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Effect Of Lantana camara Plant Leaf Extracts On Black Soybean (*Glycine soja* L.) Plant Pests

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ABSTRACT. This study aims to determine the effect of leaf and flower extracts (Lantana camara) in controlling pod borers (Etiella zincknella) on black soybean (G. soja (L) Merril). This research was conducted in February-June 2024. The study used the non-factorial RAK (Randomized Group Design) method with treatments: PO = No treatment. P1 = Concentration of 5 grams of Lantana camara leaf extract /L. P2 = Concentration of 10 grams of Lantana camara leaf extract /L. P3 = Concentration of 15 grams of Lantana camara leaf extract /L. P4 = Concentration of 20 grams of Lantana camara leaf extract /L. P5 = Concentration of 25 grams of Lantana camara leaf extract /L. The parameters observed were: Plant height, number of leaves, weight of filled pods, percentage of attack. The treatment of Lantana camara leaf extract did not significantly affect the height, number of leaves and weight of pods of black soybean plants. In the percentage of treatment P0, P1, P2, P3 showed no significant difference to the percentage of black soybean pod sucking pest attack but the four treatments were significantly different from the P4 and P5 treatments.

Keywords : *black soybean, Lantana camara, pod sucking pests*

INTRODUCTION

Black soybean (Glycine soja (L) Merril) is a local Asian plant that is widely found in tropical areas such as Indonesia. The need for soybeans from year to year has increased significantly. Based on information from the Central Bureau of Statistics (BPS), soybean production in 2014 reached 892.6 thousand tons of dry beans, an increase of 14.44 percent or 112.61 thousand tons compared to 2013 of 779.99 thousand tons. Information from the National Soybean Board states that the need for domestic soybean utilization in 2022 totals 2.4 million tons, while the 2022 soybean production target is only 892.6 thousand tons. There is still a shortage of more than 1,000,000 tons (Nurrahman, 2023).

One of the advantages of black soybeans is that they contain more anthocyanins and have a longer shelf life than yellow soybeans. The development of the soybean-based food industry accompanied by population growth has resulted in a sharp increase in demand for soybeans in Indonesia, but national production tends to decline so that the soybean deficit continues to increase. (Lumbantobing et al, 2013)

One of the threats in efforts to increase soybean crop production is pest attacks, one of which is pod suckers. Currently, efforts to reduce the attack of pod suckers (Riptortus linearis) are still widely used synthetic chemical insecticides. The use of synthetic chemical insecticides in pod sucking control efforts can have a negative impact on environmental health, and disrupt natural ecosystems. To overcome the existing problems, it is necessary to have an alternative control that does not cause pollution to the environment, is cheap, and is easily applied in the field. Biopesticide is a pesticide with the use of basic ingredients that can be obtained from plants in the surrounding environment. Some plants that can be used for vegetable insecticides are neem leaves, tembelekan leaves, mint leaves, papaya leaves, tobacco, mahogany seeds, lemongrass, turmeric. These types of insecticides are very easily broken down (biodergradable) in the environment, so they do not damage the surrounding environment and are safe for humans and livestock (Dadang and Prijono, 2008).

One of the plant leaves used for vegetable insecticides is tembelekan leaves (Lantana camara). The content of compounds contained in tembelekan leaves can be used as a vegetable pesticide to control pod sucking pests. The tembelekan plant (Lantana Camara) is a plant that is widely available in Indonesia but its utilization is still less than optimal. (Lantana Camara) is a plant that can be used as the main ingredient of biopesticides because it contains active compounds such as alkaloids, flavonoids, and triterpenoids. Parts of the plant that can be used as biopesticide materials are stems, leaves, flowers, oil and sap (Astriani, 2010).

