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Host Plant Species Of The New Invasive Pest, Fall Armyworm (*Spodoptera Frugiperda*) In South Sumatra

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Abstract. The new invasive pest, fall armyworm (*Spodoptera frugiperda*) has been found in West Sumatra since March 2019 and also found in South Sumatera. *S. frugiperda* has attacked a lot of host plant species. A record of the fall armyworm host plant species is required to comprehend pest's biology and ecology. The purpose of this study was to identify the host plant species of *S. frugiperda*. The surveys to collect and to record the host plants have been conducted in South Sumatra consisted of seven districts/cities of Ogan Ilir, Palembang, Lahat, Pagar Alam, Prabumulih, Muara Enim, and Banyuasin. This study has found 28 species of *S. frugiperda* host plants, such as *Zea mays*, *Elaeis guineensis*, *Oryza sativa*, *Lactuca sativa*, *Brassica oleracea*, *Amaranthus hybridus*, *Cucumis sativus*, *Manihot esculenta*, *Vigna unguiculata*, *Arachis hypogaea*, *Persea americana*, *Fragaria ananassa*, *Rosa* sp., *Ipomoea aquatic*, *Ipomoea batatas*, *Solanum melongena*. *S. frugiperda* host plants recorded were 14 plant families, specifically Areceae, Cyperaceae, Poaceae, Musaceae, Asteraceae, Brassicaceae, Amaranthaceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Lauraceae, Rosaceae, Convolvulaceae, and Solanaceae. There were 13 species of monocot plants and 15 species of dicot plants that can be eaten by *S. frugiperda*. So, the *S. frugiperda* has lots of host plant species including monocotyledonous and dicotyledonous plants.

1. Introduction

Spodoptera frugiperda or fall armyworm (FAW) is newly invasive on maize pest in Indonesia. This pest comes from South America [1] and entered Indonesia for the first time on March 26, 2019 in West Sumatra [2]. The FAW began to spread to other provinces and islands in Indonesia, including West Java [3], Lampung [4], Bengkulu [5], Bali [6], South Sumatra [7]. The FAW damages maize and various other plant species [8] by means of its larvae phase eating leaves, stems, flowers, fruit, growing points, and whole plant parts [5,8]. In Indonesia, the FAW generally attacks maize with damage in Lampung ranging from 26.50-70% [9], in East Nusa Tenggara ranging from 85 to 100% [10], in Bali reaching 47.84% [6].

The FAW is a polyphagous herbivorous insect because it can attack many plant species from various families [11]. Examples of host plant species attacked by the FAW are maize, cotton,



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sorghum [12], soybean, wheat and oat [11]. The results of literature reviews and surveys in the Americas reported that there were 353 *S. frugiperda* larval hosts plant records belonging to 76 plant families, principally Poaceae, Asteraceae, and Fabaceae [8]. In Indonesia, the FAW generally attacks maize, but the strain found to attack maize was a rice strain [2].

Information on variations of FAW host plants found in Indonesia is still limited, especially from South Sumatra. This study on FAW host plant species needs to be carried out as a basis for preventing further damage and is required to comprehend pest's biology and ecology which is the basis for controlling, for example to get trap plants. The purpose of this study was to identify the host plant species of *S. frugiperda*.

2. Materials and Method

2.1. Survey of *Spodoptera frugiperda* host plants

The survey was conducted in maize production centers in South Sumatra, namely Ogan Ilir, Palembang, Pagaralam, Lahat, Prabumulih, Muara Enim and Banyuasin. To confirm and test potential host plants were carried out at the Entomology Laboratory of the Faculty of Agriculture, Sriwijaya University. To determine the host plant for *S. frugiperda*, direct observations were made and documented using a camera. The host plant species were identified, while the name of the location, the time of sampling and the height of the location were recorded as supporting data. Then, the study was continued by clarifying the host plant species using literature. The plants around the maize showing symptoms of being attacked by *S. frugiperda* larvae but no larvae were found on the plant, then the leaves of the plant were brought to the laboratory to confirm whether the plant was a host plant by giving the plant to *S. frugiperda* larvae. The larvae of *S. frugiperda* were tested to eat these leaves of potential host plant by the working method of [8], namely by collecting literature related to the potential host plant of *S. frugiperda* and testing it in the laboratory. The larvae were allowed to eat the parts of the host plant for 24 hours. If it turns out that the leaves of the plant were eaten by the larvae, it can be concluded it was the host plant.

