

Degree of infestation of red belt thrips in cashew clones intercropped with fruit trees

Grau de infestação do tripses-da-cinta-vermelha em clones de cajueiro consorciados com fruteiras

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ABSTRACT

Among the species of phytophagous thrips that attack the cashew tree (*Anacardium occidentale*), the red belt thrips (*Selenotripes rubrocinctus*) is the species of greatest economic importance due to the damage it causes, the wide geographical distribution, and the attack of the cashew tree in all ages of the plant, This work aimed to evaluate the

degree of infestation of red belt thrips in dwarf cashew clones CCP 76, BRS 226, BRS 189, in field conditions, intercropped with three different fruit trees, at the Experimental Field of Embrapa Agroindústria Tropical, in the municipality of Pacajus-CE, Brazil. The evaluation of the attack in the three genotypes was based on a system that recommends using grades that varied from one to five when it was verified in the plant. The cashew clones were arranged in four blocks where each clone was intercropped with banana, watermelon, and papaya, in addition to the control treatment (single cashew). Five consecutive evaluations were carried out during the period from September 29 to December 19, 2017. The study showed that pest infestations were more intense in cashew trees intercropped with fruit trees, whereas in the consortium with banana trees, the intensity of the attack was higher than in consortia with other fruit trees. This result is probably due to the environmental conditions imposed by the greater shade of the banana trees. Over the evaluation period, infestations showed a slight downward trend for the three clones evaluated. The BRS 226 clone proved to be the most preferred by thrips in conditions of intercropping with banana.

Keywords: *anacardium occidentale*, *selenotrips rubrocinctus*, shading, susceptibility.

RESUMO

Dentre as espécies de tripses fitófagos que atacam o cajueiro (*Anacardium occidentale*), o tripses-da-cinta-vermelha (*Selenotrips rubrocinctus*) é a espécie de maior importância econômica devido aos danos que causa, à ampla distribuição geográfica e ao ataque do cajueiro em todas as idades da planta. Este trabalho teve por objetivo avaliar o grau de infestação do tripses-da-cinta-vermelha nos clones de cajueiro-anão CCP 76, BRS 226 e BRS 189 em condições de campo, consorciados com três fruteiras diferentes, no Campo Experimental da Embrapa Agroindústria Tropical, no município de Pacajus, CE, Brasil. A avaliação do ataque nos três genótipos foi baseada em um sistema que preconiza o uso de notas que variaram de um a cinco, quando se constatou a presença do inseto na planta. Os clones de cajueiro estavam dispostos em quatro blocos, em que cada clone estava consorciado com banana, melancia e mamão, além do tratamento testemunha (cajueiro solteiro). Foram feitas cinco avaliações consecutivas durante o período de 29 de setembro a 19 de dezembro de 2017. O estudo mostrou que as infestações da praga correram com maior intensidade nos cajueiros consorciados com as fruteiras, sendo que no consórcio com bananeira, a intensidade do ataque foi superior em comparação aos consórcios com as demais fruteiras. Este resultado se deve, provavelmente, às condições ambientais impostas pelo maior sombreamento das bananeiras. Ao longo do período de avaliação, as infestações apresentaram uma ligeira tendência de queda para os três clones avaliados. O clone BRS 226 mostrou-se o mais preferido pelo tripses em condições de consórcio com a bananeira.

Palavras-chave: *anacardium occidentale*, *selenotrips rubrocinctus*, sombreamento, suscetibilidade.

1 INTRODUCTION

Agribusiness involving cashew trees is one of the main options for the economic and social development of rural areas in the Brazilian Northeast, as it is a culture well adapted to existing conditions. In its set of activities, the cashew tree generates a large

number of intermediate and final products, the main product being the cashew nut (ACC). However, this segment has been experiencing difficulties for some time due to the long periods of drought associated with the incidence of pests and diseases. That has resulted in the mortality of cashew trees and production losses (MESQUITA et al., 2017).

This crop's socioeconomic potential for the semi-arid region fully adjusts to the model of joint exploitation with other intercalary cultures, which offer a source of extra income and an occupation for producers in the off-season. Furthermore, intercropping is one way to make better use of agricultural inputs, the available natural resources and reduce the costs of implementing and maintaining commercial plantations (MARTINOTO et al., 2012).

