EDUMASPUL
JURNAL PENDIDIKAN
Vol. 7 – No. 2, year (2023), page 5432-5440
| ISSN 2548-8201 (Print) | 2580-0469) (Online) |

The Population And Level of Attack By Pod-Destroying Pests On Several Soybean Varieties As Information For The General Public And Especially Biology Education Students

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Receive: 17/07/2023	Accepted: 15/09/2023	Published: 01/10/2023

Abstrak

Produktivitas kedelai di provinsi jambi lebih rendah dibandingkan dengan produktivitas kedelai nasional. Salah satu masalah dalam meningkatakan produksi kedelai adalah serangan hama. Penelitian ini bertujuan untuk mengetahui populasi dan tingkat serangan hama perusak polong pada beberapa varietas kedelai (Glycine max (L) Merril). Rancangan penelitian yang digunakan adalah Rancangan Acak Kelompok (RAK) yang terdiri atas 5 perlakuan dengan 5 kelompok. Setiap perlakuan diulang sebanyak 5 (lima) kali, sehingga total keseluruhan percobaan terdiri dari 25 unit percobaan. Teknik analisis Data yang digunakan adalah teknik analisis sidik ragam dan dilanjutkan dengan uji jarak berganda Duncan (DNMRT) pada taraf α = 5%. Hasil penelitian bahwa terdapat 3 jenis hama perusak polong pada tanaman kedelai yaitu E. zinkenella, R. linearis dan N. viridula. Serangan penghisap polong terlihat pada kelima varietas kedelai, serangan mulai terlihat pada pengamatan 73 hst dan 80 hst. Tingkat serangan pada pengamatan 73 hst dengan tingkat serangan 9,69 - 5,04%. Pada pengamatan 80 hst terlihat tingkat serangan semakin meningkat, tingkat serangan tertinggi terjadi pada varietas Anjasmoro sebesar 26,22% dan serangan terendah pada varietas Jayawijaya sebesar 7,43%.

Kata Kunci*: *hama; kedelai; populasi

Abstract

Soybean productivity in Jambi province is lower than national soybean productivity. One of the problems in increasing soybean production is pest attacks. This research aims to determine the population and level of attack by pod-destroying pests on several soybean varieties (Glycine max (L) Merrill). The research design used was a Randomized Block Design (RAK) which consisted of 5 treatments with 5 groups. Each treatment was repeated 5 (five) times, so that the total experiment consisted of 25 experimental units. The data analysis technique used is the analysis of variance technique and is followed by Duncan's multiple distance test (DNMRT) at the α = 5% level. The research results show that there are 3 types of pod destroying pests on soybean plants, namely E. zinkenella, R. linearis and N. viridula. Pod sucking attacks were seen in the five soybean varieties, attacks began to appear at 73 days after planting and 80 days after planting. The attack rate was observed at 73 HST with an attack rate of 9.69 - 5.04%. At 80 DAT observations, it was seen that the attack rate was increasing, the highest attack rate occurred on the Anjasmoro variety at 26.22% and the lowest attack rate was on the Jayawijaya variety at 7.43%

Keywords*: *pest; soya bean; population

Introduction

In Indonesia, soybean plants (Glycine max (L.) are one of the main food commodities that are important for people's lives after rice and corn, so the need for them is increasing along with the increase in population and public awareness of nutritious food. Soybeans can be used as raw materials for making various food products such as milk, tofu, soy sauce and bean sprouts (Adisarwanto, 2009). National soybean production in 2018 was 807,508 tonnes, with a harvest area of 5,541.32 ha, and productivity of 1,457 tonnes/ha. Meanwhile, soybean production in Jambi Province in the same is 2,625 tons with a harvest area of 2,069 ha and productivity of 1,269 tons/ha. Soybean productivity in Jambi Province is lower than national soybean productivity (Central Statistics Agency, 2018).

One of the problems in increasing soybean production is pest attacks. There are relatively many types of pests that attack soybean plants, so they have the potential to damage soybean plants in the mild to severe category, which ultimately results in a decrease in production and even causes the plants to rot. (Pitojo, 2003). Various pests destroying pods have become a problem in increasing soybean production. The main pod-destroying pests that are often found in soybean plants are the pod borer (Etiella zinckenella) and the pod-sucking pest (Riptortus linearis and Nezara viridula) (Saenong, 2007). Yield losses caused by these pests reach 80% (Prayogo et al, 2005) and (Baliadi et al, 2008). So far, farmers often control soybean pests using synthetic insecticides, because they have been proven to be effective in killing all pest organisms on crops. Research results prove that the use of synthetic insecticides not only kills pests, but also kills natural enemy organisms of these pests as well as non-pest organisms that happen to be present in crops (Ahmad, 2001).

