Natural control of Acanthoscelides obtectus Say in creole corn seeds in the Seridó Oriental of Paraíba

Controle natural de Acanthoscelides obtectus Say em Sementes Crioulas de Feijão –caupi no Seridó Oriental da Paraíba

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Resumo

O emprego de inseticidas naturais no controle de pragas de grãos armazenados mostra-se bastante promissor, pois a possibilidade de se controlarem as condições ambientais no interior das instalações de armazenamento, propiciando a maximização da atividade inseticida. O experimento foi conduzido no Laboratório de Sementes do Instituto Federal de Educação, Ciência e Tecnologia da Paraíba (IFPB), campus Picuí – PB. O delineamento experimental adotado foi inteiramente casualisado com 5 tratamentos e 4 repetições, as doses utilizadas para o experimento foram (0,0; 2,0; 4,0; 6,0; 8,0 gramas) de pó de jurubeba. Os parâmetros analisados para o experimento foram: O número de insetos vivos (NIV), número de insetos mortos (NIM) Os resultados foram analisados através do Sistema Computacional SISVAR, os dados obtidos foram submetidos a análise de variância e comparação de médias pelo teste de F ($p<0,05$) quanto aos efeitos das doses, foram ajustadas as equações de regressão. A análise de variância detectou que o número de insetos vivos (NIV) e o número de insetos mortos (NIM) apresentaram efeito significativo O pó de jurubeba *(Solanum paniculatum* L) mostrou-se eficiente no controle de *Acanthoscelides obtectus* Say. A taxa de mortalidade da espécie *A. obtectus* S. foi influenciada diretamente pela dosagem e pelo tempo de exposição. Nos grãos de feijão caupi (*Vigna unguiculata* L.) o gorgulho *A. obtectus* S. obteve cerca de 87,5% de mortalidade na dose de 6 g do pó de jurubeba, e 82 % de mortalidade no período de armazenamento.

Palavras-chave: Método alternativo de controle de insetos; *Solanum paniculatum* L.; Insetos-praga.

Abstract

The usage of natural insecticides in the control of pest in storage grains has shown considerable promise, because it is a possibility of controlling the environmental conditions at the storage facilities interior, providing a maximization of the insecticides activity. The experiment was conducted in the Laboratory of Seeds at the Instituto Federal de Educação, Ciência e Tecnologia da Paraíba (IFPB),

campus of Picuí – PB. The adopted experimental design was entirely with 5 treatments and 4 repetitions, the dosages used for the experiment were (0,0; 2,0; 4,0; 6,0; 8,0 gramas) of Jurubeba powder. The analysis parameters for the experiment were: The number of live insects (NLI), number of dead insects (NDI). The results were analysed by th Computacional Sistem SISVAR, the results of the search data were submitted for analysis of variance and for comparison of measures by the test of F ($p<0,05$) in terms of the dosages effects, were adjusted to the regression equations. The analysis of variance showed that the number of live insects (NLI) and the number of dead insects (NDI) showed significant effect. The Jurubeba powder (Solanum paniculatum L) showed to be efficient in the control of Acanthoscelides obtectus Say. The mortality rate of the specie A. obtectus S. were influenced directly by the dosage and by the time of exposure. In the Caupi beans (Vigna unguiculata L.) the weevils A. obtectus S. has obtained approximately 87,5% of mortality in the dosage by 6 g of Jurubeba powder, and 82 % of mortality in the storage period.

***Keywords**: Alternative method for insects control; Solanum paniculatum L.; pest insects..*

Introduction

The brazilian grain production has been growing gradually. One of the principal factors for the aliments production increase is related to the mundial demographic growth, highlighting especially cereal-based food as rice, beans and corn (JÚNIOR et al., 2012). According to Melo et al., (2011) after the harvest and processing, the beans can be used followed by the harvests or storage, to be used in a shortage period, or be put in conservation waiting for a better price on the market.

For Tonin et al., (2015) the losses in the storage's process of beans occurs, especially, because of the bean weevils (*Acanthoscelides obtectus* S.) attacks and is controlled by liquid insecticides applied directly in the grains or by purges.

Moreira et al., (2007), reinforce the problematic that the use indiscriminate of organo synthetics insecticides cause, for example; resistance for insects and insecticides, resurgence and eruption of pests, problems stemming from organo synthetics insecticides on natural enemies, environment and man, and above all the development of the organic agriculture (which the use of organo synthetics defensives is prohibited), in addition to result in the generate a chemical waste accumulation as a final product.

The use of natural insecticides for pest control at stored beans has been shown to be really promising, because the possibility to control the environmental conditions in the storage facilities, providing a maximization in the insecticide activity (TAVARES and VENDRAMIN,

2005). According to Paula et al., (2018) Jurubeba (*Solanum paniculatum* L.) presents a biological control potential against pathogens and pests that have an agronomic relevance.

