CORRELATION AMONG DAMAGES CAUSED BY YELLOW BEETLE, CLIMATOLOGICAL ELEMENTS AND PRODUCTION OF GUAVA ACCESES GROWN IN ORGANIC SYSTEM

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ABSTRACT - The objective of this research was evaluate the damage caused by the yellow beetle on 85 guava accessions and correlations of the damage with the climatological elements and the production of fruit in an orchard of guava conducted in organic system. Ten leaves by access were analyzed containing the injury of insect attack. Each leaf had its foliar area measured by leaf area meter and, after obtaining the total area, the leaf was covered with duct tape, and measure again. The averages were compared by Scott-Knott test at 5% probability. The 15 accessions with highest average damage had the data submitted to the correlation with the minimum and maximum temperature, precipitation and relative humidity. The production was obtained by the number of fruits/plant. The damages are negatively correlated with the mean relative humidity of 7:00h (local time) in the period of 14 days prior to the assessments, and negatively affect production. The accessions Saito, L4P16, Monte Alto Comum 1 and L5P19 are promising in organic agriculture, for presenting good production and minor damage to insect attack, when compared to others.

Index terms: Psidium guajava, Costalimaita ferruginea, temperature, precipitation, relative humidity.

CORRELAÇÃO ENTRE DANOS OCASIONADOS PELO BESOURO AMARELO, ELEMENTOS CLIMATOLÓGICOS E PRODUÇÃO DE ACESSOS DE GOIABEIRA CULTIVADOS EM SISTEMA ORGÂNICO

RESUMO - O objetivo deste trabalho foi avaliar os danos ocasionados pelo besouro amarelo em 85 acessos de goiabeira e as correlações dos mesmos com os elementos climatológicos e a produção, em um pomar de goiaba conduzido em sistema orgânico. Foram analisadas 10 folhas por acesso contendo a injúria do ataque do inseto. Cada folha foi medida com medidor de área foliar e, após a obtenção da área total, a folha foi coberta com fita adesiva, e medida novamente. As médias foram comparadas pelo teste de Scott-Knott, a 5% de probabilidade. Os 15 acessos com maior média de danos tiveram os dados submetidos à correlação com a temperatura mínima e máxima, a precipitação e a umidade relativa. A produção foi obtida pelo número de frutos/planta. Os danos mostraram-se correlacionados negativamente com a média da umidade relativa das 7 h no período de 14 dias que antecedem as avaliações, afetando negativamente a produção de frutos. Os acessos Saito, L4P16, Monte Alto Comum 1 e L5P19 são promissores na agricultura orgânica, por apresentarem boa produção e menor dano ao ataque do inseto, quando comparados aos demais.

Termos de indexação: Psidium guajava, Costalimaita ferruginea, temperatura, precipitação, umidade relativa.

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INTRODUCTION

The guava tree (*Psidium guajava* L.) (Myrtaceae), native from the American tropics, is an important fruit in tropical and subtropical regions of the world (SINGH e PAL, 2008). In Brazil, it is grown on a commercial scale in almost all regions (PEREIRA e RYOSUKE, 2011). The guava is one of many cultivated species that has high genetic diversity. However, there are few varieties used commercially both for industry and for natural consumption.

The differences between conventional and organic production systems presented strong influence on diversity of arthropod communities (ZEHNDER et al., 2007; MIÑARRO et al., 2009). Thus, the yellow beetle *Costalimaia ferruginea* (Fabr., 1801) (Coleoptera: Chrysomelidae) which is considered on important defoliation pest on Myrtacea, with eminence of the attacks on *Eucalyptus* (PINTO et al., 2004), also composes the insect fauna of guava trees whose adults feed on the leaves, leaving then with tracery aspect. Their larvae present in the soil feed the roots compromising mainly the installment of new orchards (SOUZA FILHO e COSTA, 2009).