This problem can be overcome with more effective and efficient control, namely integrated pest control (IPM), which is a combination of the use of several pest control methods so that better results can be obtained, with minimal impact on humans and the environment. Pest control techniques include technical culture, use of natural enemies, mechanical methods, quarantine and the use of resistant varieties. Control using resistant varieties can reduce the intensity of pest

attacks, however, data regarding soybean varieties that are resistant to pod destroying pests is still not widely known.

Method

1. Research Design

The research was carried out on plantation land belonging to residents of Koto Tuo village, Central Island, Kerinci Regency. The materials used are 5 varieties of soybean plants, namely: Willis, Tanggamus, Detam-1, Anjasmoro and Jayawijaya, cow manure, NPK fertilizer. The tools used are hoes, machetes, measuring tapes, labels, knives, sickles, gembors, blades, plastic, digital cameras and writing instruments. The research used a Randomized Group Design (RAK) consisting of 5 treatments with 5 groups. Each treatment was repeated 5 (five) times, so the entire experiment consisted of 25 experimental units. The area of one experimental plot unit consists of 2 x 5 m with a planting distance of 40 x 30 cm, a distance of 50 cm between plots. Each experimental unit plot was planted with 80 plants so that the total number of plants was 2,000 plants.

2. Implementation of Research

The soil is hoeed to a depth of 20-30 cm until loose, then a plot measuring 2 x 5 m with a height of 30 cm is made, then mixed with manure and leveled with agricultural tools. Second, planting is done after 1 week of applying manure. Planting seeds is done in a hole with a hole depth of 2-3 cm, the number of seeds in each hole is 2 plants with a planting distance of 30 x 40 cm. Third, maintenance of soybean plants includes: watering, replanting, thinning, fertilizing, weeding and loosening. Watering is done every day in the morning and evening except rainy days, if the rain is heavy enough then watering no longer needs to be done. Fourth, observations are carried out every week starting after the plants enter the generative phase until the harvest period.

Observations were carried out 5 times on sample plants which were determined systematically as many as 8 sample plants per week in each experimental unit consisting of observing the types of pod destroying pests on the sample plants by observing the pests found on the sample plants. The pod-destroying pests obtained are then observed and identified. Then each type of pod destroying pest was counted.

Observation of the percentage of pods attacked by pod destroying pests was carried out by observing the infected pods and counting the number of pods

attacked and the total number of pods for each sample plant. The percentage of infected pods is calculated using the formula.

$$T = \frac{n}{N} \times 100\%$$

information :
T : Percentage of infected pods
n : Number of pods attacked
N : Number of pods observed

Data obtained from observations were presented in tabulated form and analyzed using variance and followed by Duncan's multiple range test (DNMRT) at the α = 5% level.

Results and Discussion

The results of the research show that there are three types of pod destroying pests on soybean plants, namely E. zinkenella, R. linearis and N. viridula. For more clarity, the average population and pest attacks can be seen in the following table.

Table 1. Average population of E. zinkenella at each observation

Veriety	population (tail) / plant				
	52 day	59 day	66 day	73 day	80 day
V1 (Willis)	0,00a	0,00a	0,00a	0,00a	0,00a
V2(Tanggamus)	0,00a	0,00a	0,00a	0,00a	0,05a
V3 (Detam-1)	0,00a	0,00a	0,00a	0,00a	0,05a
V4 (Anjasmoro)	0,00a	0,00a	0,00a	0,00a	0,00a
V5 (Jayawijaya)	0,00a	0,00a	0,00a	0,03a	0,00a

Based on the table above, it shows that the E.zinkenella larvae found were greenish in color. E.zinkenella was found in the Tanggamus, Detam-1 and Jayawijaya varieties.

In the Jayawijaya variety, E.zinkenella was found 73 days after planting and in the Tanggamus and Detam-1 varieties it was found 80 days after planting. According to Awadalla N (1957) The larvae that have just hatched from the eggs are yellowish white, then turn green with longitudinal red lines. The first and second instar larvae bore into the pod skin, then enter the seed and live inside it, after the second instar the larvae live outside the seed. The body of the 2-3 instar larvae is greenish and the 4th instar larvae are reddish or bluish red. The heads of 2-3 instar larvae are black and 4 instar larvae are yellow. In one pod, more than one larva is often found.

