some typhlocybine species of fruit plants from N.W.F.P. and Baluchistan. During a recent survey, a large number of species of these leafhoppers were observed infesting the fruit plants, which appeared to be completely new to our existing knowledge of pests of fruit plants in this country. Field samples, each of which was based on insects collected in 25 sweeps of a sweep-net, from all the fruit areas of the country revealed forty-three species of typhlocybines infesting at least 20 species of fruit plants. The detailed data of various leafhopper species, affecting fruit plants in all the provinces of Pakistan has been presented in the following pages and discussed critically.

### RESULTS AND DISCUSSION

The typhlocybine leafhoppers were collected mostly during summer, both in the hilly tracts of N.W.F.P., and Baluchistan, and in the plains of Punjab and Sind. Amongst the twenty species of plants on which the leafhoppers have been collected, guava, citrus, pomegranate, fig and almond appear to be relatively less or only occasionally attacked. On the other hand those observed infested by a large number of species are apple and grape vine, each infested by 14 species of leafhoppers, peach by 10 species, apricot by 7 species and walnut and cherry by 6 species each. All of

these plants are almost exclusively grown in N.W.F.P., and Baluchistan.

As the leafhoppers were sampled from the fruit plants for a limited period, the diversity of leafhopper fauna harboured by them, and the abundance of various species presented in the accompanying table is not expected to be final and definitive. However, it is apparent that species like *Empoasca punjabensis*, *Empoasca persicae*, *Erythroneura rhamnicola*, *Typhlocyba javedi*, *Typhlocyba quettensis* and *Erythroneura vinealis* are most widespread and generalized in their feeding, affecting a large number of host/food plants. With regard to the mechanical damage liable to be caused to the host/food plants, the number of leafhoppers of any species would indicate the intensity of infestation. On this basis, a glance over Table 1 given above would show that reasonably heavy infestations are of *Empoasca punjabensis* on apple, mulberry and peach, of *Typhlocyba quettensis* on apple and of *Typhlocyba javedi* on peach and some others. It has also been observed that species like *Zygina rubronotata*, *Erythroneura vinealis*, and *Empoasca persicae* become seriously abundant on grewia (in Sind only), grape vine, and apricot respectively.

Due to discontinuous occurrence of the fruit plants in the country, it is rather premature to make a definitive comment on the natural distribution of the species harboured by them. The leafhopper species on apricot, fig and pomegranate have been collected only from Baluchistan, those of grewia from only Sind, of walnut from only N.W.F.P. and those of water melon, *Zizyphus* sp. and guava from only Punjab, a finding which does not preclude the distribution of their pest species in other provincial

\*Research project financed by USDA, under PL-480 program, grant No. FG-Pa-220, PK-ARS-4.



Table 1. Number of adult males and females of typhlocybina leafhoppers collected on fruit trees in Pakistan.

Leafhopper species	Host and food plants (No. of leafhopper adults)										Total
	Almond	Cucumis	Guava	Citrus kh.	Citrus kn	Mulberry	Pear	Plum	Water melon	Zizyphus	
In Punjab											
<i>Empoasca punjabensis</i>	—	996	8	—	—	—	—	—	1301	—	2305
<i>Empoasca naheedi</i>	—	—	—	—	—	—	9	—	—	—	9
<i>Empoasca saeedi</i>	—	—	—	—	—	—	—	1	—	—	1
<i>Amrasca devastans</i>	—	10	—	—	—	—	—	—	—	—	10
<i>Austroasca khani</i>	—	—	—	2	—	—	—	—	—	—	2
<i>Motschulysia sp.</i>	—	—	1	—	—	—	—	—	—	—	1
<i>Typhlocyba mubariki</i>	—	—	—	—	—	3	—	—	—	—	3
<i>Zygina bidrai</i>	—	1	—	—	—	—	—	—	—	—	1
<i>Zygina deraensis</i>	—	—	—	—	6	—	—	—	—	—	6
<i>Zygina pakistanica</i>	9	—	—	—	—	1	—	—	—	787	797
Total No. of samples	9	42	9	1	1	2	1	1	29	1	96
Total leafhoppers	9	1007	9	2	6	4	9	1	1301	787	3135
				Grewia	Grape vine	Lemon	Mango				
In Sind											
<i>Zygina rubronotata</i>	—	—	130	—	—	—	—	—	—	—	130
<i>Empoasca karachiensis</i>	—	—	—	—	21	—	—	—	—	—	21
<i>Austroasca vinealis</i>	—	—	12	—	20	—	—	—	—	—	32