Adults of *C. ferruginea* have approximately elliptical shape measuring between five and 6.5 cm length and with yellowish-cream color. The beetle attacks preferentially young leaves of guava, punching them due to his masticate habit. The insect also attacks the buds and when the attack occurs in flowers the fruit can be deformed (OLIVEIRA et al., 2012).

Is technical and scientific knowledge that the development of Integrated Pest Management (IPM) programs depends highly of basic studies of population dynamics and estimation of the relative importance of factors that regulate the population growth. Thus, it becomes necessary to develop research to meet what are the factors and how they affect the intensity of pest attack for the guava crop. The improvement of the knowledge of guava agro-ecosystem as a complex ecological unit enables the development of IPM programs which are important regionally (CALORE et al., 2013).

Seasonal changes in the weather have direct or indirect effects upon insects, by act directly on mortality and on the performance of pests through changes in oviposition, feeding, growth and migration (HOPKINS e MEMMOT, 2003). Seasonal temperatures and rainfall patterns constitute the major factors that determine the distribution of agricultural pests in space (WALLNER, 1987).

The objectives of this study were to evaluate the damage caused by *C. ferruginea* in accesses of guava cultivated in organic system and study the possible correlations among the insect and the meteorological factors: temperature, precipitation and relative humidity, besides fruit yield.

MATERIAL AND METHODS

The experimental work was developed in APTA - Agência Paulista de Tecnologia dos Agronegócios, Regional Centre North Pole, in Pindorama-SP, 21 13 ’ South latitude and 48 55 ‘ longitude West, 527 m altitude, with yearly average temperature of 22.8° C, annual average rainfall of 1,390.3 mm and average annual relative humidity of 71.6%. According to the Köppen classification, the climate is Aw type, defined as tropical humid, with rainy season in summer and dry in winter.

Were used plants from Germplasm Bank of guava, containing 85 accesses, with 15 years old, with three plants/access, cultivated in the last ten years in organic system, 6 X 5 meter spacing. Through the analysis of soil, it was done 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 cutter motor and manual weeding.

In July 2012, the plants have suffered a drastic pruning, and the main trunk presented a final height of 1.20 meters from the ground. Thus, plants were with new shoots in the evaluation period. Supplemental irrigation was not used in the trial.

For the study with *C. ferruginea*, on each access were evaluated at random 10 leaves containing the yellow beetle attack symptom (perforated leaves, with tracery aspect). The leaves were collected manually, stored in paper bags duly identified and brought to the laboratory. Each one had your leaf area measurement with the aid of leaf area meter CID Bio-science, model CI-202. After obtaining the total area in cm², the leaf was covered with duct tape to cover the holes left by the insect, and passed again by the appliance. The leaf area consumed by the insect, in cm², was obtained by differences in the readings (GALLI et al., 2013). To standardize data, they were transformed into percentage of leaf area consumed. The evaluations were conducted in 12/11/2012, 26/11/2012, 14/01/2013, 28/01/2013 and 18/02/2013. The damage of each access in each assessment was compared by Scott-Knott test, at 5% probability. For statistics analysis the data were transformed in √x and...
in Table 2 was found the original values.

The average data relating to damage of *C. ferruginea* on 15 accesses more attacked by the insect have been recorded in each collection and submitted to correlation (Pearson), with the minimum temperature (°C), the maximum temperature (°C), relative humidity (obtained at 7:00 and 13:00 hours) and precipitation (mm), according to methodology used by various authors (DALBERTO et al., 2004; COLOMBI; GALLI, 2009; AUAD et al., DUARTE et al., 2012; CALORE et al., 2013). The data were obtained from the meteorological station of the Regional Center North Pole, located about 300 m from the experiment. In correlations, data of damages caused by insect were correlated with the meteorological elements recorded the day before, with the average registered in periods of seven and 14 days prior to the assessments, in order to determine which length of time that must be used in the correlations. For precipitation, was used the value of the day before, and the accumulated values at seven and 14 days prior to assessments.

