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Damage Caused by Psyllids and Influence of Climatic Factors in Brazilian Accesses of Guava Trees Cultivated in Organic System

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Abstract

The psyllid (*Triozoida* sp.) is the primary pest of guava tree in the Central Northern region of São Paulo State, Brazil. The variation of climatic factors may influence directly or indirectly the behavior of agricultural pests. The present work had objectives to evaluate the damages caused by psyllid in accesses of guava trees in order to identify materials with potential resistance to pest and the possible correlations of the damage with the meteorological factors, in an orchard of guava conducted in an organic system. Eighty-five guava accesses were evaluated. Each one was analyzed at random 10 leaves containing the symptom of the psyllid attack, through visual range of notes. The averages of the notes were compared by Scott-Knott test at 5% probability. The 25 accesses with the highest average damage of psyllid had the data submitted to correlation (Pearson), with the minimum and maximum temperature (˚C), precipitation (mm) and relative humidity (%). Guava accesses used commercially were the most susceptible to the attack of psyllid, compared to the selections, with an emphasis to access "L4P14", "L7P28" and "L8P32B", which were the least attacked. The study of correlation between psyllid damages and meteorological factors, must be used the medium temperature, relative humidity and rainfall accumulated in the period of 14 days before the evaluations. There is a positive correlation between minimum temperasture, precipitation and relative humidity with the damage of psyllids in leaves of guava.

Keywords

Triozoida sp., *Psidium guajava*, Varietal Resistance, Temperature, Precipitation, Relative Humidity

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1. Introduction

The guava tree is one among many farmed species that has high genetic diversity. However, there are few varieties used commercially, both for industry and for consumption "in natura".

The production of guava in the northern region of the São Paulo State corresponds to 70% of state production [1]. Currently, in order to achieve the demand of guava fruit throughout the year, producers have irrigated the area and made constant pruning, which has caused an increase and also regularity in production. It is assumed that this change of cultural practices has led to an increase in regional population of psyllids (*Triozoidalimbata*) (Enderlein, 1918) (Hemiptera: Triozoidae), which today are cited as key pest of culture [2].

The characteristic symptom of guava psyllid attack is the winding from the edges of the leaves, where there are colonies of nymphs. Initially, these edges are of a yellowish (chlorotic areas) or reddish coloration. Later, with necrotic appearance, fall leaves may occur, causing some reduction in leaf area and, consequently, compromise in production [3].

Upon the damage caused by *T. limbata*, the occurrence of this insect throughout the year, the limited number of insecticides registered and the factors that make it difficult to contact insecticide with the nymphs, as they are protected inside the coiled leaf, studies are required to subsidize the development of management strategies for this pest on guava orchards [4].

Unlike the conventional system of fruit production, organic orchards are established techniques of certification programs to suppress the use of synthetic agricultural inputs. In this type of system, the production of guava in Brazil is still very little explored, by requiring greater care, mainly in plant disease area [5].

The variation of climate components can directly or indirectly influence the behavior of agricultural pests. These elements act directly on mortality and on performance of pests through changes in oviposition, feeding, growth and migration [6]. Among the climate elements, temperature, relative humidity and precipitation are the main factors related to population dynamics of agricultural pests [7].

By the above, the present work had objectives to evaluate the damage caused by psyllid in guava accesses cultivated in organic system, in order to identify possible materials with resistance to insect, and study the possible correlations between this pest and the meteorological factors temperature, precipitation and relative humidity.