MATERIALS AND METHODS

This research was conducted in Hutagodang village, Batangtoru sub-district on the farm of Mr. Fransisco Sitompul with an altitude of ± 50 meters above sea level. Research began in February-June 2024. The tools used in this research are hoes, paddles, blenders, filters, buckets, scales, polybags, plastic, cell phones, jars, hekter and stationery, sprayers. The materials used in this study were black soybean seeds (Glycine soja L.) and tembelekan (Lantana camara). This study used a Randomized Group Design (RAK) consisting of 6 treatments and 4 replications so that there were 24 plots. The arrangement of the treatments carried out is:

P0 = Concentration of 0 grams of Lantana camara leaf extract (Control)
P1 = Concentration of 5 grams of Lantana camara leaf extract /L
P2 = Concentration of 10 grams of Lantana camara leaf extract /L
P3 = Concentration of 15 grams of Lantana camara leaf extract /L
P4 = Concentration of 20 grams of Lantana camara leaf extract /L
P5 = Concentration of 25 grams of Lantana camara leaf extract /L
Observation Parameters

Plant Height (cm)

Plant height measurements were taken after the plants were 4 weeks after planting (MST) to 7 weeks after planting (MST). Plant height measurements were measured from the base of the plant to the growing point using a meter.

Number of Leaves (strands)

The number of leaves was calculated when the plants were 4 weeks after planting until 7 weeks after planting (MST) with an observation interval of one time in 1 week. The number of plant leaves was counted from the base of the stem to the highest leaf growth point or the top of the plant. The leaves that were counted were those that had fully opened or normal leaves.

Weight of Filled Pods (g)

The weight of filled pods was obtained from each polybag produced at harvest, weighed with a digital weighing scale.

Percentage of Attack (%)

The percentage of attack was obtained based on the ratio between the number of infested plants divided by the total number of plants in the observation plot. The formula used is Herdiana 2010 in Supriyatna, 2017.

$P=a/b \times 100\%$

Description:
P = Percentage of Attack
a = Number of infested plants
b = Total number of plants observed

RESULTS AND DISCUSSION

Plant Height (cm)

Based on the results of the analysis of variance on the treatment of Lantana camara leaf extract on the observation of the height of black soybean plants at the age of 4, 5, 6, and 7 weeks after planting can be seen in the following table:

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Table 1. Average height of black soybean plants at the age of 4,5,6, and 7 weeks after planting (MST)

TREATMENT	4 MST	5 MST	6 MST	7 MST
P0	25,75a	34,50a	43,75 ab	52,00a
P1	15,25a	27,75a	41,00 ab	48,50a
P2	24,25a	35,50a	47,75 b	55,25a
P3	22,25a	32,75a	45,00 ab	52,00a
P4	20,75a	28,50a	37,00 a	45,00a
P5	25,00a	30,75a	42,25 ab	50,25a

Based on Table 1, shows the results of variance analysis that the treatment of Lantana camara leaf extract on black soybean plants at 4, 5 and 7 weeks after planting is not significantly different from the height of black soybean plants. At the age of 6 weeks after planting, the treatment of Lantana camara leaf extract showed a significant difference to the height of black soybean plants. At the age of 4 weeks after planting, the treatment of Lantana camara leaf extract on black soybean plants was not significantly different. At the age of 5 weeks after planting, the treatment of Lantana camara leaf extract on black soybean plants was not significantly different. At the age of 7 weeks after planting, the treatment of Lantana camara leaf extract on black soybean plants was not significantly different. The highest plants at 7 weeks after planting in the P2 treatment were 55.25 cm, while the lowest in the P1 treatment were 15.25 cm.

In the observations made, the application of Lantana camara leaf extract can inhibit plant growth, it is known that the plants applied to the treatment with the control have almost the same plant height, this is because Lantana camara leaves contain allelopathic substances that inhibit the growth of black soybean plants. Allelopathy is a biochemical interaction that can inhibit or stimulate other plants and microorganisms (Mishra, 2014; Junaedi 2006). Allelopathic compounds can be found in the stem, leaves, flowers, and even sap, but most are found in the leaves (Astriani, 2010; Setiawan, 2010; Ambika, 2013).

Weight of Contained Pods (g)

Based on the results of the analysis of variance on the treatment of Lantana camara leaf extract on the number of leaves of black soybean plants at the age of 4, 5, 6, and 7 weeks after planting can be seen in the following table:

Table 3. Average weight of filled pods (g) of black soybean plants at the age of 4, 5, 6, and 7 weeks after planting (MST).