2.2. Data analysis

The data of location name, land area and location elevation were displayed in tabular forms. The host data for *S. frugiperda* was shown in the forms of tables and figures during *S. frugiperda*

3. Results and Discussions

The survey results from the lowlands to the highlands of South Sumatra found *S. frugiperda* larvae attacking maize and in only one location found in Sukarami Palembang, these larvae attacked purple sweet potato (*Ipomoea batatas* L.) and maize (Table 1). The purple sweet potatoes that were attacked were planted around the maize and used as a cover crop.

Other host plants that showing the signs of larvae feeding and were tested for the larvae preference for the plants showed the larvae eating the leaves of these plants. The test results showed that *S. frugiperda* larvae could attack monocot and dicot plants, both wild plant species and crops. The host plants of monocots were found to be the families of Areceae, Cyperaceae, Poaceae, and Musaceae, while the monocotyledonous species found to be eaten by *S. frugiperda* larvae were 13 species, including sugar cane (*Saccharum officinarum*), banana (*Musa paradisiaca*), and oil palm (*Elaeis guineensis*) (Table 2).

Table 1. Host species of *Spodoptera frugiperda* found from surveys in South Sumatra.

Village, Cities/Districts	Field area (m ²)	Altitude (m)	Host species
Tanjung Pering, Indralaya, Ogan Ilir	10000	36.0	<i>Zea mays</i> L.
Tanjung Seteko, Indralaya, Ogan Ilir	10000	36.0	<i>Zea mays</i> L.
Jl.Karya Baru, Alang-Alang Lebar	1250	23.0	<i>Zea mays</i> L.
Sukarami, Palembang	1250	32.0	<i>Zea mays</i> L.; <i>Ipomoea batatas</i> L.
Patigalung, Prabumulih Barat	2500	55.0	<i>Zea mays</i> L.
Gelumbang, Muara Enim	20000	21.2	<i>Zea mays</i> L.
Muara Sugih, Tanjung Lago, Banyuasin	7500	15.0	<i>Zea mays</i> L.

Banyu Urip, Tanjung Lago, Banyuasin	16250	14.0	<i>Zea mays</i> L.
Bangunsari, Tanjung Lago, Banyuasin	20000	14.0	<i>Zea mays</i> L.
Bunga Karang, Tanjung Lago, Banyuasin	1500	14.0	<i>Zea mays</i> L.
Telangari, Tanjung Lago, Banyuasin	30000	8.0	<i>Zea mays</i> L.
Mulyasari, Tanjung Lago, Banyuasin	6250	13.0	<i>Zea mays</i> L.
Purwosari, Sembawa, Banyuasin	7500	19.0	<i>Zea mays</i> L.
Manggul, Bandar Agung, Lahat	625	119.5	<i>Zea mays</i> L.
SP6, Bandar Agung, Lahat	1250	119.5	<i>Zea mays</i> L.
Pagar Gunung, Lahat	625	382.0	<i>Zea mays</i> L.
Air Perikan, Pagaralam	1250	625.9	<i>Zea mays</i> L.
Tanjung Payang, Pagaralam	1250	689.6	<i>Zea mays</i> L.

Table 2. Monocot host species of *Spodoptera frugiperda* resulted from feeding test.