2. Material and Methods

The experiment was developed in Apta North Centre in Pindorama, São Paulo State, Brazil (21˚11'9"S and 48˚54'25"W), with annual average temperature of 22.8˚C, annual average precipitation of 1390.3 mm and average annual relative humidity of 71.6%. According to the Köppen classification, the climate fits the type Aw, defined as tropical humid, with rainy season in summer and dry in winter. Were used guava plants belonging to Active Germplasm Bank, containing 85 accesses, with 15 years old, being three plants/access, grown in an organic system, spaced 6 × 5 m. Upon the result of the analysis of soil, took place an application on surface of 1.5 ton/ha of dolomitic limestone in total area and 20 L of filter cake, around the trunk, in each plant. The control of spontaneous plants was accomplished by ecological reaping machine and hoeing. In July 2012, the plants suffered a drastic pruning, so that the main trunk has a height of 1.20 meters from the ground. On the occasion of this pruning, plants were with new shoots in the evaluation period. For the study with psyllid, on each access were analyzed at random 10 leaves containing the symptom of psyllid attack (edges winding), totaling 850 leaves per assessment. For each leaf sampled was assigned a note from 1 to 4 [2], who assigns a variable percentage of damage, being note 1 of 0 to 25% damage; 2, of 26% to 50%; 3, 51% to 75% and note 4, 76% to 100% of damage to the leaf edge. The evaluations were conducted in 10/1/12, 10/15/12, 10/29/12, 11/12/12, 11/26/12, 1/14/13, 1/28/13 and 2/18/13. The evaluations that presented the highest notes of visible symptoms of attack were used for the analysis of the psyllid's damage (average of five final evaluations of each access), for best interpretation of the data. The averages of each access in each assessment, and the averages of the five latest evaluations, were compared by Scott-Knott test at 5% probability. For statistical analysis, the data were transformed into $\sqrt{x}$, and in the table are the original values. The average data relating to psyllid damage in 25 accesses more attacked by the insect have been recorded in each evaluation and submitted to correlation (Pearson), with the minimum temperature (˚C), the maximum temperature (˚C), relative humidity (obtained at 07:00 a.m. and 01:00 p.m. hours) and precipitation (mm). The meteorological data were obtained from the meteorological station of Apta North Centre, located about 300 m from the experiment. In correlations, psyllid data were correlated with meteorological factors recorded the day before the evaluations, with averages recorded during periods of seven and 14 days prior evaluations, in order to determine which one is the length of time that must be used in the correlations. For precipitation, we used the value of evening, and the accumulated values at seven and 14 days prior to assessments.

3. Results

It was observed an increase in the severity of insect attack from the third assessment, as shown in **Figure 1**.

The statistical analysis of the notes obtained in evaluations is in **Table 1**. The average of the last five evaluations allowed the separation of accesses into four groups, with the ones used commercially, as Rich and Paluma, the most attacked by psyllid. The L4P14, L7P28 and L8P32B accesses showed few symptoms of attack and may indicate any resistance to the insect.

The correlations between the average data relating to psyllid damage in 25 accesses more attacked with the minimum temperature (˚C), the maximum temperature (˚C) and relative humidity (%), using the average of 14 days, and for precipitation (mm) accumulated in 14 days prior the evaluations are in **Figure 2**, **Figure 3** and **Figure 4**. It was observed an increase in the severity of psyllid attack from the third assessment, probably due to the increase of new shoots.

The damage of psyllid showed positive correlation only with the relative humidity recorded at 1:00 p.m. among the meteorological factors when taken on the eve of the evaluations (**Table 2**). However, when one takes into account the average temperature of seven days before the assessments, there is a positive correlation of psyllid damage with minimum temperature, demonstrating that there is an increase in the damage caused by the insect with the increase of the minimum temperature. The average of temperature of 14 days prior assessments and the rainfall during this period, it appears that, in addition to the correlation with the minimum temperature, there is a significant positive correlation also with precipitation and relative humidity registered at 1:00 p.m., demonstrating that there is an increase in the damage caused by the pest with increasing precipitation.

4. Discussion

The increased severity of insect attack from the third assessment (**Figure 1**) is due to the greater number of shoots, once the psyllid posture is held over the pointers and young leaves of the guava tree [3]. Several authors have verified population peaks of psyllid in the months following the pruning [2] [8]-[12].