TREATMENT	Pod Weight (g)
P0	17,21a
P1	16,99a
P2	15,80a
P3	17,28a
P4	16,21a
P5	15,48a

Based on Table 3 shows the results of variance analysis that the treatment of Lantana camara leaf extract is not significantly different from the weight of black soybean pods. On average, it can be seen that the highest number of pod weights is in the P3 treatment with a weight of 17.28 g, while the lowest is in the P5 treatment which is 15.48 g. The difference in pod weight is thought to be due to genetic traits.

The difference in pod weight is thought to be due to the genetic characteristics of the plant. Soegito & Arifin (2004) explained that the increase in weight is due to genetic factors of soybean varieties. The larger the seed size, the greater the weight and the ability of plants to absorb nutrients from the environment. This is in accordance with the results of research by Sumardi (2014) which showed that the genetic characteristics of plants, one of which is the seed size of each soybean variety, affect the weight of 100 seeds. In addition, the high and low yield obtained is also determined by the size of the seeds.

Percentage of attack

Based on the results of the analysis of variance on the treatment of giving Lantana camara leaf extract to the percentage of pest attacks on black soybean plants at the age of 10 weeks after planting can be seen in the following table:

Table 4. Average Percentage of Pest Attacks on Black Soybean Plants at the age of 10 weeks after planting.

TREATMENT	Pod Weight (g)
P0	17,21a
P1	16,99a
P2	15,80a
P3	17,28a
P4	16,21a
P5	15,48a

Based on Table 4 shows the results of variance analysis that the treatment of Lantana camara leaf extract on the observation of 10 weeks after planting between P0, P1, P2, P3 showed no significant difference in the percentage of black soybean pod sucking pest attack but the four treatments were significantly different from the P4 and P5 treatments. On average, it can be seen that the highest percentage of pest attack is in the treatment of P0 to P3 with a percentage of 100%, while the lowest is in the P5 treatment which is 62.5%. It was observed that treatments P1-P3 showed that there was still pest attack even though Lantana camara leaf extract had been applied. This is likely due to the lack of treatment doses for P1-P3, so as not to get maximum results. This is in line with Hendrival's research (2012) which states that tembelekan leaf extract can be used as an alternative material for pest control. According to Ghisalberti (2000) the flowers and leaves of tembelekan plants that can be used as vegetable insetisida, these parts can control insect pests. The higher concentration of tembelekan leaf extract shows that the mortality of pod-sucking pests will also increase.

Although almost all plants were attacked, there was still pod sucking pest mortality. The death of pod sucking pests due to the treatment is due to the chemical content that is in the basic ingredients of the natural insecticide tembelekan leaves. According to (Wahyuni, 2012) secondary metabolic compounds in plants are produced by plants themselves as protection against microorganisms and predators such as insects. The results of Purwarti's research (2017) on phytochemical screening conducted, tembelekan leaf extract contains tannins, saponins, and steroids which make tembelekan plants have potential as natural insecticides to reduce insect pests and disease outbreaks in horticultural crops.

This observation shows that the concentration of 25 grams of tembelekan leaf extract is the most effective. This is because the effect of essential oils from the natural insecticide of tembelekan leaves makes the feeding activity of pod-sucking pests stop. This is in line with Wardana's research (2017) that tembelekan plants contain essential oils in their leaves. Essential oils can be repellent, attractive, respiratory poisons, reduce appetite.

Pest mortality that occurs, because tembelekan leaf extract has secondary metabolite compounds in the form of flavonoids, saponins, alkaloids, and triterpenoids. According to BBPPTP (2013), the entry of insecticides into the insect body which results in insect death can be divided into three ways, namely contact poison (through the skin), stomach poison (which enters the body), and stomach poison (which enters the body).

CONCLUSION

The results of the research analysis that has been carried out conclude that:

1. The treatment of Lanatana camara leaf extract has no significant effect on the height, number of leaves and weight of black soybean pods.
2. On the percentage of attack, the treatment of Lantana camara leaf extract at the observation of 10 weeks after planting between P0, P1, P2, P3 showed no significant difference in the

percentage of attack of black soybean pod sucking pests but the four treatments were significantly different from the P4 and P5 treatments.

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