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Leafhoppers species richness and abundance on corn crops in Argentina (Insecta–Hemiptera–Cicadellidae)

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ABSTRACT

Leafhoppers affect diverse crops, and particularly corn (*Zea mays* L.), whose production is severely diminished by diseases of diverse etyology. In Argentina, the only known *Cicadellidae* species with vector capacity of corn diseases is *Dalbulus maidis*, an important pest in tropical and subtropical areas of America. Due to the significance of the diseases and the lack of information about the leafhopper communities' composition, a survey was conducted to determine the relative importance and abundance of the species that inhabits maize crops in Argentina. The leafhoppers were collected with entomological nets in 50 localities in 12 provinces of Argentina, during 1993-2000. Overall, 25 species were detected. This study determined differences on the leafhopper communities between areas where the crop is located, and/or the phenological stages of maize; the information is shown in tables. The known geographical distribution of five species is enlarged.

Keywords: Leafhoppers, maize, disease vectors, Argentina.

INTRODUCTION

A high proportion of insect vectors transmitting diseases of crops and wild plants belong to the Suborder Homoptera. In addition to virus and other plant pathogen transmission, they cause damages that vary from necroses to severe physiological alterations produced by their feeding behavior and/or oviposition (NIELSON, 1968; NAULT & AMMAR, 1989; REMES LENICOV & VIRLA, 1999). Of the approximate 21,000 worldwide described species of leafhoppers (Cicadellidae), 151 have been reported as vectors, of which 117 belong to forty-seven genera within the subfamily Deltocephalinae (NIELSON, 1985).

Cicadellid vector/pathogens relationships vary from the simple "foregut borne" to the "circulative" and "propagative" types in which the vector plays a vital role in the life cycle of the disease (NAULT & AMMAR, 1989). From the epidemiological point of view, the

study of this group is relevant because it affects several crops, particularly corn (*Zea mays* L.), where production is severely diminished by diseases of diverse etyology.

In the Neotropical region the Cicadellidae is one of the best-represented families and although the leafhopper fauna of Argentina is among the most thoroughly studied in South America, the knowledge (based mostly on taxonomic and distributional data) are still insufficient.(REMES LENICOV *et al*, 1997). Only few contributions focused the cicadellids-host relationships (REMES LENICOV & TESÓN, 1985; PARADELL, 1995 a, b; REMES LENICOV *et al*, 1999; PARADELL *et al*, 2000).

Maize is one of the economically most important cereals in Argentina. In 1996-97 3,800,000 ha were sown which yielded an estimated of 1,460,000 t with an average yield of 4.500 kg/ha.

There are three main maize pathogens in Latin America: MRFV (Maize Rayado Fino Virus), CSS "Corn Stunt" or "achaparramiento" (Corn Stunt Spiroplasm) and MBSP (Maize Bushy Stunt Micoplasm), they are transmitted in a persistant way by the leafhopper *Dalbulus maidis* (DE LONG & WOLCOTT). Most of the cicadellid vector species are included in the *Deltocephalinae* subfamily and belong to the genera *Dalbulus*, *Baldulus*, *Exitianus*, *Stirellus* and *Graminella* (NAULT and BRADFUTE, 1979; NAULT and MADDEN, 1985).

A comparison of the phylogenetic relationships of twenty-five Deltocephalinae species with their individual ability to transmit Maize Chlorotic Dwarf Virus enabled NAULT and MADDEN (1988) to predict that species of Deltocephalini and "recent" Euscelini have a higher probability of being vectors than species of the more "primitive" Euscelini and Macrostelini. KNIGHT and WEBB (1993) analyzed and established the phylogenetic relationships among diverse genera within the Macrostelini (Deltocephalinae), and tested alternative hypotheses about the origin of the ability to transmit plant phatogens.

The only cicadellid species with known vector capacity of corn diseases in Argentina is *D. maidis* (Lenardón *et al.*, 1993) but surely there are several other species involved in the epidemiology of the corn spiroplams or phytoplasm-borne diseases. The discovery of plants with symptomatology of the above mentioned diseases in areas where *D. maidis* is not registered should be highlighted. This fact creates the necessity for studying other species of *Cicadellidae* as possible vectors.