(Table 1 continued)

	Almond	Apple	Cherry	Fig	Grape vine	Peach	Pear	Plum	Walnut	Total
<i>Zygina</i> <i>sindhensis</i>			4					24		28
<i>Amrasca</i> <i>devastans</i>			9		57					66
<i>Erythroneura</i> <i>hazarensis</i>						12				12
<i>Platyspina</i> <i>vinifera</i>					1					1
<i>Erythroneura</i> <i>vinealis</i>					50					50
Total No. of samples			10		8		1		1	20
Total No. of leafhoppers			155		149		12		24	340
In N.W.F.P.										
<i>Typhlocyba</i> <i>rahmani</i>									48	48
<i>Typhlocyba</i> <i>juglansae</i>									5	5
<i>Typhlocyba</i> <i>sharfi</i>				6						5
<i>Typhlocyba</i> <i>ismaili</i>		1							35	36
<i>Typhlocyba</i> <i>confusa</i>		34		6						40
<i>Typhlocyba</i> <i>ghanii</i>		1								1
<i>Typhlocyba</i> <i>quettensis</i>		4				1			4	9
<i>Jalalia</i> <i>colorata</i>						5				5
<i>Empoasca</i> <i>ghulami</i>						5				5



(Table 1 continued)

<i>Empoasca persicae</i>	7	44	—	—	—	4	4	—	4	63
<i>Empoasca punjabensis</i>	—	—	—	—	6	13	—	—	—	19
<i>Erythroneura rhamnicola</i>	10	50	—	4	5	32	3	3	7	114
<i>E. hazarensis</i>	—	—	—	—	4	—	—	—	—	4
<i>E. vinealis</i>	—	—	—	—	30	—	—	—	—	30
<i>E. chaudhrii</i>	—	—	—	—	8	—	—	—	—	8
<i>E. sesamae</i>	—	—	—	—	10	—	—	—	—	10
<i>Zyginidia younasi</i>	—	—	3	—	—	—	—	—	—	3
<i>Agriahana acuta</i>	—	2	—	—	—	—	—	—	—	2
Total samples	1	6	1	2	8	16	3	1	10	48
Total leafhoppers	17	136	3	15	63	60	7	3	103	407

	Almond	Apple	Apricot	Cherry	Fig	Grape vine	Mulberry	Peach	Plum	Pomegranate	Total
In Baluchistan											
<i>Empoasca decedens</i>	—	—	—	—	—	—	—	64	—	10	74
<i>Empoasca persicae</i>	6	509	296	57	—	52	—	368	10	—	1298
<i>Empoasca syedi</i>	—	—	—	—	—	—	—	—	6	—	6
<i>Empoasca punjabensis</i>	2	1251	555	8	12	75	263	910	—	18	3094
<i>Empoasca masoodi</i>	—	8	—	—	—	—	—	—	—	—	8
<i>Empoasca baluchi</i>	—	13	—	—	—	5	—	38	—	—	56
<i>Empoasca sesamae</i>	—	—	—	—	—	—	—	3	—	—	3



(Table 1 continued)

<i>Empoasca parastriata</i>	—	—	13	—	—	—	—	—	—	—	13
<i>Typhlocyba quettensis</i>	—	1310	712	—	—	—	—	—	—	7	2029
<i>Typhlocyba javedi</i>	—	118	17	—	2	—	—	308	—	10	455
<i>Typhlocyba sharfi</i>	—	—	—	8	—	—	—	—	—	—	8
<i>Typhlocyba sariabensis</i>	—	59	—	—	—	—	—	—	—	—	59
<i>Amrasca devastans</i>	—	30	—	—	—	142	—	4	—	—	176
<i>Amrasca elongata</i>	—	—	—	—	—	10	—	—	—	5	15
<i>Austroasca vinifera</i>	—	—	20	—	—	—	—	—	—	—	20
<i>Byphlocyba spinosa</i>	—	70	—	150	—	—	—	—	—	—	220
<i>Zyginidia quyumi</i>	—	—	—	—	—	—	—	2	—	1	3
<i>Erythroneura rhamnocola</i>	14	50	40	3	—	—	—	350	119	—	576
<i>Erythroneura urakensis</i>	—	6	—	—	—	—	—	—	—	—	6
<i>Erythroneura vinealis</i>	—	—	—	—	—	62	—	—	—	—	62
Total samples	2	47	21	6	3	9	3	19	7	5	122
Total											
leaf hoppers	22	3424	1653	226	14	346	265	2045	136	50	8181