Colombi & Galli [2], assessing the population fluctuation and the evolution of damage of *T. limbata* in guava orchards subjected to minimal use of pesticides, have noted a surge in damage, which continued increasing until September, and that this increase was due to the pruning accomplished in June, which induced the sprouting and emergence of new leaves, providing favorable conditions for the development of psyllid. The authors also con-

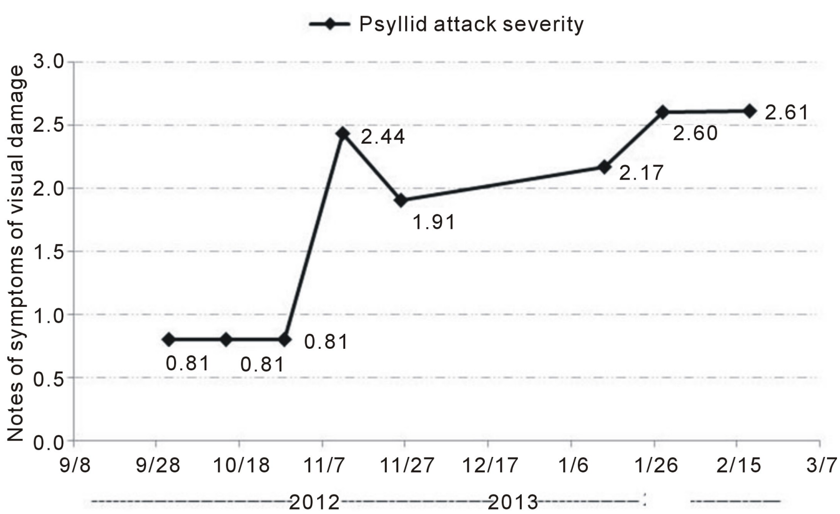

Figure 1. Average rating of visual symptoms of psyllid attack on 85 access. Pindorama/SP/Brazil, 2012/2013.

Table 1. Notes of visual symptoms of psyllid (*Triozoida* sp.) attack, in guava access, on different evaluations. Pindorama/SP /Brazil, 2012/2013.