Due to the significance of the diseases and the lack of information about the leafhopper communities' composition, a survey was conducted to determine the relative importance and abundance of the species that inhabits maize crops in Argentina. Analysis was made in order to compare the presence and importance of the different species and the phenological stage of the crop in two agroecological maize sub-regions of Argentina.

MATERIALS AND METHODS

Between 1993 and 2000 a survey of the Cicadellidae communities was carried out on corn crop located in 12 provinces of Argentina. Insects were collected with an entomological net, during the crop season (between november and april). The obtained data result from the analysis of non systematic samples (1 sample = 50 strikes), carried out in 50 localities (see table 1).

The insects were put in glass jars, killed with ethyl acetate and preserved in alcohol 70%. The phenological stage of the crop was also noted. This allowed the samples to be divided into three categories: from V2 (vegetative with almost two leaves developed) to V7 stages; from V8 stage to the appearance of the male inflorescence; and finally the reproductive stage (from the male inflorescence maturation to the harvest of cultivation).

In Argentina, maize cultivation extends from the 40° parallel South latitude to the North. For the analysis, the argentine maize area was divided in two sub-regions, the division axis was the 30° parallel (LS). The separation of localities determined outlines of two agroecological sub-regions, which induce mainly the use of different types of

Table 1.–Sampled Localities. References: (JU) Jujuy Province, (SA) Salta Prov.; (TU) Tucumán prov.; (SF) Santa Fé prov.; (ER) Entre Ríos prov.; (CB) Córdoba prov.; (LP) La Pampa prov.; (BA) Buenos Aires prov.; (RN) Rio Negro prov.; (SE) Santiago del Estero prov.; (CH) Chaco province: (CO) Corrientes prov.

Localities	Geographical location	Reference in Table 2
Palpalá (JU)	24° 16' S – 65° 12' W	1
Yavi Chico (JU)	22° 07' S – 65° 26' W	2
San Pedro (JU)	24° 13' S – 64° 52' W	3
Humahuaca (JU)	23° 13' S – 65° 21' W	4
Tilcara (JU)	23° 33' S – 65° 24' W	5
Yuto (JU)	23° 36' S – 64° 30' W	6
Tolombón (SA)	26° 11' S – 65° 57' W	7
Talapampa (SA)	25° 32' S – 65° 34' W	8
S.R. de la N. Orán (SA)	23° 08' S – 64° 19' W	9
Pichanal (SA)	23° 20' S – 64° 13' W	10
Metán (SA)	25° 30' S – 64° 58' W	11
Ceibalito (SA)	25° 06' S – 64° 18' W	12
Rosario de la Frontera (SA)	25° 48' S – 64° 58' W	13
Apolinario Saravia (SA)	24° 26' S – 64° 00' W	14
El Galpón (SA)	25° 23' S – 64° 38' W	15
Piquete Cabado (SA)	24° 49' S – 64° 11' W	16
Quebrachal (SA)	25° 18' S – 64° 02' W	
Villa Carmela (TU)	26° 47' S – 65° 16' W	17
Rumi Punco (TU)	27° 59' S – 65° 35' W	18
El Cadillal (TU)	26° 39' S – 65° 13' W	19
Tafí del Valle (TU)	26° 52' S – 65° 41' W	20
Ampimpa (TU)	26° 36' S – 65° 52' W	21
Leales (TU)	27° 10' S – 65° 13' W	22
Avellaneda (SF)	29° 07' S – 59° 07' W	23
Helvecia (SF)	31° 06' S – 60° 05' W	24
Sandford (SF)	33° 53' S – 61° 50' W	25
El Palenque (ER)	31° 40' S – 60° 13' W	26
Federal (ER)	30° 57' S – 58° 47' W	27
Bovril (ER)	31° 20' S – 59° 28' W	
Vicuña Mackenna (CB)	33° 55' S – 64° 24' W	28
Eduardo Castex (LP)	35° 12' S – 63° 35' W	29
Olavarría (BA)	36° 54' S – 60° 20' W	30
9 de julio (BA)	35° 27' S – 60° 54' W	31
25 de Mayo (BA)	35° 25' S – 60° 11' W	32
General Villegas (BA)	35° 02' S – 63° 02' W	33
Fortín Olavarría (BA)	35° 42' S – 63° 02' W	34
Bahía Blanca (BA)	38° 42' S – 62° 16' W	35
Rojas (BA)	34° 12' S – 60° 44' W	36
Colón - Morgan (BA)	33° 53' S – 61° 07' W	37
Santa Catalina (BA)	34° 46' S – 58° 27' W	38
Catriel (RN)	37° 53' S – 67° 48' W	39
Ing. Huergo (RN)	39° 04' S – 67° 16' W	40
Fernández (SE)	27° 55' S – 63° 54' W	
Suncho Corral (SE)	27° 56' S – 63° 26' W	
Saenz Peña (CH)	26° 47' S – 60° 27' W	
Quitilipi (CH)	26° 52' S – 60° 13' W	
Las Breñas (CH)	27° 05' S – 61° 05' W	
Makalle (CH)	27° 13' S – 59° 18' W	
El Sombrero (CO)	27° 36' S – 58° 44' W	
San Roque (CO)	28° 35' S – 58° 42' W	