For the yield evaluation, was computed the number of fruits per plant of each access (85 in total), accounting the fruits in the canopy and lying on the ground. The means were compared by Scott-Knott test, at 5% probability. For statistics analysis the data were transformed in $\sqrt{x}$ and in Table 3 was found the original values.

**RESULTS AND DISCUSSION**

The higher damages of *C. ferruginea* were observed in the evaluations carried out in November, with posterior drop in percentage of leaf area consumed by the insect, both to the overall average of all accesses and the average of the 15 accesses more attacked, according to Figure 1.

The increased severity of insect attack observed in the second evaluation (Figure 1) is due to the greater number of new shoots observed at that time, since the yellow beetle, during its food, starts the damage on the young leaves (GALLO et al., 2002). The fall in the percentage of leaf area consumed in the subsequent evaluations is due to the decrease of young leaves on area. Anjos and Majer (2003) reported, for eucalyptus, that yellow beetle prefers to attack the apical and tender parts, as pointers, young leaves, shoots and, in some cases, the bark of the branches. In young leaves, can cause continuous injuries and of large size, while in mature leaves only the main nervure are remaining after intense outbreaks of the pest.

Duarte et al. (2012) verified the population dynamics of *C. ferruginea* and its correlation with population of their natural enemies in organic and conventional orchard of guava, respectively located in Fernando Prestes-SP and Vista Alegre do Alto-SP, and reported that the damages caused by the insect in organic orchard represented average with note 2 (damage between 26-50%), in November 2010, with the top population resulting in high perforating of the newly mature leaves. Then, in February 2011, the authors reported that the average damage was represented by note 1 (damage between 0 – 25%), mainly by the absence of branches with young leaves during this period. In the present work also was noted the greater damage caused by *C. ferruginea* on evaluation held in November, regular season of its normal population increase in the region.

The damage caused by *C. ferruginea* presented significant and negative correlation only with the relative humidity recorded the 7:00 hs when taken the average 14 days prior evaluations, showing that there is an increase in the damage caused by the insect with the decrease in relative humidity (Table 1 and Figure 2).

Contrary to these results, Colombi (2007) found that the damage, through measurement scale of notes of *C. ferruginea* showed significant positive correlation with relative humidity, in other words, there has been an increase in the damage with increasing relative humidity. The other meteorological elements, temperature (minimum, medium and maximum) and precipitation showed no significant correlation with the yellow beetle damage, also observed in the present study.

In this experiment, we evaluated damages to several accesses of guava tree, grown in organic system, which suffered a drastic pruning, and the damages assessments were made with leaf area meter, increasing the precision in obtaining data. Colombi (2007) assessed the insect damage in an area with one variety, Paluma, in conventional system, with an application of insecticide (parathion methyl), and the damage assessments were obtained from visual form, with a scale of notes. In addition, the author conducted the evaluations for a year, covering all the seasons. Already the work here presented covered from November to February, traditionally higher rainfall and relative humidity. Therefore, differences to the correlations between the insect damage and the relative humidity should be expected.

Despite the influence of climatic elements on the behavior of agricultural pests, other factors, such as varieties, geographic location, time of sampling, stage of development, etc. cannot be neglected and should be taken into account in the process of...
assessing the damages and/or insect pest populations.

Significant differences were observed in the percentage of leaf area consumed by C. ferruginea in all evaluations (Table 2). The average of the five evaluations allowed the separation of accesses in six groups, with 24.3 percentage points difference between the most and least attacked by the insect. It was noted that the accesses FAO EEFT C.A.B.A. and RS EEFT C.A. B.A. were the most attacked, with average percentage of 27.34 and 24.93%, respectively. Among the least attacked, was observed a group of 50 accesses, which did not differ significantly among themselves, some grown commercially, as Rica, Supreme, Saito, Paluma, Ogawa1, Indiana, Webber Supreme, IAC 4 (of the materials obtained in Jaboticabal-SP and Monte Alto-SP), Kumagai branca and Patillo.