Access	Origin	Evaluation times										Average of 5 evaluations	
		11/12/12		11/26/12		01/14/13		01/28/13		02/18/13			
		-- Notas --------------------------------											
EEFT1 (Almas)	Monte Alto	3.7	a	3.7	a	4.0	a	4.0	a	4.0	a	3.9	a
RubySupreme2	Monte Alto	3.2	a	3.6	a	4.0	a	4.0	a	4.0	a	3.8	a
RubySupreme3	Monte Alto	3.5	a	2.4	b	3.9	a	4.0	a	4.0	a	3.6	a
Patillo—Ba.	Jundiaí	3.2	a	3.7	a	3.4	a	3.9	a	3.3	a	3.5	a
RedSelection	Monte Alto	3.6	a	3.3	a	3.3	a	3.0	b	4.0	a	3.4	a
M. Alto Comum 1	Monte Alto	3.3	a	3.0	a	3.4	a	3.7	a	3.4	a	3.4	a
Kioshi2	Monte Alto	2.8	b	2.2	c	3.5	a	4.0	a	4.0	a	3.3	a
Rica—J—2	Jaboticabal	3.9	a	1.6	d	3.1	a	4.0	a	3.8	a	3.3	a
Webber Supreme	Jaboticabal	3.8	a	1.9	c	1.5	c	2.9	b	2.6	b	3.1	a
Paluma	Jaboticabal	2.8	b	2.1	c	2.6	b	4.0	a	3.8	a	3.1	a
EEFT 2 (Almas)	Monte Alto	3.7	a	1.6	d	3.3	a	3.4	a	3.3	a	3.1	a
Creme arredon.	Jaboticabal	3.5	a	2.1	c	3.1	a	3.7	a	2.8	b	3.0	a
FAO—Unesp	Jaboticabal	2.9	b	1.7	c	3.5	a	3.3	a	3.6	a	3.0	a
IAC-4—Unesp	Jaboticabal	2.8	b	1.8	c	2.8	b	4.0	a	3.6	a	3.0	a
Saito	Valinhos	2.6	b	1.9	c	3.3	a	4.0	a	3.0	b	3.0	a
Kioshi1	Monte Alto	1.8	c	2.2	c	3.3	a	4.0	a	3.4	a	2.9	a
M.Alto—Branca	Jundiaí	2.5	b	2.5	b	2.6	b	4.0	a	3.1	b	2.9	a
Kioshi3	Monte Alto	3.2	a	2.9	a	2.8	b	2.5	c	3.1	b	2.9	a
EEF-3	Jaboticabal	3.3	a	1.9	c	2.6	b	3.4	a	3.2	b	2.9	a
EEFT 3	Monte Alto	3.5	a	3.6	a	2.2	b	3.1	b	2.0	c	2.9	a
Verm. Perfum.	Jundiaí	2.9	b	1.7	c	3.0	a	2.6	c	4.0	a	2.8	a
Ogawa × Kumagai	Promissão	2.8	b	2.3	b	3.4	a	2.4	c	3.2	b	2.8	a
EEFT 4	Monte Alto	3.5	a	3.2	a	2.5	b	2.3	c	2.4	c	2.8	a
RS EEFT CAB.A.	Jundiaí	3.0	b	2.3	b	2.2	c	3.0	b	3.4	a	2.8	a
L8P30	Campinas	3.7	a	2.0	c	2.1	c	2.9	b	3.1	b	2.8	a
Taquar. comum	Monte Alto	2.5	b	2.4	b	1.9	c	3.3	a	3.5	a	2.7	b
FAOEEFTCABA	Jundiaí	2.3	c	1.9	c	2.6	b	3.3	a	3.5	a	2.7	b
L1P3	Campinas	2.5	b	1.9	c	2.5	b	3.4	a	3.2	b	2.7	b
Ogawa3	Mogi Cruzes	3.2	a	2.5	b	1.7	c	3.1	b	3.0	b	2.7	b
Mirtácea	Campinas	2.1	c	1.3	d	2.3	b	3.8	a	3.9	a	2.7	b
L1P2	Campinas	2.8	b	1.9	c	2.6	b	2.8	b	3.1	b	2.6	b
L4P17	Campinas	2.9	b	1.4	d	2.7	b	2.7	b	3.2	b	2.6	b
Supreme	Monte Alto	3.0	b	2.2	c	2.4	b	2.5	c	2.8	b	2.6	b
L3P8	Campinas	2.7	b	1.9	c	1.4	d	3.1	b	3.7	a	2.6	b
L3P7	Campinas	2.9	b	2.1	c	2.6	b	2.5	c	2.7	b	2.6	b
L8P32A	Campinas	2.8	b	2.1	c	1.9	c	3.5	a	2.5	b	2.6	b
Prop. TataoOgawa	Mogi Cruzes	2.4	c	1.4	d	1.7	c	3.3	a	3.8	a	2.5	b
L5P20	Campinas	3.4	a	2.1	c	1.8	c	2.5	c	2.6	b	2.5	b
Austr.branca	Jundiaí	2.6	b	2.2	c	2.6	b	2.7	b	2.1	c	2.4	b
Patillo	Jaboticabal	2.0	c	1.1	d	2.6	b	3.0	b	3.5	a	2.4	b
Monte Alto	Jundiaí	2.4	c	1.8	c	1.6	c	2.8	b	3.5	a	2.4	b
Ogawa1	Mogi Cruzes	1.9	c	1.3	d	2.6	b	3.5	a	2.8	b	2.4	b
L3P11	Campinas	2.6	b	2.0	c	2.0	c	2.4	c	2.9	b	2.4	b
L3P12	Campinas	2.7	b	1.8	c	2.8	b	1.8	d	2.8	b	2.4	b