germoplasm. The sampled localities are listed in Table 1.

For each of the species the relative abundance (RA) and relative importance (RI) was calculated using the following formula:

$$\mathbf{RI = (ni/nt) * (mi/mt) * 100}$$

— ni: number of individuals in the species "i"
— nt: number of individuals in all species
— mi: number of samples where the species appears "i"
— mt: total number of samples.

Those species having a RI > 1 are considered "frequent"; those having a RI from 0,02 to 0,99 are considered "not very frequent"; and those having a RI < 0,019 are considered "rare or occasional".

It is important to note that some samples did not have a clear mention of the phenological stage from which were taken; therefore, in the tables, the sums of the numbers of individuals or samples that appear in the different stages are different from those in the total.

The examined insects were kept in the Scientific Department of Entomology collections, School and Museum of Natural Science, La Plata (Argentina).

RESULTS

We observed that there are some species that occur exclusively to the North of the 30° parallel SL: *Xestocephalus irroratus* Osborn, 1924 (Xestocephalinae); *Tapajosa rubromarginata* (SIGNORET, 1855), *Hortensia similis* (WALKER, 1851), *Erythrogonia* sp. (Cicadellinae); *Empoasca* sp. (Fabae group) (Typhlocibinae); *Bergallia confusa* Oman, 1938 (Agallinae); *Chlorotettix neotropicus* Jensen-Haarup, 1922; *Chlorotettix minimus* BAKER, 1898; *Balclutha rosea* (SCOTT, 1876) and *Atanus coronatus* (BERG, 1879) (Deltocephalinae); others occur to the South of the same parallel: *Syncharina argentina* (BERG, 1879), *Plesiommata mollicella* (FOWLER, 1900) (Cicadellinae); *Graminella puncticeps* Linnavuori, 1959; *Exitianus obscurinervis* (STÅL, 1859); *Amplicephalus simpliciusculus* Linnavuori, 1955; *Amplicephalus marginellanus* Linnavuori, 1955 (Deltocephalinae); and others in both regions: *Xerophloea viridis* (FABRICIUS, 1794) (Xerophloeinae); *Syncharina punctatissima* (SIGNORET, 1854) (Cicadellinae); *Haldorus sexpunctatus* (BERG, 1879); *Chlorotettix fraterculus* (BERG, 1879); *Amplicephalus dubius* (LINNAVUORI, 1955) and *Dalbulus maidis* [1] (Deltocephalinae); *Empoasca manubriata* Young, 1953 and *Empoasca curveola* Oman, 1936 (Typhlocibinae); *Agalliana ensigera* Oman, 1934 (Agallinae). The occurrence of these species in the different localities is summarized in Table 2.

There were no collected cicadellid specimens in the following localities: Quebrachal (Salta province); SUNCHO CORRAL and FERNÁNDEZ (Santiago del Estero province); Las Breñas, SAENZ PEÑA, MAKALLE and QUITILIPI (Chaco province); San Roque and El Sombrero (Corrientes province); and BOVRIL (Entre Rios province).

After the analysis of the data obtained from both agroecological regions, the five species with the highest relative importance are *Dalbulus maidis* (13.56), *Exitianus obscurinervis* (4.24), *Haldorus sexpunctatus* (3.07), *Empoasca curveola* (2.16), and *Agalliana ensigera* (1.88).

