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Original Research Paper

Development of Dust Flea Leaf Sucking Pests (*Bemisia Tabaci*) and The Incidence of Viral Diseases in Sweet Potato Plants in Two Agroecosystems

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Abstract: Whitefly pests (*Bemisia tabaci*) are leaf-sucking pests that act as vectors for the spread of viral diseases in sweet potato plants. Differences in agroecosystem conditions are suspected to affect pest populations and the development of viral diseases. This study aims to (1) identify and compare whitefly pest populations on sweet potato plants in two agroecosystems, (2) identify and compare viral disease incidence in two agroecosystems, and (3) analyze the relationship between temperature and humidity on whitefly populations and viral disease incidence. The research was carried out in drylands and technical irrigated lands by observing whitefly populations, viral disease symptoms, percentage of disease incidence, and environmental factors such as temperature and humidity. The data were analyzed using a t-test at a real level of 5% and simple linear regression. The results showed that whitefly populations and the percentage of viral disease incidence differed significantly between the two agroecosystems, with higher values on drylands than on technical irrigated land. In dry land, diseases caused by *Sweet potato chlorotic stunt virus* (SPCSV) and *Sweet potato feathery mottle virus* (SPFMV) were found, while in technical irrigation land diseases were found caused by *Sweet potato virus disease* (SPVD). Regression analysis showed that temperature was positively correlated, while humidity was negatively correlated with whitefly populations and viral disease incidence, with a stronger relationship in dry land than in technical irrigated land. The results of the study show that differences in agroecosystem characteristics affect the dynamics of whitefly populations and the development of viral diseases in sweet potato plants.

Keywords: Agroecosystems; *Bemisia tabaci;* Drylands; Sweet Potato; Technical Irrigation Land; Viral Diseases.

Introduction

Sweet potato (*Ipomoea batatas* L.) is one of the most important tuber commodities after cassava which is used for human consumption, animal feed, and agro-industrial raw materials (Mugumaarhahama et al., 2021). In Indonesia, sweet potatoes have great potential as a food diversification commodity to support food security, especially in rural areas (Badriah et al., 2022). Some regions such as Papua, Nias, and Mentawi even make sweet potatoes a staple food because of their high carbohydrate and carotin (provitamin A) content (Apriyanto, 2022).

Sweet potato production in Indonesia in 2021 was recorded at 1.42 million tons, a decrease from the previous year which reached 1.60 million tons. Based on data from the Data and Information Center in 2021, sweet potato production for 5 years shows a downward trend (Rahmawati et al., 2024). One of the main factors that causes sweet potato production to decline is the attack of plant pest organisms (OPT), especially leaf-sucking pests and transmitted viral diseases. Leaf-sucking pests such as whitefly (*Bemisia tabaci*) can play a vector in the spread of the virus (Sarjan and Nikmatullah 2019). This pest attacks by sucking cell fluid on young leaves to which interfere with the photosynthesis process and cause symptoms such as yellowing, curling, and stunted plant growth.

The presence of leaf-sucking pests is associated with an increased incidence of viral diseases in sweet potatoes. Some common sweet potato viruses include *sweet potato leaf curl virus* (SPLCV), *sweet potato clorotic stunt virus* (SPCSV), *sweet potato mild mottlel virus* (SPMMV), *sweet potato feathery mottle virus* (SPFMV), *sweet potato virus G* (SPVG), and *sweet potato virus* 2 (SPV2) (Chabi et al., 2024). The combination of infection between SPCSV and SPFMV can cause a complex disease known as *sweet potato virus diseases* (SPVD). This viral disease is the most destructive viral disease in sweet potatoes with the potential to reduce yields by up to 100% (Qin et al., 2014 in Kiomo et al., 2021). In addition, the existence of host plants other than sweet potatoes, namely from the Convolvulaceae family such as *Ipomoea setosa, Ipomoea nil, Ipomoea purpurea,* and *Ipomoea tricolor* can increase the risk of spreading viral diseases.

The existence and dynamics of leaf-sucking pests and the spread of viral diseases are affected by agroecosystem conditions. In dryland agroecosystems, air temperatures that tend to be higher and low humidity can accelerate the pest reproductive cycle so that pest populations increase due to abiotic stress (Diyasti & Amalia, 2021). On the other hand, technical irrigation land that has lower temperatures, high humidity, and stable water availability supports host plant vegetation for more abundant pests and viruses. The availability of suitable hosts can increase pest populations (Wibowo, 2023).

