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# FIRST REPORT OF ECONOMIC INJURY DUE TO THE SPIRALING WHITEFLY (HEMIPTERA: ALEYRODIDAE) ON PEPPER IN INDONESIA

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The spiraling whitefly, *Aleurodicus dispersus* Russell (Hemiptera: Aleyrodidae), is a polyphagous species native to Caribbean Region and Central America. The insect has spread westward across the Pacific and reached Southeast Asia. In South America, the whitefly has also been reported in Brazil, Ecuador, and Peru (Waterhouse & Norris 1989). The insect has progressively spread throughout the Pacific and numerous Afrotropical countries (Akinlosotu et al. 1993; Legg et al. 2003; Mware 2010 ), and countries of the Philippines, India, Bangladesh, and China in Asia (Yu et al. 2007). The first discovery of spiraling whitefly in Indonesia was made in 1989 in Java (Kajita et al. 1991).

Both nymphal and adult whiteflies can directly damage plants by depleting plant sap, which causes premature defoliation, stunted growth, and potentially death of the plant when the population is high. It can also inflict indirect damage to plant by promoting the growth of sooty mold and producing waxy, hair-like filaments that can diminish plant photosynthetic efficiency and aesthetic value. In addition, this species of whitefly is capable of transmitting plant viral diseases in a persistent manner (Berlinger 1986; Costa 1969). *Aleurodicus dispersus* has been reported as a vector of cassava brown streak virus (CBSV), a Begomovirus, in Kenya (Mware 2010).

The spiraling whitefly has a wide host range, encompassing 481 species, 295 genera, and 90 families of plant in India (Srinivisa 2000). The insect was capable of significantly reducing pepper crop yields in screen house in Nigeria (Pitan 2003) and in the field in Kerala, India (Beevi & Lyla 2001). In Indonesia, *A. dispersus* was reported attacking 22 plant species in 14 families, including ornamentals, shade and fruit trees in Java (Kajita et al 1991). The spiraling whitefly was also found on cassava, papaya, pepper, banana, hibiscus, and ficus in West Java (Gniffke 2011). A low population of the spiraling whitefly was reported on sweet pepper (*Capsicum annuum* L.) in West Java (Yuliani et al. 2005). However, none of those reports mentioned population outbreaks causing serious injury to pepper crops in Indonesia.

During a survey conducted in Sep 2012 in the District of Pinrang (S 3° 43' 37" E 119° 42' 12") South Sulawesi Province of Indonesia for entomopathogenic fungi associated with insect pests of pepper, we found serious crop damages due to heavy whitefly infestations. The lower leaf surfaces were fully covered with developing whiteflies and waxy filaments produced by the immature stages. The leaves were cupped upwards and covered with sooty mold (Fig. 1). Surveyed farmers stated that the insect had caused damage to their crops since 2011. When we revisited the field in Feb 2013, new pepper crops were also heavily infested by the whitefly. On unsprayed plants, the numbers of adult whiteflies per plant were 79.7 ± 11.7, 228.2 ± 14.6 (Figs. 2 and 3), and 339.9 ± 32.5 (mean ± SE, $n$ = 5) for 6 Mar, 13 Mar, and 20 Mar, respectively. To achieve and maintain suppression, pepper growers apply insecticides 2–3 times a week, and use combinations of up to five insecticides in a spray tank. The field survey also revealed that an average of 70% of plants in 5 pepper plantations ($n$ = 100) in Pinrang showed distinct symptoms of pepper yellow leaf curl Indonesia virus (PepYLCIV), a Begomovirus. Sample leaves expressing symptoms were sent to Agdia, Inc. (Elkhart, Indiana, USA) for molecular detection,which confirmed that the samples were positive for PepYLCIV infection. Pepper yellow leaf curl Indonesia virus is a devastating disease of pepper in Indonesia. During the visits, we also found that populations of *Bemisia tabaci* (Gennadius), a known vector of PepYLCIV (Sharma et al. 2000), were very low.