Syncharina punctantissima, S. argentina, Amplicephalus dubius, Balclutha rosea, Chlorotettix fraterculus, Xerophloea viridis, Empoasca manubriata and *Tapajosa rubromarginata* are not very frequent species. However *Plesiommata mollicella, Amplicephalus marginellanus, A. simpliciusculus, Empoasca* sp. (*fabae* group), *Atanus coronatus, Graminella puncticeps, Chlorotettix minimus, C. neotropicus, Xestocephalus irroratus, Hortensia similis, Bergallia confusa* and *Erytrogonia* sp. are rare or occasional species.

[1] It appears in only one locality, in the region located to the South of the 30° parallel (Helvecia, Santa Fe province - 30° 57' S and 58° 47' W).

Table 2.–Distribution of the leafhoper species in the sampled localities. (see localities references in Table 1).

Locality	n° spp	*D. maidis*	*E. obscurinervis*	*A. ensigera*	*H. sexpunctatus*	*E. curveola*	*X. viridis*	*Ch. fraterculus*	*A. dubius*	*B. rosea*	*T. rubromarginata*	*E. manubriata*	*P. mollicella*	*A. marginellanus*	*Empoasca sp.* (fabae group)	*A. coronatus*	*S. punctatissima*	*G. puncticeps*	*X. irroratus*	*A. simpliciusculus*	*Ch. minimus*	*H. similis*	*B. confusa*	*Erythrogonia sp.*	*Ch. neotropicus*	*S. argentina*
1	4	*		*				*															*			
2	2	*		*																						
3	2			*																		*				
4	1			*																						
5	1	*																								
6	1	*																								
7	5	*							*	*					*											
8	1	*																								
9	1	*								*	*				*	*										
10	1	*																								
11	1	*																								
12	1	*																								
13	1	*																								
14	3	*		*												*										
15	5	*						*		*											*			*		
16	1																*									
17	2	*									*															
18	4	*					*	*											*							
19	3	*			*						*															
20	3	*			*		*																			
21	3	*										*														
22	6	*		*	*	*	*	*																		
23	2	*				*																				
24	2	*	*																							
25	1		*																							
26	3		*		*	*																				
27	3		*				*						*													
28	1		*																							
29	2		*									*														
30	2				*	*																				
31	1		*																							
32	2				*			*																		
33	4		*		*	*			*																	
34	4		*		*				*					*												
35	2		*									*														
36	4		*	*	*	*																				
37	4		*	*	*				*	*																
38	11		*	*	*	*			*				*	*			*	*			*					*
39	1			*																						
40	4		*	*	*		*																			
Total	21	14	12	12	7	5	5	5	3	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1

Table 3.—Relative importance (RI) and abundance (RA) of the species found to the North of the 30° parallel LS

		Xerophloea viridis	*Dalbulus maidis*	*Chlorotettix fraterculus*	*Chlorotettix minimus*	*Chlorotettix neotropicus*	*Xestocephalus irroratus*	*Agalliana ensigera*	*Tapajosa rubromarginat*	*Haldorus sexpunctatus*	*E. curveola*	*A. dubius*	*Empoasca* sp. (Grupo fabae)	*Empoasca manubriata*	*Balclutha rosea*	*Atanus coronatus*	*Syncharyna punctatissima*	*Hortensia similis*	*Bergallia confusa*	*Erythrogonia sp.*
TOTAL	M_i [3]	3	20	4	1	1	1	7	3	3	2	1	2	1	3	2	1	1	1	1
M_t: 32 [1]	N_i [4]	4	259	7	1	1	1	47	3	13	2	1	3	2	15	2	1	1	1	1
N_t: 365 [2]	**RI**	**0.103**	**44.35**	**0.24**	**0.01**	**0.01**	**0.009**	**2.82**	**0.08**	**0.33**	**0.03**	**0.01**	**0.05**	**0.02**	**0.39**	**0.03**	**0.01**	**0.01**	**0.01**	**0.01**
	RA	1.10	70.96	1.92	0.27	0.27	0.27	12.88	0.82	3.56	0.55	0.27	0.82	0.55	4.11	0.55	0.27	0.27	0.27	0.27
Stage I[5]	M_i	—	2	—	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—
M_t: 2	N_i	—	77	—	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—
N_t: 80	**RI**	—	**96.25**	—	—	—	—	—	**2.5**	**0.63**	—	—	—	—	—	—	—	—	—	—
	RA	—	96.25	—	—	—	—	—	2.5	1.25	—	—	—	—	—	—	—	—	—	—
Stage II [6]	M_i	3	15	4	1	—	1	7	1	2	1	1	2	—	3	2	1	1	1	1
M_t: 21	N_i	4	150	7	1	—	1	47	1	12	1	1	3	—	15	2	1	1	1	1
N_t: 249	**RI**	**0.229**	**43.03**	**0.54**	**0.02**	**—**	**0.019**	**6.29**	**0.02**	**0.46**	**0.02**	**0.02**	**0.11**	**—**	**0.86**	**0.08**	**0.02**	**0.02**	**0.02**	**0.02**
	RA	1.606	60.24	2.81	0.4	—	0.402	18.9	0.4	4.82	0.4	0.4	1.2	—	6.02	0.8	0.4	0.4	0.4	0.4
Stage III [7]	M_i	—	3	—	—	1	—	—	—	—	1	—	—	1	—	—	—	—	—	—
M_t: 9	N_i	—	32	—	—	1	—	—	—	—	1	—	—	2	—	—	—	—	—	—
N_t: 36	**RI**	—	**29.63**	—	—	**0.31**	—	—	—	—	**0.31**	—	—	**0.62**	—	—	—	—	—	—
	RA	—	88.89	—	—	2.78	—	—	—	—	2.78	—	—	5.56	—	—	—	—	—	—