Based on these conditions, research is needed on the relationship between the existence of leaf-sucking pests and the incidence of viral diseases in sweet potatoes in two different agroecosystems in East Lombok, namely dryland and technical irrigation land. This research is important to reveal the relationship between vector populations and viral infection rates, so that it can be a scientific basis in formulating pest and disease control strategies that are in accordance with the characteristics of the agoecosystem. This study aims to (1) identify and compare the population of *Bemisia tabaci* leaf-sucking pests on sweet potato plants in two types of agroecosystems, namely dryland and technical irrigation land in East Lombok Regency, (2) identify and compare the incidence of viral diseases in sweet potato plants in the two agroecosystems, (3) Analyze the relationship between temperature and humidity on the *population of Bemisia tabaci* and the incidence of viral diseases in sweet potato plants in two agroecosystems.

Materials and Methods

Research Time and Place

This research was carried out from June 2025 to April 2026 in two locations, namely in South Kelayu Village, Selong District, East Lombok Regency for technical irrigation land agroecosystems and in Suryawangi Village, Labuan Haji District, East Lombok Regency for dry land locations. Pest identification was carried out at the Plant Protection Laboratory, Faculty of Agriculture, University of Mataram.

Determination of Observation Areas and Sample Plants

The determination of the observation area is carried out to determine the observation area and the number of plots (repeats) to be used. Observations were made on two agroecosystems of cultivated sweet potato plants. In each agroecosystem, 5 observation plots are determined with an area of 7 m x 3 m each which is determined diagonally. So that 5 plots (5 replicas) were prepared in each location. Each plot consists of 2 beds measuring 7 m x 1.2 m with 28 plants (planting distance 50 cm x 40 cm), so that there are 56 plants per plot. The observed sample crops were 17.86% (10 plants per plot). The sample plants are determined in a zigzag manner, starting from the first plant on each plot and the next plant is the one in the zigzag position.

Observation Parameters

The observed parameters included the population of *Bemisia tabaci*, the types and symptoms of virus disease incidence, and the percentage of virus disease incidence. Observations were conducted 10 times at one-week intervals starting at 3 weeks after planting (WAP) through direct assessment of the sampled plants. The percentage of virus disease incidence was calculated based on the proportion of symptomatic plants to the total number of observed plants.

Data Analysis

Data from observations on two sweet potato agroecosystems in East Lombok Regency were analyzed using a t-test with a real level of 5%

Results And Discussion

Types and Symptoms of Leaf Sucking Pests

Based on the results of observations on two agroecosystems, one type of leaf-sucking pest was found that attacked sweet potato plants in two agroecosystems, namely whitefly pest (*Bemisia tabaci*) according to the identification results (Figure 1b). This shows that whiteflies have a high level of adaptation to various environmental conditions. Whiteflies are pests that are polyphhagic (have many host plant genetics) and are able to adapt to all weathers, even in suboptimal weather so that they are difficult to control. Whitefly pests have marpology such as white and yellowish body color (Ardiyani et al., 2025).

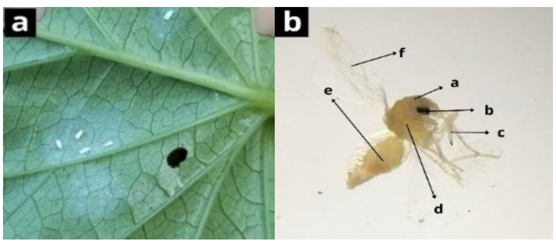

Figure 1. Dust bug pests on sweet potato leaves a. Whitefly pests suck leaves, b. results of whitefly pest identification. Description: a. head, b. eyes, c. stilets, d. chest, e. abdomen, f. wings

Whitefly pests are one of the important pests in sweet potato cultivation practices. Whitefly pests suck sweet potato leaf liquid so that patches appear on plant leaves and turn yellow due to nutrient loss (Ardiyani et al., 2025). The symptoms found in sweet potato leaves in two agroecosystems are presented in Figure 2.

Based on Figure 2a, the symptoms of whitefly attacks found on dry land are curling leaves and dwarfs. Meanwhile, in technical irrigation land, there are necrotic spots on the surface of plant leaves (Figure 2b). This is in accordance with the results of Hidayat et al.'s (2022) research, whiteflies that attack plants can cause necrotic spots on the surface of plant leaves so that plant cells and tissues become damaged.

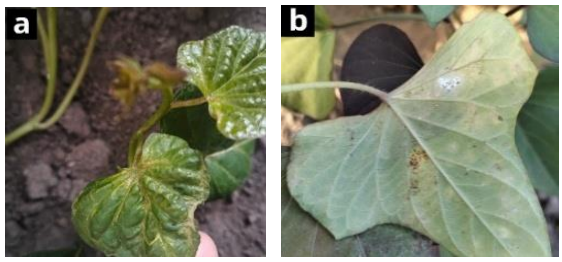

Figure 2. Symptoms of whitefly pest infestation on sweet potato leaves a. Symptoms of attack on dry land, b. Symptoms of an attack on technical irrigation land

Leaf-sucking pest populations in two agroecosystems

The results of observations on the development of whitefly pest populations in sweet potato plants from the 3rd to 12th week after planting are presented in the following figure. Based on Figure 3. The development of whitefly pest populations has differences in the two agroecosystems. Pest populations in the two agroecosystems have increased significantly from the age of 3 MST to reach the highest population in dry land at age 8 MST and technical irrigated land at age 7 MST, then decreased to age 12 MST.