The length of the final instar larva is 13-15 mm with a width of 2-3 mm. These larvae undergo four molts, the first, second and third instars each

last 1-2 days while the fourth and fifth instars last 1-3 and 2-3 days respectively. The results of the analysis of the E. zinkenella population did not show significant differences at 73 and 80 days after planting.

Table 2. Average population of R. linearis at each observation

Variety	Population (tail) / plants				
	52 day	59 day	66 day	73 day	80 day
V1 (Willis)	0,00a	0,00a	0,03a	0,03a	0,05a
V2 (Tanggamus)	0,00a	0,00a	0,03a	0,00a	0,03a
V3 (Detam-1)	0,00a	0,00a	0,00a	0,00a	0,00a
V4 (Anjasmoro)	0,00a	0,00a	0,03a	0,03a	0,00a
V5 (Jayawijaya)	0,00a	0,00a	0,05a	0,08a	0,00a

Based on table 2, it shows that the R. linearis imago found is yellow-brown in color and looks like a palm grasshopper, along the side of the body it has a yellowish-white line. R. linearis was found in the Willis, Tanggamus Anjasmoro and Jayawijaya varieties. In the Willis and Tanggamus varieties R. linearis was found in observations 66 to 80 days after planting, but at 73 days after planting in the Tanggamus variety no R. linearis was found.

In the Anjasmoro and Jayawijaya varieties R. linearis was found in observations 66 and 73 days after planting, while in the Detam-1 variety R. linearis was not found in all observations. This is in line with the opinion of the Director General of Food Crops (1992) ImagoR. linearis has a long body and is yellow-brown in color and looks like a palm grasshopper, along the side of the body it has a yellowish-white stripe. The length of the imago reaches 11-14 mm and the lifespan reaches 4-7 days. Although R. linearis was found in several observations, on average the population average does not show any significant differences.

Table 3. Average population of N. viridula at each observation

Variety	Population (tail) / Plants				
	52 day	59 day	66 day	73 day	80 day
V1 (Willis)	0,00a	0,00a	0,00a	0,00a	0,03a
V2 (Tanggamus)	0,00a	0,00a	0,00a	0,00a	0,00a
V3 (Detam-1)	0,00a	0,00a	0,00a	0,00a	0,03a
V4 (Anjasmoro)	0,00a	0,00a	0,00a	0,00a	0,00a
V5 (Jayawijaya)	0,00a	0,00a	0,00a	0,00a	0,00a

The table above explains that the N. viridula nymphs found were green with black and white spots. N. viridula nymphs were only found on the Willis and Detam-1 varieties in observations 80 days after planting, while they were not

found on the Tanggamus, Anjasmoro and Jayawijaya varieties in all observations. According to Nurjanah (2008) Nymphs are like imago but do not have wings. The first instar is reddish then becomes light brown. The 2nd instar is black with white spots, the 3rd, 4th and 5th instars are green with black and white spots. 1st instar nymphs cluster on egg shells, after molting they move to pods to eat and live in groups. The 3rd, 4th and 5th instar nymphs stay on the upper leaf surface, in the morning after 09.00, move to the pods to eat. The green ladybug's life cycle lasts 29 days, the nymph stage is 23 days. However, the population numbers are not significantly different.

Table 4. Average percentage of pods attacked by E. zinkenella at each observation.

Variety	Population (tail) / Plants				
	52 day	59 day	66 day	73 day	80 day
V1 (Willis)	0,00 a	0,00 a	0,00 a	0,00 a	0,00 a
V2 (Tanggamus)	0,00 a	0,00 a	0,00 a	0,00 a	0,03 a
V3 (Detam-1)	0,00 a	0,00 a	0,00 a	0,00 a	0,69 a
V4 (Anjasmoro)	0,00 a	0,00 a	0,00 a	0,16 a	0,00 a
V5 (Jayawijaya)	0,00 a	0,00 a	0,00 a	0,12 a	0,26 a