[1] total number of samples.
[2] number of individuals in all species
[3] number of samples where the specie "i" appears
[4] number of individuals in the species "i"
[5] Early vegetative: with two leaves developed (V2) to V7
[6] Last vegetative stage: from V8 stage to the appearance of the male inflorescence
[7] Reproductive stage (from the male inflorescence maturation to the harvest of cultivation).

Haldorus sexpunctatus (RI:10.9), *Dalbulus maidis* (RI: 9.59) and *Exitianus obscurinervis* (RI: 8.22) are the most important species in the earliest vegetative stages (V2 to V7). *D. maidis* (RI: 25.45) is most important during the final vegetative stage and *Exitianus obscurinervis* (RI: 5.38) and *A. ensigera* (RI: 3.47) behaves in a similar way. After the formation of the male inflorescence and up to the end of cultivation the more significant species is *D. maidis* (RI: 25.26), and the species that appear as occasionally important during this period are *Empoasca manubriata* (RI: 0.53) and *A. ensigera* (RI: 0.53).

The analysis of the data obtained from samples made in the northern agroecological subregion demonstrates that the most abundant and frequent species is *D. maidis* together with *A. ensigera.*

X. viridis, C. frateuculus, T. rubromarginata, H. sexpunctatus, E. curveola, Empoasca sp. *(fabae group), E. manubriata, B. rosea* and *A. coronatus* are not very frequent species. The rare or occasional species are *C. minimus, C. neotropicus, X. irroratus, A. dubius, S. punctatissima, H. similis, B. confusa* and *Erytrogonia* sp (Table 3).

The analysis of the data obtained from samples made in the southern agroecological subregion shows that the most frequent species is *E. obscurinervis* and then in order of importance *H. sexpunctatus, E. curveola, A. ensigera* and *S. punctatissima.*

S. argentina, P. mollicella, A. marginellanus, E. manubriata, X. viridis, G. puncticeps and *A. simpliciusculus* are not very frequent species; meanwhile *D. maidis* and *C. fraterculus* are very rare or occasional species (Table 4).

CONCLUSIONS AND DISCUSSION

PARADELL (1995 a) based on literature and the examination of specimens deposited in diverse entomological collections reported 31 species associated with maize crops in Argentina. In that contribution, only a brief description and distributional data of each species were given without information about the relative importance or abundance of their populations. Throughout this study the relative abundance and importance of 25 species that relate to maize crop in Argentina are established. In the available literature we were not able to find similar studies written in another South American country with which to compare it.

Nine of the 25 species are widely spread and are present in all of the monitored corn agroecosystems. Ten species were found only in localities to the North of the 30° parallel LS while six species were present only to the South of this parallel.