Samples of adults, pupae, and nymphs of the whitefly collected from pepper crops in Padang Loang, Pinrang, South Sulawesi of Indonesia were sent to the Florida Department of Agriculture and Consumer Services, Division of Plant Industry (FDACS-DPI) for identification process. The specimens were identified as *A. dispersus* and a voucher of slide-mounted specimens of the whitefly is deposited in the Florida State Collection of Arthropods (FSCA), at FDACS-DPI. To the best of our knowledge, this is the first record of *A. dispersus* presence in the province and of serious

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Fig. 1. Lower surface of pepper leaf (*Capsicum annuum*) covered with whiteflies and wax filaments and exudates. The affected leaves were upwardly cupped. Leaves, petioles, and stems were entirely covered with sooty mold.

pepper damage caused by the whitefly in Indonesia. Given its wide host range and dispersal capability, concern has been raised that this insect may become a serious pest on many important crops across Indonesian islands and in neighboring countries.

In a survey conducted during the rainy season in other parts of the Province of South Sulawesi, the spiraling whitefly was also found on pepper in residential yards in Balocci, Pangkep District (S 4° 53' 54" E 119° 42' 29") on 2 Mar 2013 and Sabbangparu, Wajo District (S 4° 14' 09" E 120° 00' 43") on 12 Jun 2013. Although the populations in both locations were much lower than in Pinrang, it has a potential to cause serious damage to pepper when the plant is widely planted during the dry season.

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## Summary

A pest survey and subsequent identification confirmed the presence of the spiraling whitefly, *Aleurodicus dispersus* Russell (Hemiptera: Aleyrodidae), in Pinrang District, South Sulawesi Province of Indonesia. This is the first report of the insect in the province and population outbreaks resulting in serious damage to pepper, *Capsicum annuum* L. (Solanaceae), in Indonesia. In our subsequent survey, *A. dispersus* was found on pepper in 2 other districts of the province, Pangkep and Wajo. Given its wide host range and dispersal capability, the insect poses a serious threat to pepper in Indonesia. Pepper growers at the survey site applied mixtures of insecticides 2–3 times per week to suppress the pest. Their insecticide choices and application frequencies were based on their own experience in controlling other pests. They urgently need information on effective measures to control this new pest. Therefore,

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Fig. 2. Whitefly infestation of unsprayed *Capsicum annuum* plants on 13 Mar 2013 in Padang Loang, Pinrang, South Sulawesi, Indonesia

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Fig. 3. Adults of the spiraling whitefly on the lower surface of a pepper (*Capsicum annuum*) leaf.

a study on field and laboratory evaluations of selected insecticides against the spiraling whitefly has been completed recently and the results will be published in a separate paper. Surveys for potential biological control agents, such as parasitoid wasps and entomopathogenic fungi, are also underway. Furthermore, given the following phenomena: the presence of high population of *A. dispersus* concomitant with the high incidence of PepYLCIV, a Begomovirus; low population of its known vector, *B. tabaci*; and the ability of *A. dispersus* to transmit a Begomovirus, CBSV in Africa; it is imperative to conduct a study to determine the capability of the spiraling whitefly in transmitting the PepYLCIV in South Sulawesi.

Key Words: *Aleurodicus dispersus*, *Capsicum annuum*, insecticides, survey

## Resumen

Un sondeo de plagas y suidentificación posterior confirmaron la presencia de la moscablanca-gigante, *Aleurodicus dispersus* Russell (Hemiptera: Aleyrodidae), en Pinrang Distrito, South Sulawesi, Indonesia. Este es el primer informe del insecto en la provincia y de sus brotes poblacionales que causó severos daños a la pimienta, el *Capsicum annuum* L. (Solanaceae), en Indonesia. En un sondeo posterior, *A. dispersus* fue encontrada en la pimienta en 2 otros distritos de la provincia, Pangkep y Wajo. Dada suampliorango de hospederos y capacidad de dispersión, el insect es una seria amenaza para la pimienta en Indonesia. Los productores de pimienta en las áreas evaluadas aplican mezclas de insecticidas de 2-3 veces a la semana para eliminar la plaga. Sus opciones y frecuencias de aplicación de insecticidas se basan en su propia experiencia en el control de otra splagas. Estos productos necesitan urgentemente información sobre medidas eficaces para manejar esta nueva plaga. Por lo tanto, un estudio de evaluaciones de insecticidas seleccionados de campo y de laboratorio contra la mosca blanca gigante está en marcha.

Palabras Clave: *Aleurodicus dispersus*, *Capsicum annuum*, insecticidas, sondeo

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