Ordo	Family	Host species	Reference
Arecales	Areceae	<i>Elaeis guineensis</i> Jacq.	[8]
		<i>Phoenix roebelenii</i> O'Brien.	[8]
Cyperales	Cyperaceae	<i>Cyperus roduntus</i> L.	[8]
		<i>Kyllinga odorata</i> Vahl.	[8]
Poales	Poaceae	<i>Eleusine indica</i> L. Gaertn.	[13]
		<i>Oryza sativa</i> L.	[14]
		<i>Panicum virgatum</i> L.	[15]
		<i>Paspalum</i> sp. L.	[8]
		<i>Pennisetum purpureum</i> Schumach.	[8]
		<i>Saccharum officinarum</i> L.	[16,17]
		<i>Setaria plicata</i> (Lam.) T. Cooke.	[8]
Zingiberales	Musaceae	<i>Musa paradisiaca</i> L.	[18]

The host plants of dicots were found to be the families of Amaranthaceae, Asteraceae, Brassicaceae, Convolvulaceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Lauraceae, Rosaceae, and Solanaceae, while 15 species of dicot species were found eaten by *S. frugiperda* larvae, including spinach (*Amaranthus hybridus*), lettuce (*Lactuca sativa*), cabbage (*Brassica oleracea*), kale (*Ipomoea aquatic*), watermelon (*Citrullus lanatus*), and cucumber (*Cucumis sativus*) (Table 3).

Families and plant species that can be eaten by the larvae of *S. frugiperda* in this study are included in the families found by [8] stating that *S. frugiperda* can attack 78 plant families, including Poaceae and Convolvulaceae. For monocots, 13 plant species eaten by *S. frugiperda* larvae in this study were the host plants according to the research results, such as [13,15]. The leaves of 15 species of dicot plants eaten by *S. frugiperda* larvae were also reported by other studies, such as [19–21] as host plants of *S. frugiperda*.

Table 3. Dicot host species of *Spodoptera frugiperda* resulted from feeding test.

Ordo	Family	Species	Reference
Asterales	Asteraceae	<i>Lactuca sativa</i> L.	[21]
Brassicales	Brassicaceae	<i>Brassica oleracea</i> L.	[8]
Caryophyllales	Amaranthaceae	<i>Amaranthus hybridus</i> L.	[13]
Cucurbitales	Cucurbitaceae	<i>Cucumis sativus</i> L.	[22]
Euphorbiales	Euphorbiaceae	<i>Manihot esculenta</i> Crantz.	[8]
Fabales	Fabaceae	<i>Vigna unguiculata</i> L. Walp.	[19]
		<i>Arachis hypogaea</i> L.	[14]
Laurales	Lauraceae	<i>Persea americana</i> Mill.	[8]
Rosales	Rosaceae	<i>Fragaria ananassa</i> Duchense;	[20]
		<i>Rosa</i> sp.	[8]
Solanales	Convolvulaceae	<i>Ipomoea aquatic</i> Forssk.	[8]
		<i>Ipomoea batatas</i> (L.) Lam. cv.	[16]

	Ayamurasaki	
	<i>Ipomoea batatas</i> (L.) Lam. cv. Cilembu [16]	
	<i>Ipomoea batatas</i> (L.) Lam. cv. Papua [16]	
	solossa	
Solanaceae	<i>Solanum melongena</i> L.	[21]

The host plant of *S. frugiperda* from various families indicated that this pest was polyphagous. According to [11] *S. frugiperda* is a polyphagous herbivorous insect because it can attack many plant species from various families [11]. Although *S. frugiperda* is reported by many researchers as a polyphagous herbivorous insects, in South Sumatra this pest generally only attacks maize in the field. Information on various host plant species of *S. frugiperda* is important information for studying the ecology and biology of *S. frugiperda* which is the basis for integrated pest control, for example the basis for finding trap plants.

4. Conclusions

The survey results in South Sumatra found that *S. frugiperda* larvae only attack maize and only at one location was found in Sukarami Palembang, the larvae attacked purple sweet potato. The results of laboratory tests showed that *S. frugiperda* could eat monocot and dicot plants from the following families: Areceae, Cyperaceae, Poaceae, dan Musaceae, Amaranthaceae, Asteraceae, Brassicaceae, Convolvulaceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Lauraceae, Rosaceae, and Solanaceae. There were 13 species of monocot plants and 15 species of dicot plants that can be eaten by *S. frugiperda*.

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