With an emphasis on the insects of economic importance that affect the production and the quality of the cashew tree products, species of the order Thysanoptera (thrips) causes injuries to the leaves and fruits, causing deformations, dryness, and defoliation of the plant (MONTEIRO & MOUND, 2012). Among the species of phytophagous thrips that attack the cashew tree, the red belt thrips are the species of greatest economic importance due to the damage it causes, the wide geographical distribution, and the attack on the cashew tree at all ages of the plant (MESQUITA et al., 2017).

Given the above, the present study aimed to investigate the degree of infestation of *S. rubrocinctus* in different dwarf cashew clones cultivated in field conditions intercropped with banana, papaya, and watermelon.

2 METHODOLOGICAL PROCEDURES

The experiment was conducted at the Experimental Field of Embrapa Agroindústria Tropical (CEP), located in the municipality of Pacajus, Ceará (4°11'26.62" S, 38°29'50.78" W). Five observations were made in the period from September 29 to December 19, 2017.

The pest infestation was monitored in three dwarf cashew clones, CCP 76, BRS 226, and BRS 189, intercropped with the banana tree of the Prata Catarina type; Hawaiian papaya tree, Sunrise Solo type; watermelon, Crimson Sweet type; and the single cashew tree (control). For the cashew trees, the spacing used was 8m x 4m, in a total area of 1.5 ha. The seedlings were four months old before planting and originated in the EMBRAPA CEP nursery. The banana tree was planted with a space of 2 m between them, arranged in rows spaced 2 m apart on each side of the rows of cashew trees. The papaya trees were spaced 2 m apart, arranged in rows 2 m apart on either side of the cashew tree rows. The

watermelon was planted at a distance of 2 m from the cashew trees, with the trees spaced 1 meter apart.

The experimental arrangement used was randomized block design (RBD) with a 4x3 factorial arrangement (three fruit trees + control and three cashew clones) with four replications, in which the consortia are the treatments, and the clones are the plots. Each plot was composed of eight plants, totaling 384 plants evaluated.

The evaluation of the attacks on the genotypes was based on a system that recommends the use of grades varying from 1 to 5, when the insect's presence in the plants was verified, according to the scale below. A zero score was given in the absence of the attack (MESQUITA et al., 2006).

Grading scale:

0 = no thrips;

1 – a few insects

2 = insect colony and beginning of tanning;

3 = generalized tanning

4 = generalized tanning of inflorescences;

5 = total tanning of the plant and fall of the leaves.

At the end of each evaluation, the degree of infestation of each clone/evaluation/consortium was calculated using the following formula:

$GI = \sum (nxf) \times 100/NxZ$, in which

n – is the grading scale (assigned in the field);

f – is the frequency of the grades (assigned in the field);

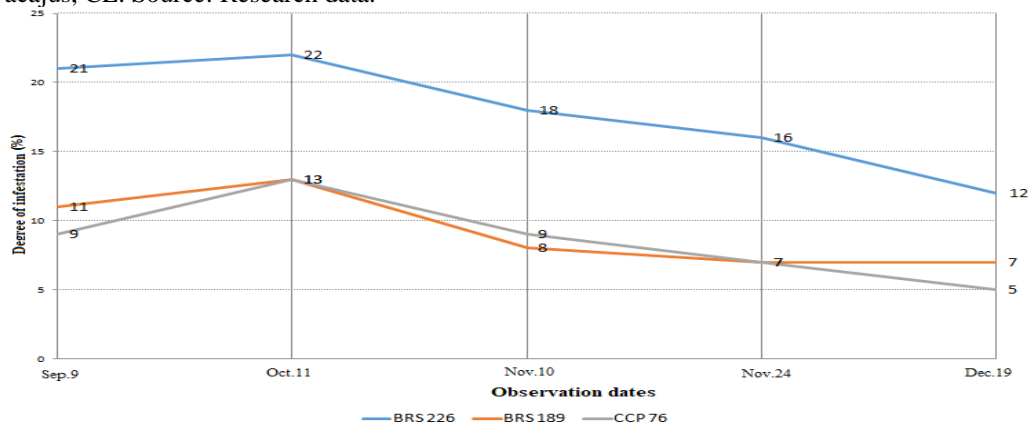
Z – is the numerical value of the maximum score on the scale (equal to 5)

N – is the total number of plants sampled.