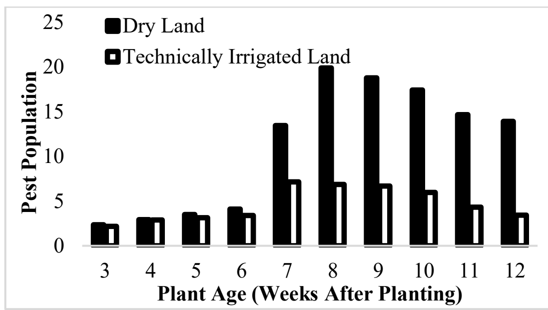

Figure 3. Graph of the development of whitefly pest populations in two agroecosystems

The increase in the population of whitefly pests in sweet potato plants has changed according to the growth phase of the plant. Fluctuations in pest populations are influenced by a variety of internal and external factors. Internal factors include the development phase of sweet potato plants, whiteflies attack young leaves in the vegetative phase of the plant so that the population increases and decreases in the generative phase because the young part of the

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plant is not as much as the vegetative phase (Narendra et al., 2017). Meanwhile, external factors are the presence of host plants around cultivated plants which can affect the dynamics of pest populations by providing additional resources.

Table 1. Results of T-test analysis on two agroecosystems

Observations	Agroecosystem		P-value
	Dry Land	Technical Irrigation Land	
Pest population	11,05	4,59	0.012s

Description: s: significant

The results of the t-test analysis showed that there were significant differences in the two observed agroecosystems. The high population of pests in dry land (Table 1) shows that environmental factors such as high temperature, waplow humidity, and host vegetation around the research land play an important role in supporting pest feeding, development, and reproduction activities. The results of Diyasti & Amalia's (2021) research show that air temperatures that tend to be higher and low humidity can accelerate the pest reproductive cycle so that pest populations increase due to abiotic stress. These conditions allow pests to develop faster and increase pest populations.

Intensity of Leaf Sucking Pest Attack on Two Agroecosystems

The development of the intensity of whitefly pest infestations during observation is presented in Figure 4. The results of observations showed that the intensity of whitefly pest attacks in the two aggregators showed a relatively similar pattern. In dry land, the intensity of the attack increased from 10.5% at 3 MST to 21.87% at 8 MST, then gradually decreased to 17.37% at 12 MST. In contrast, in technical irrigated land, the intensity of the attack increased from 8.4% at 3 MST to 16.15% at 7 MST and then decreased to 11.9% at 12 MST. This increase is due to the high population of pests and the availability of abundant food in the vegetative phase of the plant. The higher the pest population level, the higher the intensity of the attack. Meanwhile, a decrease in the intensity of attacks occurs when entering the generative phase because the population and availability of food for pests decreases so that pests begin to move to find food for their survival (Firiyah, 2023).

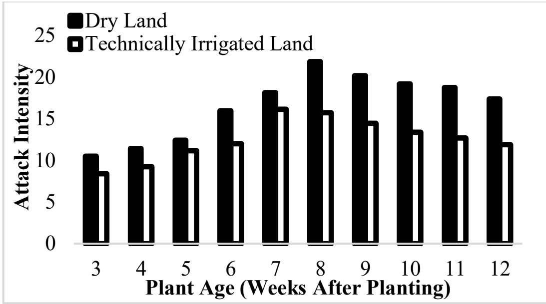

Figure 4. Graph of the development of whitefly pest attack intensity in two agroecoxiastems

Table 1. Results of the analysis of the T test of pest attack intensity in two agroecosystems

Observations	Agroecosystem		P-value
	Dry Land	Technical Irrigation Land	
Attack Intensity	16,58	12,51	0.012s

Description: s = significant

The results of the t-test analysis (Table 4) show that there is a significant difference in the intensity of pest attacks between dry land and technical irrigated land. The high intensity of attacks on drylands is related to higher pest populations compared to technical irrigated land. The increase in pest populations has an impact on the number of pests that attack plants, causing higher intensity of attacks on dry land compared to technical irrigated land.

Types and Symptoms of Viral Disease Incidences in Two Agroecosystems

The results of observations show that there are several types of viruses that infect sweet potato plants, especially in dryland agroecosystems. Virus identification is carried out based on the visual symptoms that appear in the plant as well as based on the characteristics of each virus.