Continued

L4P15	Campinas	3.1	a	2.6	b	1.3	d	2.3	c	2.4	c	2.3	b
L6P22	Campinas	2.1	c	2.2	c	1.7	c	3.1	b	2.3	c	2.3	b
L2P5	Campinas	2.1	c	2.0	c	2.1	c	2.7	b	2.6	b	2.3	b
L4P16	Campinas	2.2	c	2.2	c	1.7	c	3.0	b	2.2	c	2.3	b
Supreme BA.	Jundiaí	2.2	c	1.6	d	1.8	c	2.6	c	3.0	b	2.2	b
L4P13	Campinas	1.6	d	1.7	c	1.7	c	3.0	b	3.2	b	2.2	b
L7P26	Campinas	1.8	c	1.7	d	1.6	c	2.9	b	3.1	b	2.2	b
Indiana	Jundiaí	1.6	d	2.0	c	2.4	b	2.8	b	2.2	c	2.2	b
Ver. (Shimoda)	Valinhos	2.1	c	0.6	d	2.1	c	2.1	c	2.8	b	2.1	b
Kumagai branca	Valinhos	2.5	b	1.6	d	2.2	b	2.3	c	2.1	c	2.1	b
Webber Supreme	Jundiaí	2.1	c	2.7	b	2.8	b	3.7	a	2.2	c	2.1	b
L6P24	Campinas	1.7	d	1.6	d	2.1	c	2.0	c	3.2	b	2.1	b
L2P6	Campinas	3.2	a	1.9	c	2.1	c	1.9	d	1.5	d	2.1	b
Austr.Vermelha	Jundiaí	2.6	b	1.5	d	1.4	d	2.8	b	2.2	c	2.1	b
(Cingapura)	Linhares-ES	2.0	c	1.5	d	2.6	b	2.7	b	1.5	d	2.06	c
Goiaba p. amarela	Valinhos	2.1	c	1.3	d	2.3	b	2.9	b	1.7	d	2.06	c
L3P9	Campinas	1.7	d	1.2	d	2.2	c	2.4	c	2.6	b	2.0	c
RubySupreme1	Monte Alto	2.2	c	1.8	c	1.7	c	2.8	b	1.4	d	2.0	c
L5P21	Campinas	1.3	d	1.5	d	1.3	d	2.5	c	2.6	b	1.8	c
L5P18	Campinas	1.9	c	1.8	c	1.8	c	1.8	d	1.9	c	1.8	c
L3P10	Campinas	2.0	c	2.0	c	1.8	c	1.3	d	2.1	c	1.8	c
L6P25	Campinas	2.0	c	1.2	d	2.3	b	1.0	d	2.1	c	1.7	c
Indiana—UNESP	Jaboticabal	1.5	d	1.3	d	1.4	d	2.3	c	1.9	c	1.7	c
Supreme branca	Jundiaí	2.0	c	1.9	c	1.3	d	1.4	d	1.7	d	1.7	c
IAC-4—Cica	Monte Alto	2.1	c	1.3	d	1.4	d	2.2	c	1.2	d	1.6	c
Goiaba branca	Unknown	2.2	c	1.4	d	1.7	c	1.4	d	1.5	d	1.6	c
Guanabara	Jundiaí	1.8	d	1.0	d	1.2	d	1.6	d	2.4	c	1.6	c
L2P4	Campinas	2.3	c	1.5	d	1.2	d	1.7	d	1.3	d	1.6	c
Torrão de Ouro	Jundiaí	1.3	d	1.8	c	0.1	d	1.8	d	1.9	c	1.6	c
L5P19	Campinas	2.0	c	1.7	c	1.4	d	1.3	d	1.5	d	1.6	c
Rubi Supreme	Jundiaí	1.4	d	1.2	d	1.6	c	1.6	d	2.0	c	1.6	c
Ver. Red. (Shim.)	Valinhos	1.4	d	1.5	d	1.3	d	1.4	d	2.1	c	1.5	c
L6P23	Campinas	1.7	d	1.0	d	1.4	d	1.5	d	1.6	d	1.4	c
IAC-4	Jundiaí	1.6	d	1.2	d	1.2	d	1.4	d	1.6	d	1.4	c
EEFT—CA—BA	Jundiaí	1.5	d	1.6	d	1.4	d	1.3	d	1.0	d	1.4	c
L8P31	Campinas	1.6	d	1.6	d	1.0	d	0.6	e	1.9	c	1.3	c
Campos	Jundiaí	1.4	d	1.3	d	1.2	d	1.2	d	1.4	d	1.3	c
Tetraplóide	Jundiaí	1.4	d	1.2	d	1.3	d	1.0	d	1.1	d	1.2	d
L4P14	Campinas	1.7	d	1.5	d	1.0	d	0.1	f	1.5	d	1.2	d
L7P28	Campinas	2.2	c	1.4	d	1.0	d	0.2	f	0.2	e	1.0	d
L8P32B	Campinas	1.0	d	1.4	d	0.4	e	0.4	e	0.3	e	0.7	d
F (Blocks)		1.0839^{NS}		1.4468^{NS}		1.3135^{NS}		1.0228^{NS}		0.6908^{NS}		23.3399^{**}	
F (Treatments)		6.1636^{**}		5.2656^{**}		10.063^{**}		20.684^{**}		14.5337^{**}		8.2977^{**}	
CV (%)		19.91		21.67		19.99		17.46		17.99		11.96	