3 RESULTS AND DISCUSSION

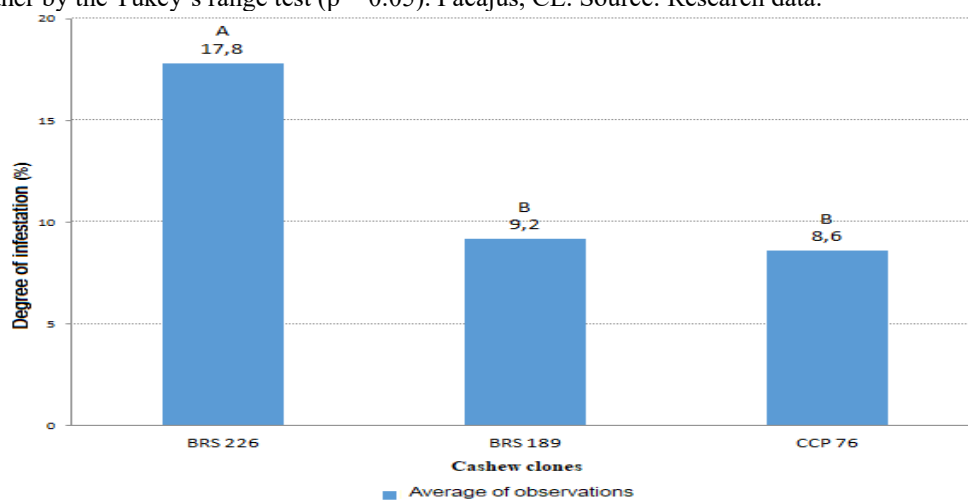
The average values of the degrees of infestation of the BRS 226, BRS 189, and CCP 76 clones, assigned according to the levels of attacks of the red belt thrips for the three fruit trees and the control (single), are shown in Figure 1. It was observed that there was a slight downward trend in the degrees of infestation for the three clones during the evaluation period.

Figure 1. Average of the degrees of infestation of the cashew trees attacked by the red belt thrips intercropped with three fruit trees and the control (single), in the period from September 29 to December 19. Pacajus, CE. Source: Research data.



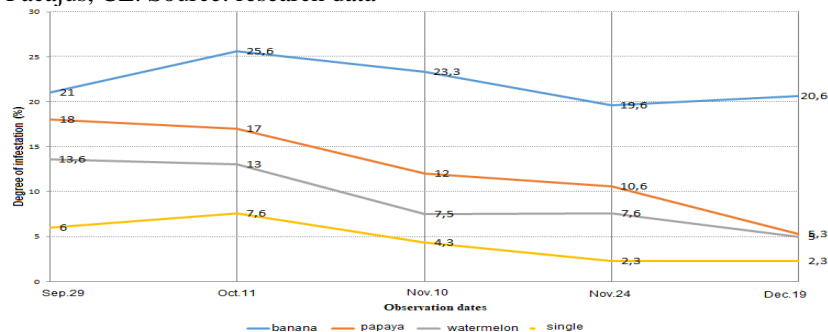
The averages of the five evaluations of the degrees of infestation for the three cashew clones are in Figure 2. It was observed that there was a significant difference between the tested genotypes, with the BRS 226 clone being the most attacked one, with an infestation of 17.8%. BRS 189 and CCP 76 had similar degrees of infestation. These results show that the BRS 226 clone was more susceptible to the pest attack. One of the aspects that may explain an insect's preference for a given genotype is the size of the leaves of the host plant. In general, insects prefer large leaves, as they increase young forms' survival (HESPENHEIDE, 1991). In this regard, the BRS 226 clone has larger, darker leaves and a more compact and rounded crown than the BRS 189 and CCP 76 clones.

Figure 2. Average of five evaluations of the degrees of infestation (%) of the red belt thrips in three dwarf cashew clones intercropped with fruit trees. Columns with the same letter do not differ significantly from each other by the Tukey's range test ($p = 0.05$). Pacajus, CE. Source: Research data.



