ABSTRACT

NI MADE LAKSI ERNAWATI. Phenotypic and Molecular Characterizations of Bacterial Pathogen and Epidemy of Bacterial Leaf Blight on Acacia crassicarpa Seedlings. Under the directions of Budi Tjahjono, Muhammad Machmud, Sientje Mandang Sumaraw, and Giyanto.

Bacterial leaf blight (BLB) disease is a new and deadly disease on Acacia crassicarpa nursery in Pelalawan Riau and never been reported either in Indonesia or in other countries. This research was designed to study etiology of BLB disease on A. crassicarpa seedlings and other factors that triggered epidemy of BLB disease. The results showed that the first symptom of BLB appeared on 5-6 weeks-old seedlings and blight was formed within 1-2 weeks. Early symptoms appeared as small red streaks on tip, middle, or basal leaf that increase in length and width along the leaf veins and later turned into brownish red color. The streaks were then turned into dark brown in color which was surrounded by a yellow halo, and finally, they might united and dried that made blight syndrome. Generally, colonies of the bacterial leaf blight pathogen on YDCA or NA media were yellow, round shape, wet appearance, smooth surface, and colony diameters 1.0-2.0 mm. The Koch’s postulate test has been conducted and pure isolates were further physiologically, morphologically, and molecularly characterized. Characteristics of the bacterial were Gram negative, aerobic growth, yellow colonies and mucoid on YDCA, positive growth on 33-35°C, positive in starch and esculin hydrolysis, positive in protein digestion and litmus milk, and positive utilization of arabinose, glycerol, and melibiose. Morphologically, the bacterial cells were rod-shape with cell sizes 0.5-0.7 x 0.8-1.7 μm. Based on phenotypic and molecular characterizations the bacterial pathogen belongs to Xanthomonas campestris. Since host range of the pathogen is limited on Acacia sp., the proposed name of the bacterium is Xanthomonas campestris pv. acaciae.

Some epidemiological factors, i.e., cultural techniques, initial inoculum around its host, rainfall, and source of seedlings, were examined for their effects on bacterial leaf blight disease development. The results showed that disease incidence and severity were decreased in 2007 than those in 2004 due to changes in cultural techniques applied. Generally, Xanthomonas campestris pv. acaciae can be detected either from seeds, culture media, or water sources of A. crassicarpa seedlings. Total of Xanthomonas campestris pv. acaciae population isolated from seeds, peat soil, oil palm compost, coconut powder, rice husk, and water sources were $9.0 \times 10^5$, $1.36 \times 10^7$, $1.033 \times 10^7$, $2.03 \times 10^5$, $1.17 \times 10^4$, and $8.2 \times 10^2$ CFU/ml respectively. The BLB disease incidence and severity were influenced by rainfall, but not the early initiation of the disease symptom. Disease developments on seedlings grown from seeds were slower than those on seedlings grown from cuttings. Percentages of BLB disease incidences and disease severities on seedlings were lower than those on seedlings grown from cutting.

Keywords: Bacterial leaf blight, A. crassicarpa seedlings, phenotypic characterization, molecular identification, epidemic of BLB, Xanthomonas campestris.