cluded that there is a strong relationship between the damage and the population density of the insect.

Duarte *et al*. [12], studying the population dynamics of *T. limbata*, *Costalimaita ferruginea* (Fabr., 1801) (Col.: Chrysomelidae) and natural enemies in organic and conventional orchard of guava, verified that the population density of *T. limbata* remained low, but constant, with a peak in October, in the organic orchard, next month

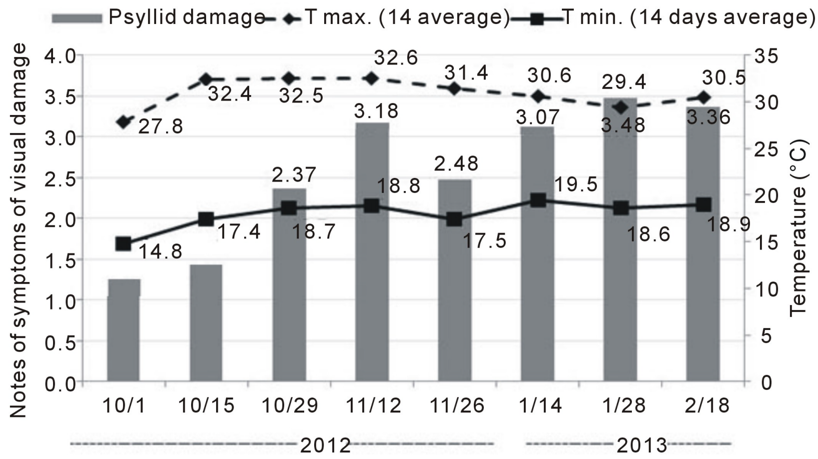

Figure 2. Average rating of visual symptoms of psyllid attack in 25 access and maximum and minimum temperatures recorded during the period. Pindorama/SP/Brazil, 2012/2013.