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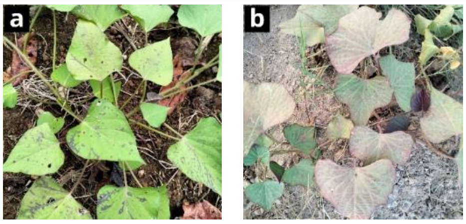

Figure 5. Symptoms of the incidence of viral diseases in dry land. a. Symptoms of the SPCSV virus; b. Symptoms of SPFMV virus

The symptoms observed in dry land (Figure 5) indicate the incidence of *Sweet potato clorotic stunt virus* (SPCSV) virus disease (Figure 5a) with symptoms of uneven purple patches on the leaf surface. The symptoms of the incidence of *Sweet potato feathery mottle virus* (SPFMV) virus (Figure 5b) observed showed symptoms of purple spots. The presence of SPCSV SPFMV in the dryland agroecosystem indicates that sweet potato plants at the study site were infected by more than one virus. The occurrence of the whitefly (*Bemisia tabaci*) at the study site may have contributed to the spread of SPCSV, as this insect is a known vector of the virus.

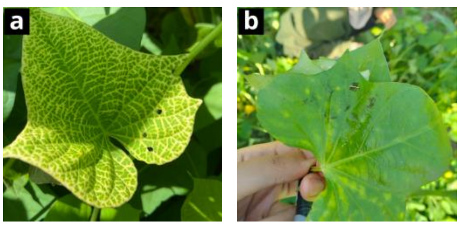

Figure 6. Symptoms of the incidence of viral diseases in technical irrigation land a. Symptoms of the incidence of SPVD viral disease; b. Symptoms of the incidence of SPCSV viral disease

The results of observation of the types and symptoms of viral disease incidences in technical irrigation land found two types of viral disease incidences, namely *Sweet potato clorotic stunt virus* (SPCSV) and *Sweet potato feathery mottle virus* (SPFMV). Leaves of plants infected with the SPCSV virus show symptoms of yellowing of the leaf bones and clearance of the leaf veins (Figure 6a). A symptom of the incidence of SPFMV virus disease is the presence of yellow patches on the leaves of the plant (Figure 6b). The presence of SPCSV and SPFMV viruses in technical irrigated land is related to the presence of whitefly pests and virus host plants, *namely I. triloba* and *I. purpurea*.

Percentage of Viral Disease Incidence in Two Agroecosystems

The results of observations of viral disease incidence in two agroecosystems from week 3 to week 12 can be seen in Figure 7. The percentage of viral disease incidence in the two agroecosystems showed the same pattern of increase from 3 MST to 12 MST (Figure 7). In dry land, the incidence of viral disease gradually increased from 17.1% at 3 MST to 70.9% at 12 MST. Meanwhile, on technical irrigated land, the incidence of viral diseases increased from 2% in 3 MSTs to 16.4% in 12 MSTs.

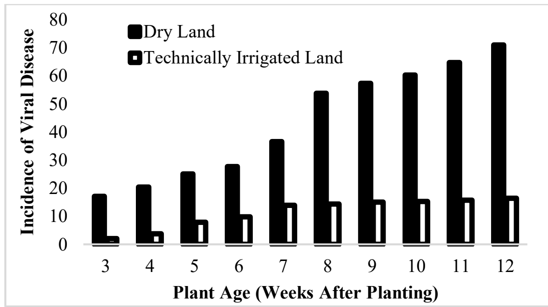

Figure 7. Graph of the development of the percentage of viral disease incidence in two agroecosystems

The higher incidence of viral diseases in drylands is related to differences in plant growth in the two agroecosystems. Limited water availability, high temperatures, and low humidity cause plants to experience stress so that the growth of sweet potato plants is less optimal and more susceptible to viral infections. Meanwhile, in technical irrigation land, which has sufficient water availability, lower temperatures, and higher humidity, plants grow more optimally.

Table 2. Results of t-test analysis of the percentage of viral disease incidence in two agroecosystems

Observations	Agroecosystem		P-value
	Dry Land	Technical Irrigation Land	
Incidence of Viral Diseases	43,36	11,39	0.00012^{s}

Description: s = significant

The results of the t-test analysis showed that there was a significant difference in the

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incidence of viral diseases between dry land and technical irrigated land. Dry land has a higher incidence of disease than technical irrigated land. The high incidence of viral diseases in drylands is related to environmental conditions that are more supportive of pest development and activity. According to Munster et al. (2017); Gutierrez-Sanchez et al. (2023), drought stress can cause a weakening of plant defense mechanisms thereby increasing pest feeding activities. This condition causes pests to suck plants more often and for longer so that plants become more susceptible to virus infection because their durability decreases. In addition, the high population of whitefly pests also results in a higher percentage of viral disease incidence in dry land compared to technical irrigation land because whiteflies can be a vector for the spread of the virus (Sari et al., 2025).