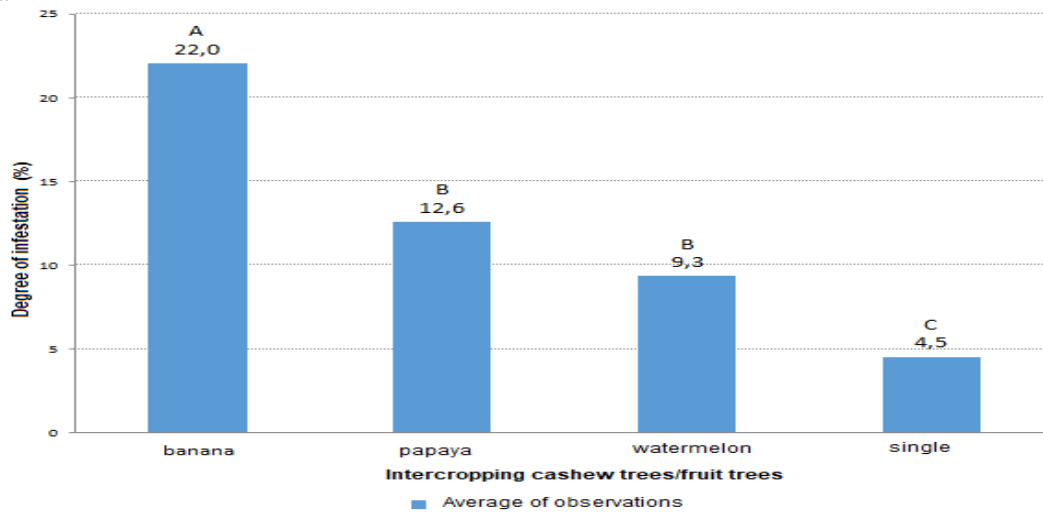
The fluctuation curves of the thrips populations, represented by the averages of the degrees of infestation of the plants evaluated of the three clones for each consortium and the control (single), are in Figure 3. It was observed that the infestation of cashew trees for the consortium with banana provided an environmental condition that favored the attack to the three clones much more accentuated than the consortia with papaya, watermelon, and single cashew. In this condition, and considering that the level of action or control for the red belt thrips is 25%, according to BLEICHER et al. (2002) and MESQUITA et al. (2006), only for the evaluation on October 11 would justify the adoption of a pest control measure since the value was slightly higher than the control level mentioned. However, the bases for control decision, specifically, the levels of action and damage, are important information that aim, among other aspects, the economy for the producer, the concern with the environment, society, the preservation of agricultural activity, as well as the rational use of control tactics (TORRES & MARQUES, 2000). In Brazil, the commercial chemical products registered for the control of red belt thrips in cashew trees are the Decis 25 EC and the Delegate (AGROFIT, 2003).

Figure 3. Average of the degrees of infestation of the cashew trees attacked by the red belt thrips of three fruit trees and the control (single), intercropped with fruit trees in the period from September 29 to December 19. Pacajus, CE. Source: research data



The averages of the five evaluations of the degrees of infestation of the three clones, intercropped with banana, papaya, watermelon, and in a single-crop condition, are in Figure 4. It was observed that, in average values, the banana tree favored an attack significantly superior to that of the other treatments, with a degree of infestation of 22%. The intercropping with papaya and watermelon showed statistically similar values but different from the single cashew tree.

Figure 4. Average of five evaluations of the degrees of infestation (%) of the red belt thrips of three dwarf cashew clones intercropped with three fruit trees and the control (single). Columns with the same letter do not differ significantly from each other by the Tukey's range test ($p = 0.05$). Pacajus, CE. Source: research data



The greatest infestation for the intercropping with the banana trees is probably related to the degree of shading that the plants provide, favoring the formation of a microclimate more favorable to the insect population. According to Greve (2004), insect populations vary in size and fluctuation because of biotic factors (action of predators and parasitoids) and abiotic factors (occurrence of climate conditions), such as temperature, precipitation, airspeed, among others. In Pacajus, CE, in the banana consortium, the cashew tree was under a milder temperature and less solar radiation incidence (Figure 5) than the other consortia. This information is based on the fact that *S. rubrocinctus* lives preferentially on the underside of the leaf, where these conditions prevail. Silva et al. (2017) obtained similar results when they studied the evolution of the gecko fly (*Stenodiplosis* sp.) under the same conditions of intercropping and environment.