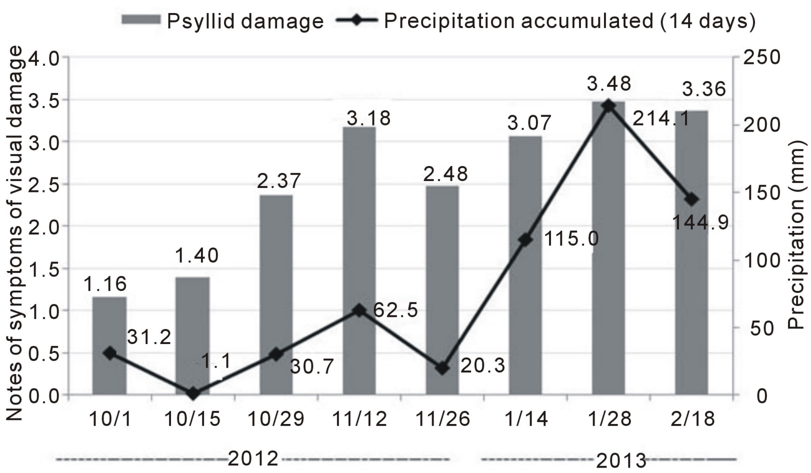

Figure 3. Average rating of visual symptoms of psyllid attack in 25 access and precipitation recorded in the period. Pindorama/SP/Brazil, 2012/2013.

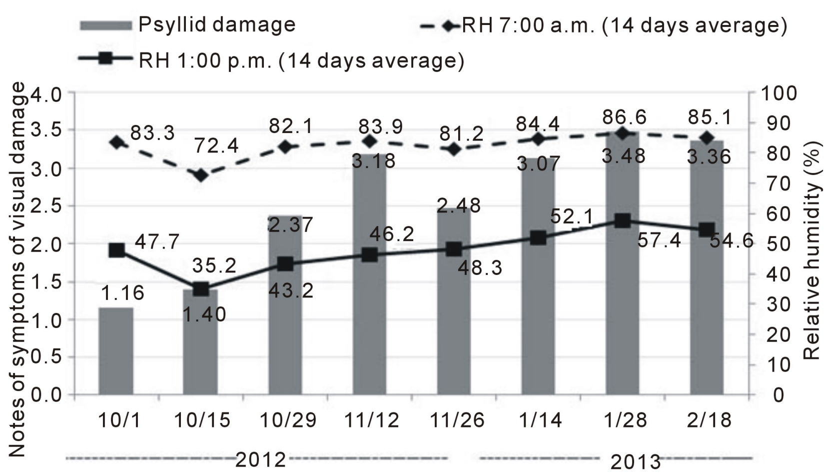

Figure 4. Average rating of visual symptoms of psyllidattack in 25 access and relative humidity recorded in the period. Pindorama/SP/Brazil, 2012/2013.

Table 2. Coefficient of correlation between damage caused by psyllids and meteorological factors minimum temperature (TMIN), maximum temperature (TMAX), precipitation (PREC) and the relative humidity at 7:00 a.m. and 1:00 p.m. (RH) recorded on the eve of assessments, the 7 and 14 days prior assessments. Pindorama/SP/Brazil, 2012/2013.

Psyllid	Coefficient of correlation (Pearson)				
	TMIN (˚C)	TMAX (˚C)	PREC (mm)	RH 7 a.m.	RH 1 p.m.
	----------------------------- Registered the day before ----------------------				
Damages	0.6946^{NS}	0.0800^{NS}	0.5008^{NS}	0.1750^{NS}	0.7362*
	------------------------------- Average 7 days prior ---------------------------				
	0.7271*	0.4409^{NS}	0.5357^{NS}	−0.0746^{NS}	0.4281^{NS}
	------------------------------ Average 14 days prior --------------------------				
	0.8292*	0.1390^{NS}	0.7781*	0.6828^{NS}	0.7207

of pruning. However, the damage caused by psyllid in young leaves exhibited average with note 1 (damage between 0 and 25% of leaves), indicating that the highest population occurred after pruning was not enough to cause significant damage in the orchard. Differently, the authors reported that, in conventional cultivation system (pruning in March and November), the population of *T. limbata* presented peaks in April, June, August, September, October and November, even under constant applications of insecticides, with note 3 of average (between 51% and 75% damage). In the present experiment (**Table 1**), 82% of accesses analyzed, after pruning, showed averages notes of damage minor than 3, showing that, in an organic system, depending on the chosen material, the infestation caused by psyllid can be smoothed.

For the management of psyllid in organic farming system of guava are recommended sprays with solution of Neem Oil to 0.5% (v/v) in periods of high incidence of the insect [13].