The average production of guava fruit, registered as fruits per plant, of 85 accesses of guava trees can be found in Table 3. The Scott Knott test allowed separate statistically the accesses in eight groups, where the cultivar Saito presented the biggest yield of the experiment (average of 373 fruits per plant), not differing from other twelve accesses. Five accesses did not producing fruits, including cultivar Paluma, with widespread commercial use. Generally speaking, the production of all accesses were lower than the obtained in literature for commercial orchards, which can be attributed to the fact that the plants belong to a germplasm bank and therefore had not received the appropriate cultural practices as in commercial crops.

The accesses Saito, L4P16, Monte Alto Comum 1 and L5P19, respectively with average production of 373.0, 362.7, 357.7 and 340.7 fruits per plant (Table 3), showed percentages of leaf area consumed by beetle of 4.67, 5.47, 3.38 and 5.02, respectively (Table 2) being therefore best indicated to organic farming, when it is taken into account the attack of C. ferruginea. Gallo et al. (2002) considered significant the losses caused by C. ferruginea, which depredate the leaves, leaving them fully laced, and causing reduction in the photosynthetic capacity of the plant, reducing its production.

It is necessary to recognize that, in the last 50 years, all the research efforts have been directed towards developing high-yielding cultivars, heavily dependent on large financial inputs and technologies, mainly oriented to maximizing productivity, without concerns about the ecological aspects. Therefore, it is expected that a long way is to be taken, in order to develop productive cultivars suitable for organic farming (NEVES et al., 2000).

Studies of damages assessment of C. ferruginea in guava orchards have been carried out by visual scale of notes for each sampled leaf (COLOMBI, 2007; DUARTE et al., 2012). However, this is the first study to compare accesses of guava to the attack of the pest with accurate results, obtained by the use of leaf area meter. Obtaining results that allows us to distinguish materials least attacked by the insect is an important tool for future planting choices and/or materials for possible genetic improvement. The use of resistant varieties is considered the ideal method for management being apply to large areas and have low environmental impact.

| TABLE 1- Coefficient of correlation between damages caused by C. ferruginea and climatic elements minimum temperature (TMIN), maximum temperature (TMAX), precipitation (PREC) and relative humidity to the 7:00 and the 13:00 (RH) recorded on the eve of the assessments, the 7 and 14 days prior evaluations. |
|--------------------------- Registered the day before ------------------- |
| Costalimita ferruginea     | Correlation coefficient (Pearson) |
| TMIN (°C)                 | TMAX (°C)   | PREC (mm) | RH 7hs   | RH 13 hs  |
|----------------------------|------------|------------|----------|-----------|
| 0.2969NS                   | 0.3273NS   | - 0.1769NS | - 0.4111NS | - 0.5512NS |
| --------------------------|------------|------------|----------|-----------|
| 0.5420NS                   | 0.3552NS   | - 0.6365NS | 0.1888NS | 0.6662NS  |
| --------------------------|------------|------------|----------|-----------|
| 0.8525NS                   | 0.5682NS   | - 0.8213NS | - 0.8831* | 0.0587NS  |

