

PAPER • OPEN ACCESS

Transmission of virus by whitefly *Bemisia tabaci* from dutch eggplant *Solanum betaceum* cav. for cucurbitaceae plants in greenhouse

To cite this article: R Sirait *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **260** 012141

View the [article online](#) for updates and enhancements.

You may also like

- [The Presence of Whitefly *Bemisia tabaci* and Thrips *Thrips tabaci* on Different Cucumber Plant Hybrid Varieties in the Field Conditions](#)
Q Ahmed and F B Hermize
- [The Effect of Virginia tobacco stem extract against whitefly \(*Bemisia tabaci* Genn.\) and their virus symptoms on potato plants \(*Solanum tuberosum* L.\)](#)
Muhammad Sarjan, Muhammad Taufik Fauzi, Aluh Nikmatullah et al.
- [Synergistic of *Trichoderma virede* and *Beauveria bassiana* to Biocontrol Tomata Against and *Bemisia tabaci*](#)
Abdulnabi A. A. Matrood and Khalil-Berdi Fotouhifar

Transmission of virus by whitefly *Bemisia tabaci* from dutch eggplant *Solanum betaceum* cav. for cucurbitaceae plants in greenhouse

R Sirait¹, M I Pinem^{2*} and Hasanuddin³

Department of Agrotechnology, Faculty of Agriculture, Universitas Sumatera Utara, Indonesia

Email: *mi_pinem@yahoo.com

Abstract. Family *Cucurbitaceae* is a member the plant propagates that have an important role in agriculture particularly in the subsector of vegetable plants. However, the production plant of the family *Cucurbitaceae* is declining each year. Cucumber, Watermelon and Pumpkin plants those are included in the family *Cucurbitaceae*. Decrease in crop production is caused by virus attacks that attack plants through an insect vector Whitefly (*B. tabaci*). This research was carried out in February-September 2018 Greenhouse in the Faculty of Agriculture University of North Sumatera, Medan. This research aims to know the ability of Whitefly (*B. tabaci*) in the transmit viruses and the influence of lice inoculation feeding period against the widespread symptoms of virus attacks on some of the *Cucurbitaceae* plant. This research was compiled in a random Design Complete with two factors, namely: 1. The type of crop that is Cucumber, Watermelon and Pumpkin, 2. Inoculation Time is 24 hours and 48 hours. The results showed that the type of plant and the Time Period of Incubation and Inoculation affects the Severity of Disease in plant experiment.

1. Introduction

Family *Cucurbitaceae* is a member the plant propagates that has an important role especially in the vegetable plants. A member of the family is generally a type of Pumpkin with members of about 120 genera and 900 species. Cucumber, muskmelon, watermelon is a great example of a member of the family, who came from India and Africa [1].

Cucumber production in Indonesia has decreased in the last year. In 2013 with a land area of cucumber production 53,596 ha reached 521,535 tons, while in the same area in 2014 the production only reached 512,556 tons of cucumber, watermelon crop production in Indonesia year 2013 amounted 460,628 tons of land area 32,210 ha and have an increased reach 653,974 tons with land area 35,802 ha, while pumpkin fruit production in 2013 amounted 387,617 tones with land area 10,938 ha and decline became 357,552 tons [2].

The decline in crop production above is generally not separated from plant disease pests. One of the causes of disease plants is insects that act as an intermediary or vectors of plant viruses one Whitefly (*B. tabaci*) is a small-sized insect commonly called ticks or Whitefly. *B. tabaci* is both polifagus and consuming plant virus Transmission through vegetable insects is very common in nature and economic spread of the virus through insect votes has economic value that matters [3].



2. Materials and Methods

This research was carried out in February-September 2018 in The Greenhouse Faculty of Agriculture University of North Sumatera, Medan. This study used a Randomized Complete Design with two factors, namely: 1. the type of crop that is cucumber, Watermelon and Pumpkin, 2. Inoculation Time is 24 hours and 48 hours. This research starts from the planting media preparation, seedling, planting plants, plant maintenance, preparation of Whitefly (*B. tabaci*), an inventory of Whitefly (*B. tabaci*), incubation period variables and severity the disease. This research was observed for 30 days.

3. Results and Discussion

3.1. Incubation period

Based on a test of DMRT 0.05% on table 1. Indicates that the type of plants the real effect against a period of incubation of each incubation period in which the fastest plant that is on the type of plant (C2) melon of 3.63 which is not vary markedly with the cucumber plant (C1) of 3.57 but real different with pumpkin plants namely of 1.89 (Images. 1). This suggests that plant watermelon and cucumber plants have a level of resilience that is vulnerable to virus attack. In accordance with literature [4] states that each plant has a level of resilience and a different response against viruses that attack depends on the genetic factors of the plant itself in responding to attacks from viruses plant.

Table 1. The period of Incubation due to viral infections in plants experiment (%)

Treatment	T1	T2	Total	Average
C1	2.94	4.20	7.14	3.57 a
C2	3.84	3.41	7.25	3.63 a
C3	1.40	2.38	3.78	1.89 b
Total	8.18	9.99	18.17	
Average	2.73	3.33		3.03

Description: C1: C2: Cucumbers, Watermelon, C3: Pumpkin; T1: the time of Inoculation 24 hours. T2: the time of Inoculation 48 hours.

The numbers followed the same letter in a column indicates no real different according to test Duncan 0.05%.