The Relationship Between Pest Populations and Attack Intensity on Sweet Potato Plants in Two Agroecosystems

Based on the results of the analysis, the relationship between the whitefly pest population and the intensity of the attack can be seen in the following figure.

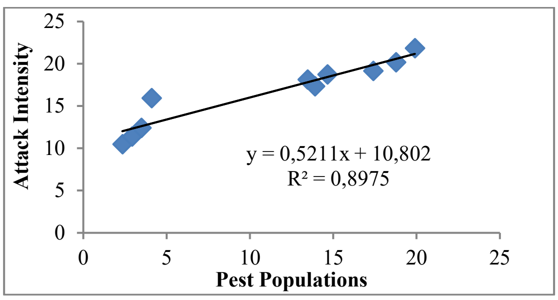

Figure 8. Graph of the relationship between pest populations and attack intensity in dry land

The results of the regression analysis showed a positive relationship between the increase in the population of whitefly pests and the intensity of attacks on the two agroecosystems. The increase in pest populations in the two agroecosystems was followed by an increase in the intensity of attacks on drylands. According to Singarimbun et al. (2017), an increase in the number of pest populations is also followed by an increase in the intensity of attacks.

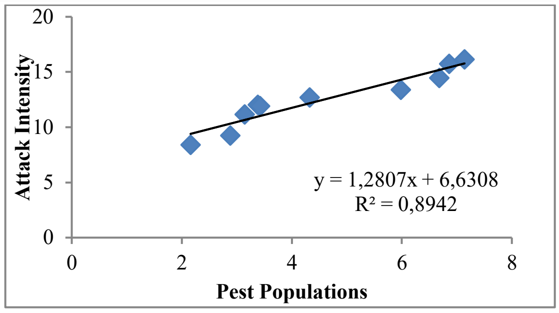

Figure 9. Graph of the relationship between pest populations and attack intensity in technical irrigated land

The Relationship Between Pest Populations and Incidence of Sweet Potato Plant Viral Disease in Two Agroecosystems

The results of the regression analysis between the population variables of pests and viral diseases can be seen in figure 10 below. The results of the regression analysis (Figure 10) show that an increase in the population of whitefly pests will increase the incidence of the virus in dry land. A high R-value indicates a strong degree of association between pest poplasia and viral disease incidence. The results of the study of Singarimbun et al. (2017) show that an increase in the number of whitefly pest populations will increase the spread of the virus.

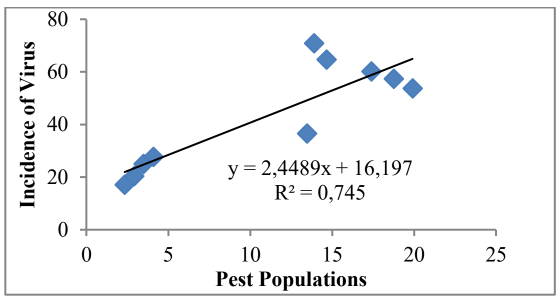

Figure 10. Graph of the relationship between pest populations and viral incidence in dry land

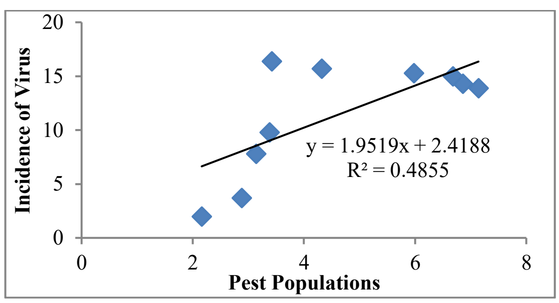

Figure 11. Graph of the relationship between pest populations and viral incidence in technical irrigated land

The results of the regression analysis showed that an increase in the population of whitefly pests would increase the incidence of viruses on technical irrigation land. The relationship between pest populations and the incidence of viral diseases in technically irrigated land showed a positive pattern, but with a different degree of influence with dry land. Lower pest populations in technical irrigated land have a lower incidence of virus occurrence as well as in technical irrigated land.

Temperature, Humidity, and Vegetation Conditions of Plants in Two Agroecosystems

Based on Table 4, the temperature and humidity conditions in the two agroecosystems show differences. Dry land has higher temperatures (30.1-32.9oC) and low humidity (67-78%), while technically irrigated land has lower temperatures (23.9-29.6oC) and higher humidity (75-86%). The difference in temperature and humidity in the two agroecosystems is influenced by the availability of water. In technical irrigation land that has a more stable water supply so hat it can lower the ambient temperature and increase air humidity. Meanwhile, dry land that has limited water can increase air temperature and lower humidity. An increase in temperature will affect humidity because the two variables are inversely proportional to each other (Makruf et al., 2025).