*p* Significantly, at 5% probability; *NS* Not Significantly.
| Accesses                      | Origin       | Evaluation times       | Averages of 5 evaluations |
|------------------------------|--------------|------------------------|--------------------------|
|                              |              | 12/11/2012 | 26/11/2012 | 14/01/2013 | 18/02/2013 |
| FAO EFFT C.A. B.A.           | Jundiaí      | 27.47’a   | 35.08a     | 21.52b     | 27.28a     | 25.36a     | 27.34 a     |
| R.S. EE.FT C.A. B.A.         | Jundiaí      | 27.97a    | 27.29b     | 32.29a     | 17.56c     | 19.52b     | 24.93 a     |
| IAC – 4                      | Jundiaí      | 20.25b    | 23.16c     | 22.59b     | 23.78b     | 21.78a     | 22.31 b     |
| Guanabara                    | Jundiaí      | 17.59c    | 20.12c     | 18.50c     | 18.56c     | 22.18a     | 19.39 c     |
| Australiania Vermelha        | Jundiaí      | 22.05b    | 21.48c     | 16.96c     | 13.79d     | 19.09b     | 18.67 c     |
| Indiana                      | Jundiaí      | 14.44d    | 24.76b     | 14.47c     | 15.72c     | 15.89c     | 17.06 c     |
| Webber Supreme               | Jundiaí      | 16.96c    | 15.37d     | 14.26c     | 20.43b     | 14.32c     | 16.27 c     |
| Rubi Supreme                 | Jundiaí      | 15.68c    | 17.39d     | 12.00c     | 16.78c     | 18.19b     | 16.01 c     |
| Supreme BA.                  | Jundiaí      | 22.10b    | 18.13d     | 14.31c     | 14.93c     | 8.08d      | 15.51 d     |
| Monte Alto                   | Jundiaí      | 13.70d    | 19.65c     | 13.09c     | 16.17c     | 12.89c     | 15.10 d     |
| V. Redonda (Shimoda)         | Valinhos     | 17.73c    | 22.43c     | 12.52c     | 13.02d     | 9.45d      | 15.03 d     |
| Torrão de Ouro               | Jundiaí      | 7.29e     | 25.89b     | 13.14c     | 11.41d     | 11.90c     | 13.93 d     |
| L3P8                        | Campinas     | 20.23b    | 17.70d     | 12.71c     | 7.23e      | 10.69d     | 13.71 d     |
| V. Comprida (Shimoda)        | Valinhos     | 18.17c    | 17.64d     | 6.43d      | 8.50e      | 8.85d      | 11.92 d     |
| Campos                      | Jundiaí      | 12.16d    | 18.28d     | 8.76d      | 12.70d     | 7.47d      | 11.87 d     |
| L7P28                       | Campinas     | 14.68d    | 9.46e      | 9.12d      | 11.41d     | 6.01d      | 10.14 e     |
| L6P24                       | Campinas     | 10.82e    | 8.18e      | 4.99e      | 8.74e      | 16.98c     | 9.94 e      |
| Red Selection               | Monte Alto   | 12.91d    | 10.88e     | 12.77c     | 6.09e      | 5.57d      | 9.65 e      |
| Tetraplóide                 | Jundiaí      | 8.84e     | 13.69e     | 8.93d      | 7.35e      | 7.16d      | 9.19 e      |
| Mirtácea (Campinas)          | Campinas     | 9.08e     | 9.31e      | 8.65d      | 7.57e      | 6.63d      | 8.25 e      |
| Ogawa 3                     | M. das Cruzes| 7.21e     | 11.04e     | 7.12d      | 8.94e      | 6.11d      | 8.08 e      |