The separation of the guava accesses in four groups, regarding of notes of psyllid attack symptoms (**Table 1**), demonstrated that the accesses used commercially, as Rica and Paluma, were more attacked by the psyllid, and the L4P14, L7P28 and L8P32B accesses showed few symptoms of attack and may indicate any resistance to insect attack. According to [14], the damage caused by the consumption of food with residues of agrochemicals have required the development of resistant cultivars and/or tolerant to pests. The development of guava cultivars resistant to psyllid and rust (*Pucciniapsidii* Wint.) without losses of fruit quality is a great way to be followed. In relation to psyllid, in the genetic improvement program of the Unesp/FCAV University, Jaboticabal Campus, Brazil, was developed the selection J-8501, completely resistant to this insect, however it is necessary to improve the quality of the fruit to make it commercial [14].

The cultivars sold on the market, almost in its entirety, were introduced over the years by the producers themselves. This promotes the non-recognition of improvement efforts, since, when the consumers are asked about guava cultivar, we realized that the only existing information is regarding the color of flesh, red or white [15].

It is necessary to recognize that, in the last 50 years, all research efforts were directed towards developing high-yielding cultivars, heavily dependent on large financial inputs and technologies, mainly oriented to maximizing productivity, without major concerns about the ecological aspects. Therefore, it is expected that a long way is to be taken, in order to develop productive cultivars aimed for high efficiency in the use of inputs and appropriate technologies to organic agriculture [16].

As for the psyllid correlation with meteorological data (**Table 2**), it was found that the damage showed better correlation when used the average data of 14 days prior assessments, with significant and positive correlation between damage of psyllid and the minimum temperature, precipitation and relative humidity registered at 1:00 p.m. The correlation between the population fluctuation of psyllid and the climatic factors has been greatly studied by various authors, but with controversial data.

In similar work [2], by Pearson correlation test showed that there is an increase in pest population density with high temperatures. Psyllid damage already showed no correlation between the meteorological factors analyzed, indicating that the damage is directly related to the presence of psyllid in the orchard, being weather conditions a secondary factor.

Dalberto *et al*. [9] studied the population fluctuation of psyllid in Londrina/PR/Brazil, by use of traps, and verified, by Pearson correlation test, that maximum and average temperatures affect positively the population of adults, constituting the most important factor for the occurrence of this insect. Minimum temperatures showed no significant correlation with the psyllid, but with a tendency of reduction of population in the months that have reached lower minimum temperatures. The authors also reported that the rainfall during the days that the trap was in the field showed no correlation with the variation of the insect population.

Pazini& Galli [11], by registering and correlate the natural enemies inhabitants in agro ecosystem guava with key pest and with meteorological factors, found that the population fluctuation of *T. limbata*, obtained by the average number of psyllids in control, was not changed by the meteorological factors rainfall, average and minimum temperature.

Given the controversy between the results of the influence of climatic factors on the population dynamics of psyllid, the presence of budding and the phenological stage of guava trees probably have a higher importance than climatic variables in the development of this insect. A study required for better understanding the relationship of *T. limbata* with temperature would be your thermic requirements, to verify the real influence of temperature on insect development [17].

Generally, it was noted, by articles cited, that somehow the temperature has positive correlation with the presence of the insect. In the present work, the psyllid damages positively correlated with increased minimum temperature, rainfall and an increase in relative humidity, factors that stimulate the growth of plants. As has already been said, the insect has preference in attack new shoots, suggesting that the climate data interfere more in the host plants than in the pest.

5. Conclusions

Guava accesses used commercially are more susceptible to the attack of psyllid, compared to the selections, with an emphasis on the access "L4P14", "L7P28" and "L8P32B", selected by the Agronomic Institute/IAC/ Campinas/Brazil, which showed few symptoms of attack and may indicate any resistance to psyllid *Triozoida* sp.

The visible damages of psyllids in leaves of guava are correlated positively with the minimum temperature, rainfall and relative humidity in the period of 14 days preceding the evaluations.

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