Figure 5. Cashew clone cultivated intercropped with the banana tree. Pacajus. Ceará. Photo by Antonio Lindemberg M. Mesquita



4 FINAL CONSIDERATIONS

The red belt thrips of the cashew tree are a phytophagous insect that is found in practically all regions where the cashew tree is grown. The study showed that the pest infestations occurred with higher intensity in the cashew trees intercropped with the fruit trees, and in the consortium with the banana trees, the intensity of the attack was higher when compared to the other fruit trees. This result is probably due to the environmental conditions imposed by the greater shading of banana trees. Throughout the evaluation period, infestations showed a slight downward trend for the three clones evaluated. The BRS 226 clone proved to be the most preferred by thrips in intercropping conditions with the banana tree.

REFERENCES

- AGROFIT. 2003. Available at: <http://extranet.agricultura.gov.br/agrofit_cons/principal_agrofit_cons>. Acesso on: August 15, 2020.
- BLEICHER, E.; MELO, Q. M. S.; FURTADO, I. P.; RODRIGUES, S. M. M. *Técnicas de amostragem para as principais pragas*. In: MELO, Q. M. S. (Ed.) Caju: fitossanidade. Fortaleza: Embrapa Agroindústria Tropical; Brasília: Embrapa Informação Tecnológica, cap. 2, p. 35-40. (Frutos do Brasil, 26), 2002.
- GREVE, C. *Aspectos bioecológicos das fase imaturas de *Phyllocnistis citrella* Station (Lepidoptera: Gracillariidae), em pomares de *Citrus sinensis* Var. Valência sob dois sistemas de cultivo*. 2004. 107 p. Dissertação (Mestrado em Biologia e Comportamento Animal). Universidade Federal do Rio Grande do Sul, Porto Alegre, 2004. <<http://hdl.handle.net/10183/5214>> Acesso on: March 01, 2022.
- HESPENHEIDE, H. A. *Bionomics of leaf-mining insects*. Annual Review of Entomology, v. 36, p. 535-560, 1991.
- MARTINOTO, F.; MARTINOTO, C.; COELHO, M. F. B.; AZAVEDO, R. A. B.; ALBUQUERQUE, M. C. F. *Sobrevivência e crescimento inicial de espécies arbóreas nativas do cerrado em consórcio com mandioca*. Pesqu. Agropec. Bras. Brasília, v. 47, n. 1, p. 22-29, jan. 2012.
- MESQUITA, A. L. M.; BRAGA SOBRINHO, R.; OLIVEIRA, V. H.; ANDRADE, A. P. S. de. *Monitoramento de pragas na cultura do cajueiro*. Fortaleza: Embrapa Agroindústria Tropical, p. 34 (Embrapa Agroindústria Tropical. Documentos, 48), 2006.
- MESQUITA, A. L. M.; DIAS-PINI, N. S.; BRAGA SOBRINHO, R. *Sistema de produção do caju: Pragas do cajueiro*. 2ª ed. Fortaleza: Embrapa Agroindústria Tropical, 2017.
- MONTEIRO, R. C.; MOUND, L. A. *Thysanoptera* Haliday, 1836. In: RAFAEL, J. A.; MELO, G. A. R.; CARVALHO, C. J. B. de; CASARI, S. A.; CONSTANTINO, R. (Ed.). *Insetos do Brasil: diversidade e taxonomia*. Ribeirão Preto: Holos, 2012. p. 408-422.
- TORRES, J. B.; MARQUES, E. J. *Tomada de decisão: um desafio para p manejo integrado de pragas*. In: Semana De Fitossanidade: Desafios do Manejo Integrado de Pragas e Doenças, Recife. Palestras e minicursos. Recife: UFRPE, 2000. p. 152-173. 2000.
- SILVA, D. L. V. da; MESQUITA, A. L. M.; POLICARPO, G. T. P.; MIRANDA, F. R. de. *Grau de infestação da mosca-da-verruca em clones de cajueiro-anão consorciados com fruteiras*. SEABRA, G. (Org.). Educação Ambiental: natureza, biodiversidade e sociedade. Ituiutaba: Barlavento, 2017. p. 92-100. <https://www.mediafire.com/file/t3679h4m8tz8l5y/E-book_V_CNEA_-_Livro_3.pdf/file> Acesso on: March 02, 2022.