| L2P6                        | Campinas     | 8.59e     | 5.77f      | 10.44d     | 7.94e      | 7.07d      | 7.96 e      |
| L8P31                       | Campinas     | 9.27e     | 10.44e     | 7.21d      | 3.87f      | 7.01d      | 7.56 e      |
| L6P22                       | Campinas     | 9.45e     | 11.62e     | 7.14d      | 4.03f      | 5.30d      | 7.51 e      |
| L1P2                        | Campinas     | 7.63e     | 6.95e      | 3.33e      | 6.14e      | 12.74c     | 7.36 e      |
| L5P21                       | Campinas     | 6.24e     | 10.09e     | 9.77d      | 4.82f      | 5.56d      | 7.29 e      |
| FAO – UNESP                 | Jaboticabal  | 5.42f     | 8.43e      | 8.57d      | 10.43e     | 2.97d      | 7.17 e      |
| L6P25                       | Campinas     | 9.23e     | 7.45e      | 6.18d      | 6.38e      | 6.41d      | 7.13 e      |
| L3P7                        | Campinas     | 11.44e    | 7.72e      | 7.45d      | 3.53f      | 3.74d      | 6.78 e      |
| L8P30                       | Campinas     | 9.15e     | 9.54e      | 4.43e      | 2.16f      | 8.38d      | 6.73 e      |
| L2P5                        | Campinas     | 9.54e     | 3.17f      | 6.83d      | 7.28e      | 6.59d      | 6.68 e      |
| L5P18                       | Campinas     | 8.25e     | 7.41e      | 6.08d      | 6.10e      | 5.53d      | 6.67 e      |
|                    |         |       |       |       |       |
|--------------------|---------|-------|-------|-------|-------|
| **Vermelha perfumada** | **Jundiaí** | 14.11d | 6.49f | 2.96e | 6.16e | 3.36d | 6.62 e |
| **L6P23**           | **Campinas** | 5.96f  | 10.14e | 6.35d | 5.99e | 4.04d | 6.50 e |
| **L3P11**           | **Campinas** | 9.22e  | 8.57e  | 5.11e | 4.89f | 3.85d | 6.33 e |
| **L1P3**            | **Campinas** | 8.82e  | 7.33e  | 4.17e | 5.54f | 4.43d | 6.06 f |
| **G. vermelha**     | **Linhares-ES** | 4.79f  | 7.97e  | 4.79e | 6.64e | 5.46d | 5.93 f |
| **(Cingapura)**     | **Supreme Branca** | 5.64f  | 5.99f  | 7.54d | 6.73e | 3.46d | 5.87 f |
| **propr. de Tadao** | **M. das Cruzes** | 4.53f  | 5.15f  | 6.46d | 7.29e | 5.82d | 5.85 f |
| **Ogawa**           | **L7P26** | 8.18e  | 3.93f  | 7.52d | 4.82f | 4.03d | 5.70 f |
| **EEFT 3**          | **Monte Alto** | 5.98f  | 3.92f  | 4.78e | 9.46e | 3.85d | 5.60 f |
| **L4P16**           | **Campinas** | 3.40f  | 3.28f  | 14.46c | 2.54f | 3.68d | 5.47 f |
| **EEFT – CA - BA**  | **Jundiaí** | 7.98e  | 8.35e  | 4.48e | 3.47f | 2.97d | 5.45 f |
| **EEFT 2**          | **Monte Alto** | 4.76f  | 5.26f  | 9.07d | 5.13f | 3.01d | 5.45 f |
| **(C. das Almas)**  | **L4P14** | 7.43e  | 7.32e  | 3.79e | 4.31f | 4.29d | 5.43 f |
| **L4P17**           | **Campinas** | 8.31e  | 6.17f  | 4.46e | 3.60f | 3.84d | 5.27 f |
| **L3P9**            | **Campinas** | 7.04e  | 4.62f  | 4.47e | 5.62f | 4.29d | 5.21 f |
| **Rica – J – 2**    | **Jaboticabal** | 6.16e  | 6.65f  | 4.47e | 5.25f | 3.19d | 5.14 f |
| **Supreme**         | **Monte Alto** | 6.55e  | 6.60f  | 4.96e | 2.23f | 5.15d | 5.10 f |
| **Ruby Supreme 3**  | **Monte Alto** | 2.95f  | 6.27f  | 6.94d | 4.26f | 5.03d | 5.09 f |