According to Lima et al., (2014) the search to get new insecticides, containing the use of plants for natural insecticides fabrication, is established in an open, broad and continuous field of research.

Aiming to increase the knowledge for new alternatives of natural insecticides, and a form to control without trigger problems caused by the chemical insecticides. That way, this work had the objective to evaluate the Jurubeba (*Solanum paniculatum* L.) peel powder efficiency as a natural insecticide, for the control of *A. obtectus* S. in the storage beans.

Material and Methods

The experiment was conducted at the Laboratory of Seeds at Instituto Federal de Educação, Ciência e Tecnologia da Paraíba, campus de Picuí – PB, in the period of august to october in 2019.

The beans used for the achievement of this search were common beans stemming from familiar agriculture. The grains undergo a rigorous harvest, grains absent of injuries and complete grains without the presence of insects *A. obtectus,* with determinations according to the Rules for Seeds Analysis (BRASIL, 2009). The adult insects of *A. obtectus* used in the experiment were stemming from a replication made at the Laboratory of seeds- Picuí campus. For obtaining the Jurubeba's peel (*S. paniculatum*), were removed from plants located at the Sítio Malhada da Catingueira, carefully to not commit several injuries to the plant.

The experimental design adopted was a completely randomised design (CRD) with 5 treatments and 4 repetitions. The insects were submitted to dosages using Jurubeba powder (0,0; 2,0; 4,0; 6,0; 8,0 gramas); the insects were isolated in glass containers (10/containers). The containers were sealed with a voile tissue to promote a gas exchange avoiding the death of the insects by asphyxia. The experiment analysed the variants: Number of live insects (NLI), number of dead insects (NDI) and the bean's mass weight. The tests had occurred every seven days on a period of 21 days, for monitoring the grain mass loss, for this it had been used a precision scale.

The results were analysed by a Computer Statistical Analysis System SISVAR (FERREIRA, 2014), the achieve data was submitted to a variance analysis and to an average comparison by the F test ($p<0,05$), in terms of the dosages effects, it was adjusted to the regression equations for the effects in each species.

Results and discussions

Through the variance analysis, it has been established that the number of live insects (NLI) and the number of dead insects (NDI) showed significant effect and the bean`s weight (BW) has shown a significant effect (p<5%).

According to the results obtained during the period of tests, it has been noted that the weevil`s (*A. obtectus* Say) mortality increased by the exposure period, after 18 days the number of weevils was about 1,78, in a total 17,8% live insects. For the Jurubeba powder dosages, it has been established that the dosage with 6,0 g had a lower incidence of live insect, with an average of 1,0 live insects in the period tests, concluding that is an excellent dosage, compared to the others dosages used for the bean weevil's (*A. obtectus* Say) control having a percentage of 10% survivors insects, presented in the image 1 and 2.

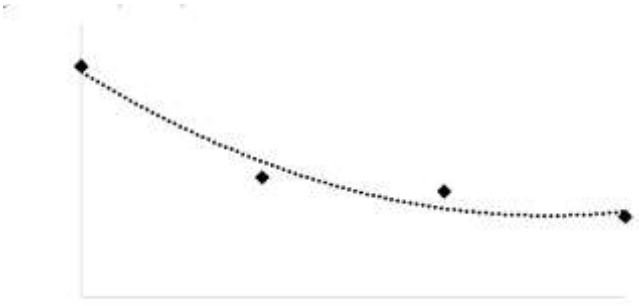


IMAGE 1. Number of live insects (NLI) A. obtectus Say, on the function of days in storage.

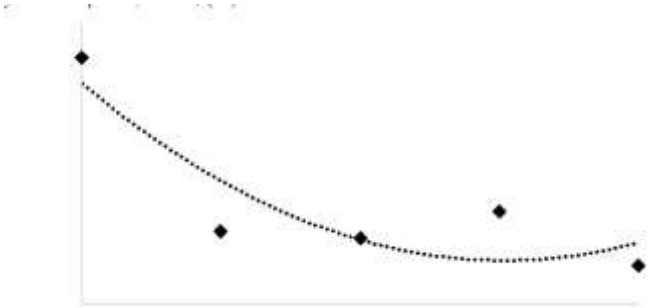
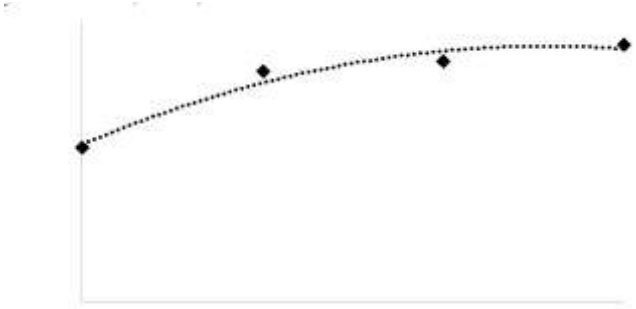


IMAGE 2. Number of dead insects (NDI) *A. obtectus* Say, on the functions different concentrations of Jurubeba`s (*Solanum paniculatum* L.) powder dosages.