Table 3. Temperature and humidity in two agroecosystems

Agroecosystem	Average			
	Temperature (^{O}C)		Humidity (%)	
	Min	Max	Min	Max
Dry Land	30,1	32,9	67	78
Technical Irrigation Land	23,9	29,6	75	86

The results of vegetation observation show that the amount of vegetation of technical irrigated land is more than that of dry land. The more diverse amount of vegetation in technical irrigated land indicates environmental conditions that are more favorable for the growth of various types of plants. On the other hand, drylands that have less vegetation show conditions of limited growth caused by low water availability, high temperatures and low humidity. The diversity of vegetation can affect the populence of whitefly pests because whiteflies have a wide host plant. According to (Kavallieratos, 2024), the whitefly is a polyphagous pest with a very wide host range. In addition, the existence of sweet potato virus host plants found on technical irrigation land can increase the potential for virus transmission. Host plants such as *Ipomoea triloba* and *Ipomoea purpurea* found on technical irrigation land can function as a reservoir of viruses in the field, facilitating the process of virus transmission by vectors such as whiteflies.

The Relationship of Temperature and Humidity with Pest Populations and Incidence of Viral Diseases in Dryland Agroecosystems

The results of the regression analysis of the relationship between temperature factors and pest populations and the incidence of viral diseases in drylands are presented in the following figure.

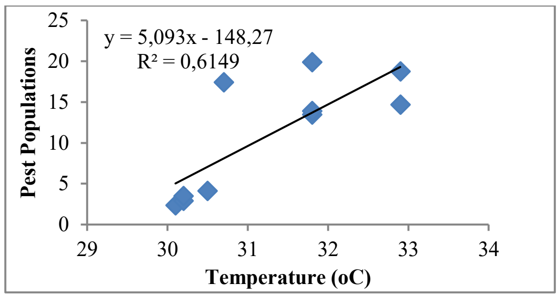

Figure 12. Graph of the relationship between temperature and pest population in dry land

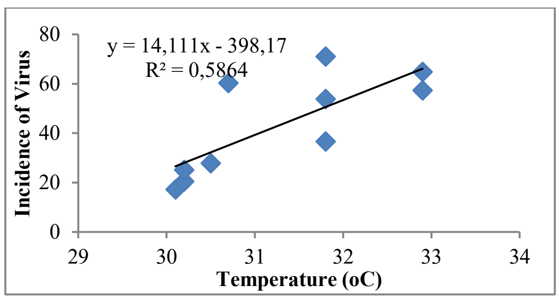

Figure 13. Graph of the relationship between temperature and incidence of virus occurrence in dry land

Based on the results of the regression analysis, the results of the relationship between temperature and pest populations in dry land and the incidence of viral diseases were obtained. The effect of temperature on pest populations and viral occurrences on dry land showed positive results, meaning that the increase in temperature had an effect on the increase in pest populations and the incidence of viral diseases. Rising temperatures tend to accelerate the development, life cycle, and reproduction of pests so that they can increase their populations. High temperatures can accelerate the pest cycle so that it can increase its population (Winkler et al., 2020).

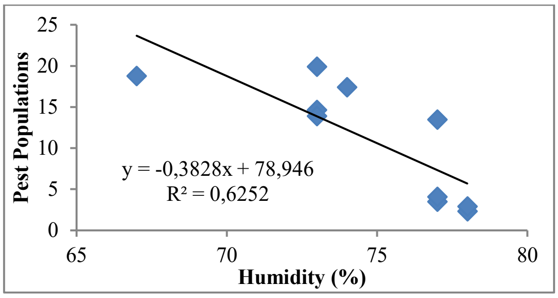

Figure 14. Graph of the relationship between humidity and pest populations in dry land

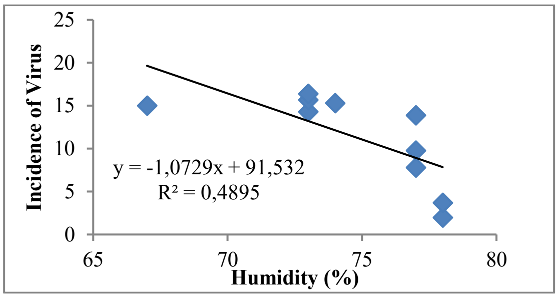

Figure 15. Graph of the relationship between humidity and viral incidence in dry land

Figures 14 and 15 show the negative relationship between humidity and pest populations and the incidence of viral diseases. The results of the negative regression analysis mean that the increase in humidity is followed by a decrease in the pest population and the incidence of viral diseases.