| **L3P12**           | **Campinas** | 8.25e  | 4.90f  | 4.64e | 3.71f | 3.69d | 5.04 f |
| **L5P19**           | **Campinas** | 7.11e  | 7.18e  | 4.06e | 4.67f | 2.07d | 5.02 f |
| **EEFT 1**          | **Monte Alto** | 6.41e  | 4.94f  | 5.94d | 4.74f | 2.77d | 4.96 f |
| **(C. das Almas)**  | **EEF – 3** | **Jaboticabal** | 5.73f  | 3.65f  | 5.55e | 5.57f | 4.20d | 4.94 f |
| **Australian Branca** | **Jundiaí** | 5.34f  | 3.85f  | 5.71e | 5.18f | 4.30d | 4.88 f |
| **L5P20**           | **Campinas** | 7.73e  | 4.77f  | 4.69e | 3.81f | 2.92d | 4.78 f |
| **L2P4**            | **Campinas** | 8.31e  | 4.63f  | 2.67e | 4.03f | 3.87d | 4.70 f |
| **Saito**           | **Valinhos** | 3.27f  | 5.02f  | 4.00e | 6.42e | 4.65d | 4.67 f |
| **L4P13**           | **Campinas** | 7.68e  | 4.78f  | 3.54e | 4.31f | 2.80d | 4.62 f |
| **Paluma**          | **Jaboticabal** | 3.14f  | 8.01e  | 3.97e | 5.15f | 2.82d | 4.62 f |
| **Ogawa 1**         | **M. das Cruzes** | 5.13f  | 5.06f  | 3.84e | 4.68f | 4.32d | 4.61 f |
| **Kioshi 3**        | **Monte Alto** | 3.51f  | 4.27f  | 6.82d | 4.23f | 3.85d | 4.54 f |
| **L3P10**           | **Campinas** | 7.23e  | 5.06f  | 4.03e | 3.21f | 3.05d | 4.52 f |
| **Ruby Supreme 1**  | **Monte Alto** | 3.87f  | 3.25f  | 7.19d | 4.27f | 3.69d | 4.45 f |
| **Creme Arredondada** | **Jaboticabal** | 4.06f  | 4.50f  | 5.57e | 3.61f | 4.50d | 4.45 f |
| **Indiana - UNESP** | **Jaboticabal** | 3.39f  | 4.69f  | 5.21e | 4.31f | 4.58d | 4.44 f |
| **Webber – Supreme** | **Jaboticabal** | 3.12f  | 5.82f  | 4.71e | 3.53f | 4.95d | 4.42 f |
| **Ogawa x Kumagai** | **Promissao** | 4.03f  | 6.69f  | 4.23e | 3.28f | 3.83d | 4.41 f |
| Acesses               | Production | Acesses               | Production |
|----------------------|------------|----------------------|------------|
| Ruby Supreme 2       | 3.85f      | EEFT 4               | 3.69f      |
|                      |            | Kioshi 1             | 2.73f      |
|                      |            | IAC – 4 - UNESP      | 3.70f      |
|                      |            | Taquaritinga comum   | 4.06f      |
|                      |            | Patillo – Ba.        | 3.26f      |
|                      |            | IAC – 4 – Cica       | 3.42f      |
|                      |            | Kumagai Branca      Valinhos | 3.94f |
|                      |            | Goiaba Branca       Desconhecida | 4.44f |
|                      |            | Patillo              Jaboticabal | 1.69f |
|                      |            | Monte Alto – Branca Valinhos | 3.20f |
|                      |            | L8P32B               Campinas | 4.12f |
|                      |            | Goiaba polpa amarela Limeira | 3.51f |
|                      |            | M. Alto – Comum 1    Monte Alto | 2.30f |
|                      |            | L4P15                Campinas | 5.31f |
|                      |            | Kioshi 2             Monte Alto | 3.23f |
|                      |            | L8P32A               Campinas | 2.56f |