Capps et al., (2009) presented a similar data, with the objective to control the *S. oryzae* using the *Cyperus*`s powder in three concentration (1, 2 e 5%) during 30, 60, 90, 120 e 150 days,

achieve 77 % of mortality in adult insects, when the grains were treated with the powder made by the roots from the *Cyperus,* using a concentration of 5%, is has others treatments, with a inferior efficiency.

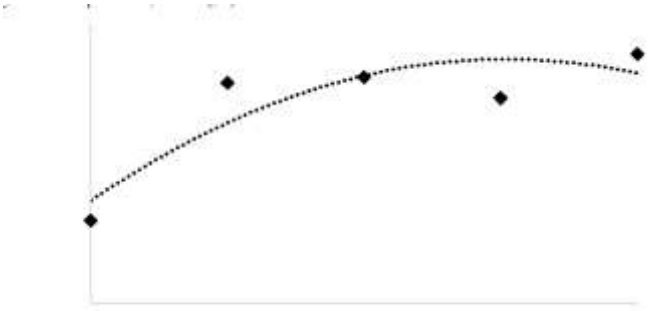
During the period of tests, it was realized that the numbers of weevils (*A. obtectus* Say) had decreased until 18 days as a result from the storage period, with an average of 8,20 dead weevils, achieving a percentage of 82% in the mortality rate, (Image 3).



Days of storage

IMAGE 3. Number of dead insects (NDI) A. obtectus Say., on function of the days in storage.

It is noted that it had a tendency for the rise in the insects mortality when it was used a dosage with 6,0 g of Jurubeba powder, with an average of 8,75 dead weevils in the period of tests, with a mortality rate of 87,5 %, Image 4.



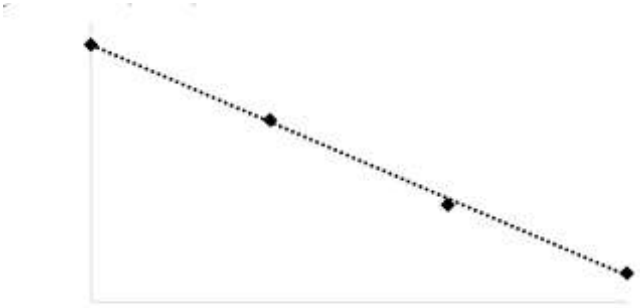
Extract concentration (%)

IMAGE 4. Number of dead insects (NDI) *A. obtectus* Say., on the function of different dosages using de Jurubeba powder (*Solanum paniculatum* L.).

It is noted at the Campos et al. (2015) work that the 90% of bean weevils mortality (*A. obtectus* Say) with Sweet Carqueja essential oil, with 24 hours of exposition, that this value was

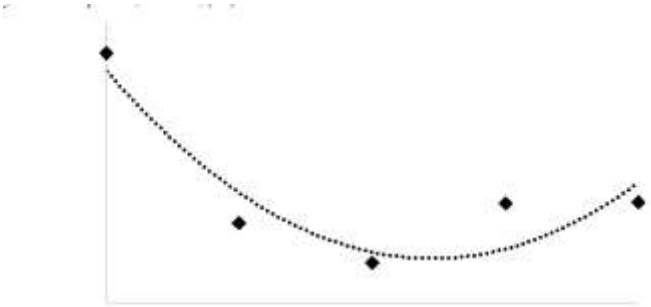
achieved regardless of the tested dosage, the authors declare that the weevil mortality rate is directly influenced by the increase of the dosage and by the extension in the time of exposure.

When verified the bean's weight (BW), highlighting that this sample was analysed with the absence of 10 beans in each test, was noted an average the bean's weight (BW) related by the storage days was 92.56 g achieving a significant value, (Image 5). In relation to the one that had 4,89 dosages of Jurubeba powder, had a lower weight, approximately 91,22 g, this weight was a considerable in relation to the initial quantity were 100 g per treatment, image 6.



Days of storage

IMAGE 5. Bean's weight (BW) on the function of the days in storage.



Extract concentration (%)

IMAGE 6. Bean's weight (BW2) on the function of different dosages using de Jurubeba powder (*Solanum paniculatum* L.).

Santos et al., (2002) noted a loss of grains of corn caused by the weevils, a weight reduction of 21% approximately 90 days after the storage, the authors used 300 adult insects of *S. zeamais* in 1,5 kg of wheat grain.

Conclusion

The Jurubeba powder (*Solanum paniculatum* L) had shown to be efficient on the control of *Acanthoscelides obtectus* Say. The mortality rate was affected directly by the dosage and by the time of exposure. In the grains of Caupi bean (*Vigna unguiculata* L) the weevils *A. obtectus* Say achieve approximately 87,5% of mortality using the dosage of 6 g of Jurubeba powder, and 82% of mortality in the storage.

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