The Relationship of Temperature and Humidity with Pest Populations and Incidence of Viral Diseases in Technical Irrigated Land Agroecosystems

The results of the regression analysis of the relationship between temperature factors and pest populations and the incidence of viral diseases in technical irrigation land are presented in the following figure. Based on Figure 16, it shows that temperature has a positive relationship with pest populations in technical irrigated land. The relationship between temperature and with the pest population showed the results of the regression equation y = 0.8509x - 17.756 and R^2 = 0.5875. A positive coefficient value indicates that any increase in temperature is followed by an increase in pest populations. This shows that temperature plays an important role in increasing pest populations.

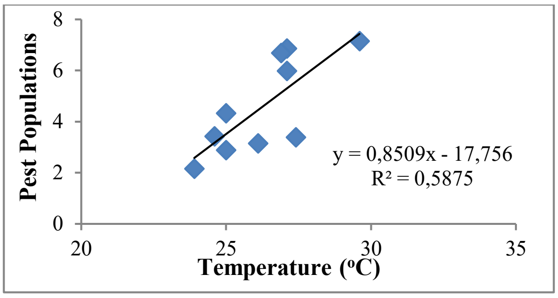

Figure 16. Graph of the relationship between temperature and pest populations in technical irrigated land

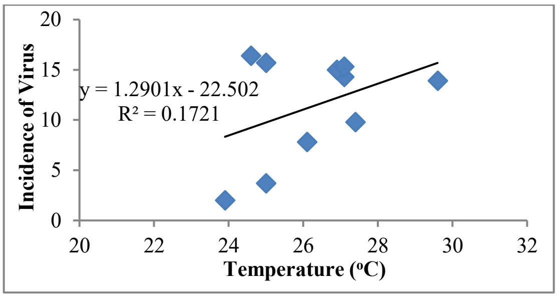

Figure 17. Graph of the relationship between temperature and the incidence of viral diseases in technical irrigated land

The relationship between temperature and viral disease incidence showed a positive direction but the relationship was not significant (P-Value = 0.2332). Low R2 levels indicate that the influence of temperature on viral diseases contributes small and is influenced by other factors such as pest populations and other environmental factors.

The relationship between humidity and pest populations indicates a negative direction (Figure 18). This shows that the higher the humidity, the less the pest population. The R^2 value = 0.5598 indicates that humidity contributes 55.98% to the pest population, while the rest is influenced by other factors.

Based on the results of regression analysis, it shows that the relationship between humidity and the incidence of viral diseases shows a negative direction, which means that an increase in humidity is followed by a decrease in the incidence of viral diseases. However, the relationship was not significant (P-Value = 0.1078) so humidity was not the main factor influencing the incidence of viral events in this study. In addition, a low R^2 value ($R^2 = 0.2906$) indicates that the contribution of moisture to the incidence of viral disease is low.

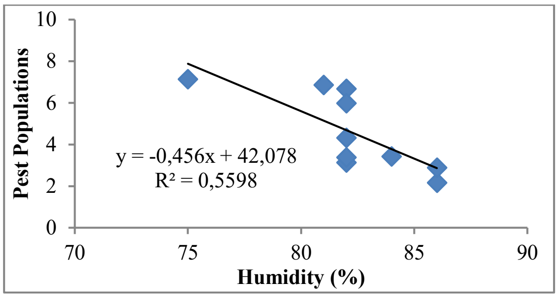

Figure 18. Graph of the relationship between humidity and pest populations in technical irrigated land

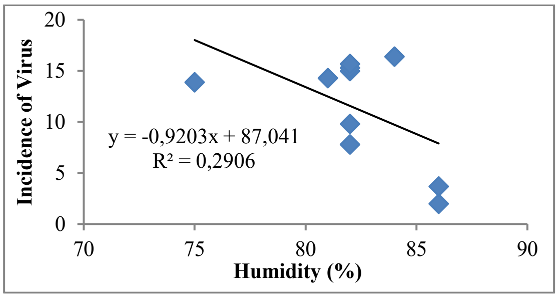

Figure 19. Graph of the relationship between humidity and the incidence of viral diseases in technical irrigated land