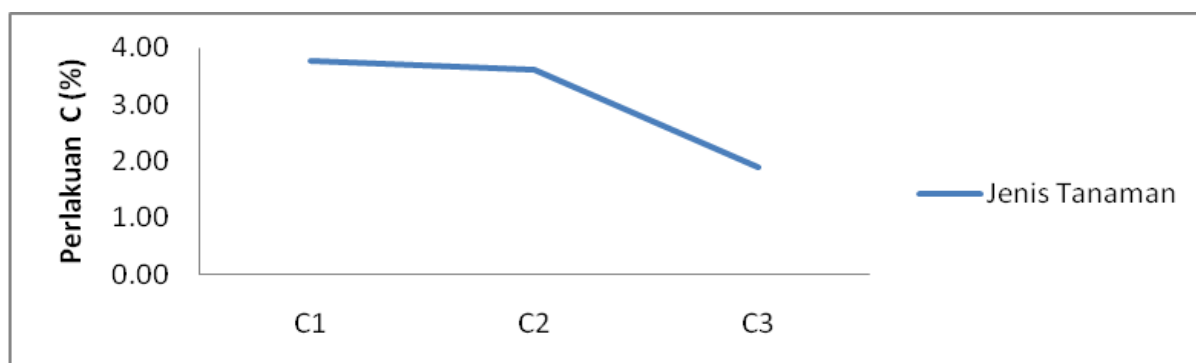


Figure 1. The Incubation period of the Diagram types of plants

3.2. The severity of the disease

Based on a test of DMRT 0.05% on table 2. indicates that the severity of the disease at the treatment plant (C2) melon of real different 4.07 with treatment plant type cucumber (C1) of 2.75 and pumpkin plants (C3) of 1.54. This shows that the types of plants can influence the severity of disease in plants exposed to virus attack where each plant has a different response against viruses that attack (Images 2.) in accordance with the literature [5] which claimed that the resilience of the vegetation varies depending on genetic factors, crop biophysical factors, Antibiosis and response of each plants against pathogens that cause diseases of plants.

Table 2. The severity of the diseases caused by viral infection in plants experiment (%)

Treatment	T1	T2	Total	Average
C1	2.79	2.70	5.49	2.75 b
C2	4.18	3.96	8.14	4.07 a
C3	1.31	1.77	3.08	1.54 c
Total	8.28	8.43	16.71	
Average	2.76	2.81		2.78

Description: C1: Cucumbers, Watermelon, C3: Pumpkin; T1: the time of Inoculation 24 hours. T2: the time of Inoculation 48 hours.

The numbers followed the same letter in a column indicates no real different according to test Duncan 0.05%.

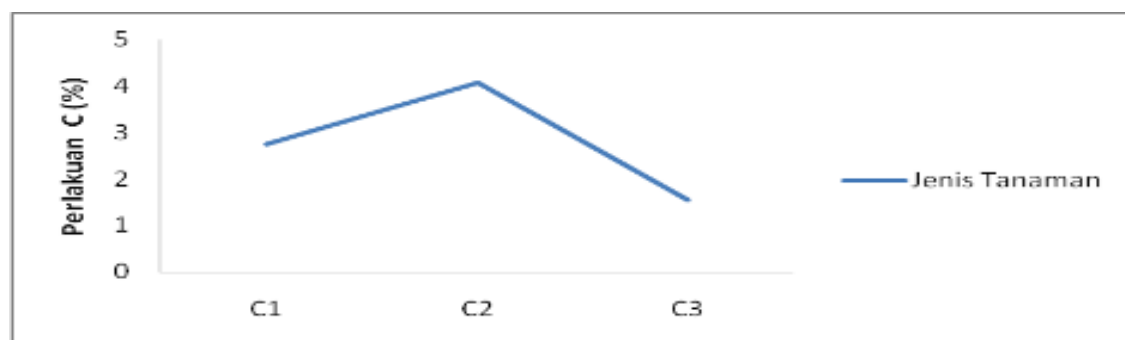


Figure 2. Diagram of the severity of the disease type of plant



Figure 3. Virus attack symptoms in plants (A) Cucumber; (B) Watermelon and (C) Pumpkin

4. Conclusions

Incubation period due to viral infection was the fastest type of watermelon plant (C2) of 3.63 which is not vary markedly with the cucumber plant (C1) of 3.57 but real different with pumpkin plants namely of 1.89. The average severity of diseases caused by virus infection the highest data contained on the plant type of treatment (C2) watermelon of 4.07 and lowest at the treatment plant type pumpkin (C3) of 1.54.

References

- [1] Wehner T C and Maynard D N 2003 Cucurbitaceae (vine crops) in Encyclopedia of Life Sciences *Nature Publishing*
- [2] Badan Pusat Statistik [Central Bureau of Statistics] 2015 Kementerian Pertanian [Ministry of Agriculture] (Jakarta: Direktorat Jenderal Hortikultura [Directorate General of Horticulture])
- [3] Hadiastono T 2012 Virologi Tumbuhan (Identifikasi dan Diagnosis Virus Tumbuhan) [Plant Virology (Identification and Diagnosis of Plant Viruses)] (Malang: Universitas Brawijaya Press)
- [4] Ford R and Evans T 2003 Tobacco mosaic virus *The Plant Health Instructor* doi: 10.1094/PHI-K-2003-0528-01
- [5] Brian C F and Gwyn A B 2008 An Overview of Plant Defenses against Pathogens and Herbivores *The Plant Health Instructor* doi: 10.1094/PHI-I-2008-0226-01