areas. By and large our important fruit plants in hilly areas of N.W.F.P. and Baluchistan appear usually heavily infested with typhlocybine leafhoppers.

As the typhlocybine leafhopper species have been observed feeding, in general on leaf tissue, or occasionally on tender skin of fruits, it is obvious that their large scale presence on the host/food plants would not only result in reduction of plant vigour, but would also cause physical damage and nutritional loss both to the fruit and leaves.

The coexistence of several leafhopper species, in many cases, on the same plant also indicates lack of host plant specificity in most of these species. It is obvious on the basis of this preliminary survey that typhlocybine leafhopper complex on apple, grape vine, peach, and grevia, particularly involving species like *Empoasca punjabensis*, *Typhlocyba quettensis*, *Typhlocyba javedi*, *Erythroneura vinealis*, *Empoasca persicae*, and *Zyginidia rubronotata* needs thorough investigation due to its apparent serious nature. Placewise



Table 2. Summarised table showing abundance of typhlocybine leafhoppers on fruit plants in Pakistan.

Host and food plants	Punjab			Sind			N.W.F.P.			Baluchistan			Total		
	Samples collected	Total leafhoppers	No. of species	Samples collected	Total leafhoppers	No. of species	Samples collected	Total leafhoppers	No. of species	Samples collected	Total leafhoppers	No. of species	Samples collected	Total leafhoppers	No. of species
Almond	9	9	1	—	—	—	1	17	2	2	22	3	12	48	3
Apple	—	—	—	—	—	—	6	136	7	47	3424	11	53	3560	14
Apricot	—	—	—	—	—	—	—	—	—	21	1653	7	21	1653	7
Cherry	—	—	—	—	—	—	1	3	1	6	226	5	7	229	6
Citrus	2	8	2	—	—	—	—	—	—	—	—	—	2	8	2
Cucumis	42	1007	3	—	—	—	—	—	—	—	—	—	42	1007	3
Fig	—	—	—	—	—	—	2	15	3	3	14	2	5	29	5
Grape vine	—	—	—	8	149	5	8	63	6	9	346	6	25	558	14
Grewia	—	—	—	10	155	4	—	—	—	—	—	—	10	155	4
Guava	9	9	2	—	—	—	—	—	—	—	—	—	9	9	2
Lemon	—	—	—	1	12	1	—	—	—	—	—	—	1	12	1
Mango	—	—	—	1	24	1	—	—	—	—	—	—	1	24	1
Mulberry	2	4	2	—	—	—	—	—	—	3	265	2	5	269	4
Peach	—	—	—	—	—	—	16	60	6	19	2045	7	35	2195	10
Pear	1	9	1	—	—	—	3	7	2	—	—	—	4	16	3
Plum	1	1	1	—	—	—	1	3	1	7	136	4	9	140	4
Pomegranate	—	—	—	—	—	—	—	—	—	5	50	4	5	50	4
Walnut	—	—	—	—	—	—	10	103	6	—	—	—	10	103	1
Water melon	29	1301	1	—	—	—	—	—	—	—	—	—	29	1301	1
Zizyphus	1	787	1	—	—	—	—	—	—	—	—	—	1	787	1
Total	96	3135	10	20	340	8	48	407	18	122	8181	20	286	12063	43



position of infestation is outlined below:

**Almond.** The plant grows only in the hilly tracts of N.W.F.P. and Baluchistan provinces. Of the three species of leafhoppers collected on it, *Erythroneura rhamnocola* and *Empoasca persicae* infest it in both the provinces. *E. rhamnocola* also breeds on the plant.