Agroecosystem-Based Pest and Viral Disease Management Strategy

In dryland agroecosystems, the value of the determination coefficient (R^2) showed that temperature ($R^2 = 0.6149$) and humidity ($R^2 = 0.6252$) had a fairly strong relationship with whitefly populations. Similarly, for the incidence of viral diseases, temperature ($R^2 = 0.5864$) and humidity ($R^2 = 0.4895$) also affect the development of viral disease incidence. Dry land conditions that have higher temperatures and low humidity create a more suitable environment for whitefly development, so that pest populations increase and accelerate the spread of viruses. Therefore, the control strategy needs to be focused on the implementation of Integrated Pest Management (IPM). The use of virus-free cuttings or varieties is the first step to prevent inoculum sources from entering the field. Planting refugia plants, such as kenikir (*Cosmos sulphureus*), sunflower (*Helianthus annuus*), zinnia (*Zinnia elegans*), and chicken poop flower (*Tagetes erecta*) can provide nectar, pollen, and habitat for the natural enemies of whiteflies thus helping to suppress pest populations naturally (Yulifada et al., 2014). In addition, the installation of yellow *sticky traps* and *yellow pan traps* is effective for monitoring and capturing whitefly imago because these pests have an interest in yellow, so that they can reduce pest populations and reduce the chance of virus spread. In addition, the application of an intercropping system with non-host crops, such as corn (*Zea mays*) or sorghum (*Sorghum bicolor*) can increase vegetation diversity and support the existence of natural enemies so that pest populations can be suppressed (Distankan, 2020). Planting *barrier crops* around the land, such as neem (*Azadirachta indica*), moringa (*Moringa oleifera*), or gamal (*Gliricidia sepium*) can function as *a repellent* plant (Manuputty et al., 2023). Hedge plants can also improve the conditions around the land by lowering the surface temperature, making the environment less favorable for the development of whiteflies.

In addition to vector control, efforts to suppress the source of virus inoculum are also carried out through land sanitation by cleaning plant residues and weeds that can be alternative hosts for whiteflies and sweet potato plant viruses (Acevedo, 2023). Plants that show symptoms of the virus need to be immediately uprooted and destroyed (*roguing*) so that they do not become a source of inoculum for healthy plants in the vicinity. In addition, agricultural tools such as knives, hoes, and machetes need to be cleaned or disinfected especially after contact with infected plants. Water management and the use of mulch can also help maintain soil moisture and lower surface temperature so that conditions become less favorable for whitefly development. Vegetable pesticides, such as neem extract (*Azadirachta indica*), citronella (*Cymbopogon nardus*), garlic (*Allium sativum*), or soursop leaves (Annona muricata), can be used as a more environmentally friendly alternative because they have repellent, antifeedant, and insecticidal properties against whiteflies (Ditjenbun, 2019).

In contrast, in technical irrigated land agroecosystems, the value of the determination coefficient (R^2) showed that temperature (R^2 = 0.5875) had a moderate relationship and humidity (R^2 = 0.5598) had a very low relationship with whitefly populations. Meanwhile, temperature (R^2 = 0.1721) and humidity (R^2 = 0.2986) had no significant effect on the incidence of viral diseases. Lower pest populations and the incidence of viral diseases are the basis for developing control strategies that are more geared towards preventive measures. The use of virus-free cuttings is used to prevent the entry of inoculum sources into the field. Yellow *pan traps* and *yellow sticky traps* are installed as a tool to monitor whitefly populations so that control measures can be taken before the population increases. The cultivation of refugia plants, such as yellow walnuts (*Cosmos sulphureus*) and zinnia (*Zinnia elegans*) can be planted in beds or on the edges of plots without interfering with sweet potato growth, and serve to provide a source of nectar and habitat for the natural enemies of whiteflies. The use of plant-based pesticides also needs to be done to suppress the population of whitefly pests, the plant-based pesticides used can be from papaya leaves (*Carica papaya*), garlic, and lemongrass (*Cymbopogon citratus*) (Fitriyah et al., 2023; Tambun et al., 2025).

Weed control on technical irrigation land is very necessary because weeds *Ipomoea purpurea* and *Ipomoea triloba* are found which are alternative hosts of the sweet potato virus. The existence of these weeds has the potential to be a source of inoculum that can maintain the presence of viruses in the field, thereby increasing the risk of spreading the virus to sweet potato plants. Therefore, routine weed control through weeding and land sanitation needs to be implemented to break the disease cycle and reduce the source of viral infection. In addition, the uprooting and destruction of plants infected with the virus, as well as cleaning agricultural equipment after use, also need to be carried out regularly to suppress the source of disease inoculum.

Conclusion

The population of whitefly pests (*Bemisia tabaci*) in sweet potato plants in the two agroecosystems has significant differences. Dry land has a higher population of whiteflies compared to technical irrigated land. The incidence of viral diseases found in sweet potato plants in dry land is SPFMV, while in technical irrigation land is SPFMV and SPCSV. The percentage of viral disease incidence in the two agroecosystems showed significant differences. Dry land has a higher percentage of viral disease incidence compared to technical irrigated land. Temperature and humidity are associated with *Bemisia tabaci populations* and the incidence of viral diseases in sweet potato plants in both agroecosystems. This relationship tends to be stronger in dry land than in technical irrigated land.

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