The geographical distribution of five species is enlarged: *Chlorotettix fraterculus* and *Bergallia confusa* are new to Jujuy province; *Balclutha rosea* and *Erythrogonia* sp. are new to Salta province, *Dalbulus maidis* are new to Jujuy and Santa Fe provinces. *Erythrogonia* sp. and *Chlorotettix minimus* were quoted for the first time on maize crops in the region.

Because the occurrence of CSS disease and plants with symptomatology of the phytoplasm-borne diseases are in areas where *D. maidis* (the only known vector present in Argentina) is absent, we suggest that *Exitianus obscurinervis, Haldorus sexpunctatus, Amplicephalus dubius, Agalliana ensigera, Syncharina punctatissima* and *Empoasca curveola* are the prime candidates for use in transmission tests. *E. obscurinervis* is present in 90% of the monitored localities to the south of the 30° parallel LS and due to it frequency and abundance it could be involved in the epidemiology of these diseases.

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Table 4.—Relative importance (RI) and abundance (RA) of the species found to the South of the 30° parallel LS. (Reference as in a Table 2)

		Xerophloea viridis	*Dalbulus maidis*	*Chlorotettix fraterculus*	*Agalliana ensigera*	*Haldorus sexpunctatus*	*E. curveola*	*Exitianus obscurinervis*	*P. mollicella*	*A. dubius*	*A. marginellanus*	*Empoasca manubriata*	*A. simpliciusculus*	*Graminella puncticeps*	*Syncharyna punctatissima*	*Syncharyna argentina*
TOTAL	M_i	2	1	1	5	9	5	14	2	4	2	2	1	1	1	1
M_t: 18	N_i	2	1	1	16	90	122	122	3	11	3	3	2	3	48	13
N_t: 440	**RI**	**0.051**	**0.013**	**0.013**	**1.010**	**10.23**	**7.702**	**21.56**	**0.076**	**0.556**	**0.076**	**0.076**	**0.025**	**0.038**	**0.606**	**0.164**
	RA	0.45	0.23	0.23	3.64	20.45	27.73	27.73	0.68	2.50	0.68	0.68	0.45	0.68	10.91	2.95
Stage I	M_i	1	—	1	3	6	3	6	—	1	—	1	—	—	—	—
M_t: 9	N_i	1	—	1	9	24	4	22	—	3	—	2	—	—	—	—
N_t: 66	**RI**	**0.168**	—	**0.168**	**4.545**	**24.24**	**2.020**	**22.22**	—	**0.505**	—	**0.337**	—	—	—	—
	RA	1.52	—	1.52	13.64	36.36	6.06	33.33	—	4.55	—	3.03	—	—	—	—
Stage II	M_i	1	1	—	—	2	1	7	1	2	1	1	—	—	—	—
M_t: 7	N_i	1	1	—	—	5	1	73	2	4	2	1	—	—	—	—
N_t: 90	**RI**	**0.159**	**0.16**	—	—	**1.59**	**0.16**	**81.1**	**0.3**	**1.3**	**0.3**	**0.2**	—	—	—	—
	RA	1.11	1.11	—	—	5.56	1.11	81.11	2.22	4.44	2.22	1.11	—	—	—	—

RESUMEN

Los homópteros auquenorrincos (chicharritas) afectan diversos cultivos, en especial maíz (*Zea mays* L.), cuyas producciones se ven severamente disminuidas por enfermedades de diversa etiología. En Argentina, la única especie de Cicadellidae reconocida como vector de enfermedades al maíz es *Dalbulus maidis*, importante plaga en áreas tropicales y subtropicales de América. Debido a la importancia de las enfermedades y la marcada carencia de información referida a la composición faunística de las comunidades de cicadélidos, se llevaron a cabo relevamientos tendientes a determinar la abundancia e importancia relativa de las diversas especies que habitan en cultivos de maíz de Argentina. Los Cicadélidos fueron recolectados con red entomológica de arrastre en 50 localidades distribuídas en 12 provincias de Argentina entre los años 1993-2000. En total, se listaron 25 especies. Este estudio determina las diferencias en las comunidades de Cicadélidos según el área de localización del cultivo y/o el estado fenológico en el cual se encuentra; esta información es mostrada a través de tablas. Se amplía la distribución geográfica de cinco especies.

Palabras Clave: Cicadellidae, maíz, vectores de enfermedades, República Argentina.

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