F (Blocos) 0.3546 NS 0.9873 NS 1.0738 NS 1.2463 NS 2.1530 * 14.2537 **
F (Tratamentos) 19.2476 ** 19.8593 ** 9.6526 ** 12.0371 ** 11.1480 ** 18.7615 **
CV (%) 24.44 25.53 32.24 29.84 33.20 15.47

Means followed by the same letter in the column do not differ by Scott-Knott test. at 5% probability.
Data transformed in √x.
**Significantly. at 1% probability; * Significantly. at 5% probability; NS Not Significantly.
| Variety                  | Mean  | Letter | Variety                  | Mean  | Letter |
|--------------------------|-------|--------|--------------------------|-------|--------|
| RubySupreme1             | 135.7 | b      | EEFT 4                   | 44.3  | e      |
| L6P23                    | 135.3 | c      | Webber – Supreme         | 41.3  | e      |
| L4P13                    | 135.3 | c      | IAC – 4 - UNESP          | 34.7  | f      |
| Kioshi1                  | 135.3 | c      | EEFT – CA - BA           | 33.7  | f      |
| L6P22                    | 133.0 | c      | L6P25                    | 32.7  | f      |
| L2P6                     | 127.3 | c      | RubySupreme2             | 31.7  | f      |
| L1P2                     | 126.7 | c      | RubySupreme3             | 31.0  | f      |
| Supreme Branca           | 120.7 | c      | Guanabara                | 30.0  | f      |
| L4P17                    | 117.3 | c      | Monte Alto               | 26.7  | f      |
| Kioshi3                  | 116.7 | c      | EEF – 3                  | 26.0  | f      |
| L2P4                     | 116.3 | c      | IAC – 4                  | 23.7  | f      |
| L1P3                     | 114.3 | c      | Australiana Vermelha     | 20.3  | f      |
| Goiaba polpa amarela     | 112.0 | c      | Vermelha Redonda (Shimoda)| 19.7  | f      |
| Monte Alto - Branca      | 107.7 | c      | Tetraplóide              | 19.3  | f      |
| Indiana                  | 105.0 | d      | L8P30                    | 18.0  | f      |
| Kioshi2                  | 104.7 | d      | Mirtácea (Campinas)      | 16.3  | f      |
| L5P18                    | 103.3 | d      | EEFT 1 (Cruz das Almas)  | 14.7  | f      |
| Rica – J – 2             | 102.3 | d      | Supreme BA.              | 11.0  | g      |
| L7P26                    | 97.3  | d      | FAOEEFT C.A. B.A.        | 6.0   | g      |
| Patillo – Ba.            | 92.0  | d      | Vermelha Comprida (Shimoda)| 4.0  | g      |
| EEFT 2 (Cruz das Almas)  | 91.7  | d      | R.S. E.E.F.T. C.A. B.A.  | 0.0   | h      |
| L2P5                     | 88.7  | d      | L7P28                    | 0.0   | h      |
| Ogawa1                   | 88.7  | d      | Paluma                   | 0.0   | h      |
| IAC – 4 – Cica           | 88.0  | d      | Goiaba Branca            | 0.0   | h      |
| Rubi Supreme             | 84.3  | e      | Goiaba vermelha (Cingapura)| 0.0  | h      |
| Indiana - UNESP          | 82.0  | e      |                          |       |        |

| F (Acesses)              | 35.7968  ** |
| F (Blocks)               | 1.0092  NS  |
| CV (%)                   | 15.07     |

1 Means followed by the same letter in the column do not differ. by Scott-Knott test. at 5% probability.
2** Significantly. at 1% probability;  NS Not Significantly.
FIGURE 1 - Average percentage of leaf area consumed by the yellow beetle *C. ferruginea* in 85 accesses of guava and in the 15 accesses more attacked.

FIGURE 2 - Average percentage of leaf area consumed by the yellow beetle *C. ferruginea* on 15 accesses more attacked by the insect and relative humidity recorded in the period.
CONCLUSIONS

The damage caused by *Costalimaita ferruginea* in leaves of guava were negatively correlated with the average relative humidity of 7:00 in the period of 14 days prior to the assessments, adversely affected the production of fruits.

The accesses Saito, L4P16, Monte Alto Comum 1 and L5P19 are promising in organic agriculture, for presenting good production and suffer little damage to the yellow beetle attack, when compared to the other materials tested.

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