The results of observations on the percentage of infected pods showed that E. zinkenella attacks were seen on the Tanggamus, Detam-1 Anjasmoro and Jayawijaya varieties. E. zinkenella attacks were found to have cracks on the pod skin and black holes on the pods when opened. Inside the pods were E. zinkenella larvae. . E. zinkenella attacks were found on the Tanggamus and Detam-1 varieties at 80 DAP observations. In the Jayawijaya variety, E. zinkenella attacks were seen in observations 73 to 80 days after planting, while in Anjasmoro only in observations 73 days after planting. Furthermore, the Willis variety did not show any pods attacked by E. zinkenella in all observations. This is in line with the opinion of Marwoto et al (1999) that larvae damage seeds by boring into the skin of young pods and then entering and boring into the seeds. Before burrowing, the larva covers itself with a white sheath of spun thread. The sheath is still visible until several days after the larva enters the pod. After the white sheath disappears, the entrance is visible as a dark brown spot. Abandoned pods are characterized by the presence of drilled holes with grains of yellow or light brown dirt bound together by spun thread containing the seeds that are eaten. The analysis results showed that the level of E. zinkenella attack at the age of 73 and 80 days after planting did not show a significant difference.

Tabel 5. Rata-rata persentase polong yang terserang oleh penghisap polong pada setiap pengamatan

Varietas	Populasi (ekor) / tanaman				
	52 hst	59 hst	66 hst	73 hst	80 hst
V1 (Willis)	0,00 a	0,00 a	0,00 a	9,69 0a	17,57b
V2 (Tanggamus)	0,00 a	0,00 a	0,00 a	12,42a	12,44b
V3 (Detam-1)	0,00 a	0,00 a	0,00 a	13,89a	11,86b
V4 (Anjasmoro)	0,00 a	0,00 a	0,00 a	7,00 a	26,22a
V5 (Jayawijaya)	0,00 a	0,00 a	0,00 a	5,04 a	7,43 b

Percentage of pod sucker attacks found causing pods and seeds to collapse. Pod sucking attacks were seen in the five soybean varieties, attacks began to appear on observations 73 and 80 days after planting. This is in line with the opinion of Rahadjo et al (1991) that nymphs and adult insects damage plants by sucking soybean pods and the pods have black puncture marks. When young pods are attacked by green ladybugs, the pods become empty and deflated because the seeds do not form and the pods fall. Old pods cause the seeds to become wrinkled and have black spots which eventually rot. The attack rate observed 73 days after planting was not significantly different from the attack rate of 9.69 - 5.04%. At 80 DAT observations, it was seen that the attack rate was increasing, the highest attack rate occurred on the Anjasmoro variety at 26.22%. However, it was not significantly different for the Willis, Tanggamus and Detam-1 varieties but was significantly different for the Jayawijaya variety by 7.43%.

Observations of the population of pod-destroying pests did not show significant differences in the varieties tested, it is suspected that this was caused by biotic factors, namely environmental conditions during the rainy season at the time of the research. Mangundojo (1958) stated that climatic factors greatly influence the emergence of pod-destroying pest populations. This is in line with the research results of Syahrir et al. (1998) that the pest population on soybean plants is less in the rainy season than in the dry season. However, when observing the percentage of infected pods at 80 days after planting, there were significant differences. This shows that there are differences in interactions between the pests and the varieties planted. This is in line with Evita (2011) who stated that the Jayawijaya variety is more resistant to pests destroying pods than the Willis, Tanggamus varieties. and Detam-1. According to Painter (1958), resistant varieties influence the development of insects, thus the use of resistant varieties

inhibits the development of pest populations so that the level of pest attacks is low. Meanwhile, the Anjasmoro variety was the most vulnerable with a higher attack intensity, namely 26.22%. Nisa et al (2013) explained that the number of trichomes of the Anjasmoro variety was less than that of the Jayawijaya variety. Furthermore, Suharsono (2009) stated that dense and long trichomes reduce the number of stylet puncture wounds while few and short trichomes have a greater chance of being attacked by pod destroying pests.

Conclusion

After conducting research, there were 3 types of pod destroying pests, namely E. zinkenella, R. linearis and N. viridula. E. zinkenella was found at 73 to 80 days after planting, R. linearis was found at 66 to 80 days after planting and N. viridula was only found at 80 days after planting. The use of several varieties did not have a significant effect on the population of pod-destroying pests, but had a significant effect on the percentage of pods attacked in the five varieties tested. This research is useful as information for the general public and especially biology education students.

Thank-you note

The author conveys praise and gratitude to Allah SWT who has bestowed all His grace and blessings so that the author can compile the research. In writing this research, the author received a lot of support, guidance and input from various parties. For this reason, the author would like to take this opportunity to thank Mr. Chancellor of UIN Sulthan Thaha Saifuddin Jambi, then Institute for Research and Community Service Uin Sulthan Thaha Saifuddin Jambi. Finally, the author hopes that this research can be useful and contribute to improving the quality and quality of education

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