**Apple.** Apple orchards are quite common in N.W.F.P. and Baluchistan particularly in colder parts of the two provinces. The plant was observed to harbour at least fourteen species of typhlocybines, of which *Typhlocyba quettensis* and *Empoasca punjabensis* appeared most abundant and widespread. The host plant is more seriously infested in Baluchistan, where some other species like *Empoasca persicae* and *Typhlocyba javedi* were also fairly abundant. *T. quettensis* and *E. punjabensis* were observed breeding on the plant.

**Apricot.** The plant grows both in N.W.F.P and Baluchistan, but was observed infested by typhlocybine species in Baluchistan only. Of the seven species collected on it, *Typhlocyba quettensis*, *Empoasca punjabensis* and *Empoasca persicae* were most abundant. Nymphs of *T. quettensis* were also collected along with adults.

**Cherry.** The plant is very sparsely grown in N.W.F.P. and Baluchistan. Of the six species of typhlocybine leafhoppers collected on the host plant, *Byphlocyba spinosa* was the most abundant, and observed breeding on the plant in Baluchistan. *Empoasca persicae* was also common in some areas on the plant.

**Cucumis.** The fruit plant grows all over Pakistan, particularly in warmer parts. Of the three species of typhlocybines collected, and only from Punjab, *Empoasca punjabensis* was the most dominant, and observed breeding freely on the plant.

**Grape Vine.** Grape vine orchards are commonly grown in N.W.F.P and Baluchistan, and to a lesser extent in Sind and Punjab. Of the fourteen species of typhlocybines collected on the plant, *Erythroneura vinealis*, *Empoasca punjabensis* and *Amrasca devastans* were found to be most abundant. All the three species were observed breeding on the host plant, both in N.W.F.P. and Baluchistan.

**Grewia.** *Grewia asiatica* is grown sparsely in Sind and Punjab, but the leafhopper infestation was observed only in Lower Sind. Of the four species collected from the plant, *Zygina rubronotata* was the most abundant. The leafhopper was also found responsible for spreading the

fungi infection *Phakopsora grewiae* particularly in Karachi and Tandojam areas. The leafhopper freely breeds on the grewia plant from August to February, till the leaves become unsuitable for feeding of leafhoppers.

**Mulberry.** The plant was observed very heavily infested with *Empoasca punjabensis* in a few areas of Baluchistan only.

**Peach.** The plant was observed more seriously infested in Baluchistan than in N.W.F.P. Of the ten species of typhlocybines collected on it, *Empoasca punjabensis*, *Empoasca persicae*, *Erythroneura rhamnocola* and *Typhlocyba javedi* were the most abundant. All the species breed on the plant throughout summer.

**Plum.** Of the four species of typhlocybines collected on the fruit plant, *Erythroneura rhamnocola* was observed to be the most abundant. Nymphs of the species were very rare on the plant in Baluchistan.

**Walnut.** Walnut plant grows in N.W.F.P. Of the six species of leafhoppers collected on it, *Typhlocyba rahmani* and *Typhlocyba ismaili* were the most abundant. No obvious damage to the host plant was observed. Both the species breed on the plant.

**Water Melon.** Only *Empoasca punjabensis* was observed in large numbers on the host plant in Punjab. The species also breeds on it.

**Zizyphus sp.** The fruit plant grows in all the provinces of Pakistan, but was observed infested by *Zygina pakistana* in Punjab only. Casual studies confirmed the occurrence of the species in Sind. The leafhopper breeds on the plant both in Punjab and Sind.

The data in the tables above supports the contention that the fruit plants like fig, guava, citrus, mango, pear and pomegranate are not seriously affected by typhlocybine leafhoppers. On the other hand several of the forty-three leafhopper species recorded on various fruit plants, are only chance catches, and these as a routine do not attack these plants. Fruit plants of higher economic value, and affected by serious infestations of leafhoppers are concentrated in N.W.F.P., and Baluchistan.

## REFERENCES

1. M. Ahmed, Pakistan J. Zool., 2, 292 (1970).
2. M. Ahmed, J. Sci. University of Karachi, 1, 190 (1971).
3. K. Samad, M. Ahmed and R. Naheed, (in press).