SHORT REPORTS

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MYCOPLASMA-LIKE ORGANISM IN WHITE LEAF DISEASE OF SUGARCANE

YUPA MONGKOLSUK and THIRA SUTABUTRA

Depart of Plant Pathology, Kasetsart University, Bangkok 9, Thailand

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Summary

Mycoplasma like organism was found to be associated with a sugarcane showing white leaf symptom. After treatment with tetracyline at 200, 300, 500 ppm. for 24 hours, the symptom disappeared within four weeks, but recurred in the tenth week.

Sugarcane is one of the most important economic crops of Thailand. White leaf had been reported to be the most important sugarcane disease in this country.[1] In 1962, 10,000 acres of sugarcane were infected and approximately 10 million bahts worth of sugarcane were lost. The causal agent was first described to be virus.[2] Lin and Lee[3] later found that mycoplasma like bodies were associated with the infected plants. There were doubts whether the symptom was due to mycoplasma or deficiency in certain essential minerals. The objective of this study was thus to determine the agent associated with this disease as found in Thailand.

Sugarcane showing white leaf symptom (Fig. 1) was collected from Chon Buri and Rayong provinces. Leaves of sugarcane showing white leaf symptom were cut into pieces of approximately 1 x 2 mm. They were fixed in 6% glutaraldehyde in 0.1 M phosphate buffer pH 7.2 for 3 h, washed in the same buffer for 2 h, and post-fixed in 2% osmium tetroxide in 0.1 M phosphate buffer pH 7.2 for 2 h. The sections were dehydrated in graded ethyl alcohol series and then transferred to propylene oxide. Reinfiltration was done by the use of graduated concentrations of Epon 812 in propylene oxide. Finally, the tissues were immersed in 100% Epon, placed in Beem capsules and cured for 24 h at 35°C, 48h at 45°C and 72 h at 60°C.

These sections of embedded tissue were cut with Sorvall MT 1 ultramicrotome by using a glass knife. They were stained in 2% aqueous solution of uranyl acetate for 20 min, followed by 1 min in 0.1% lead citrate. Sections were examined in a Hitachi 11 C Electron microscope.

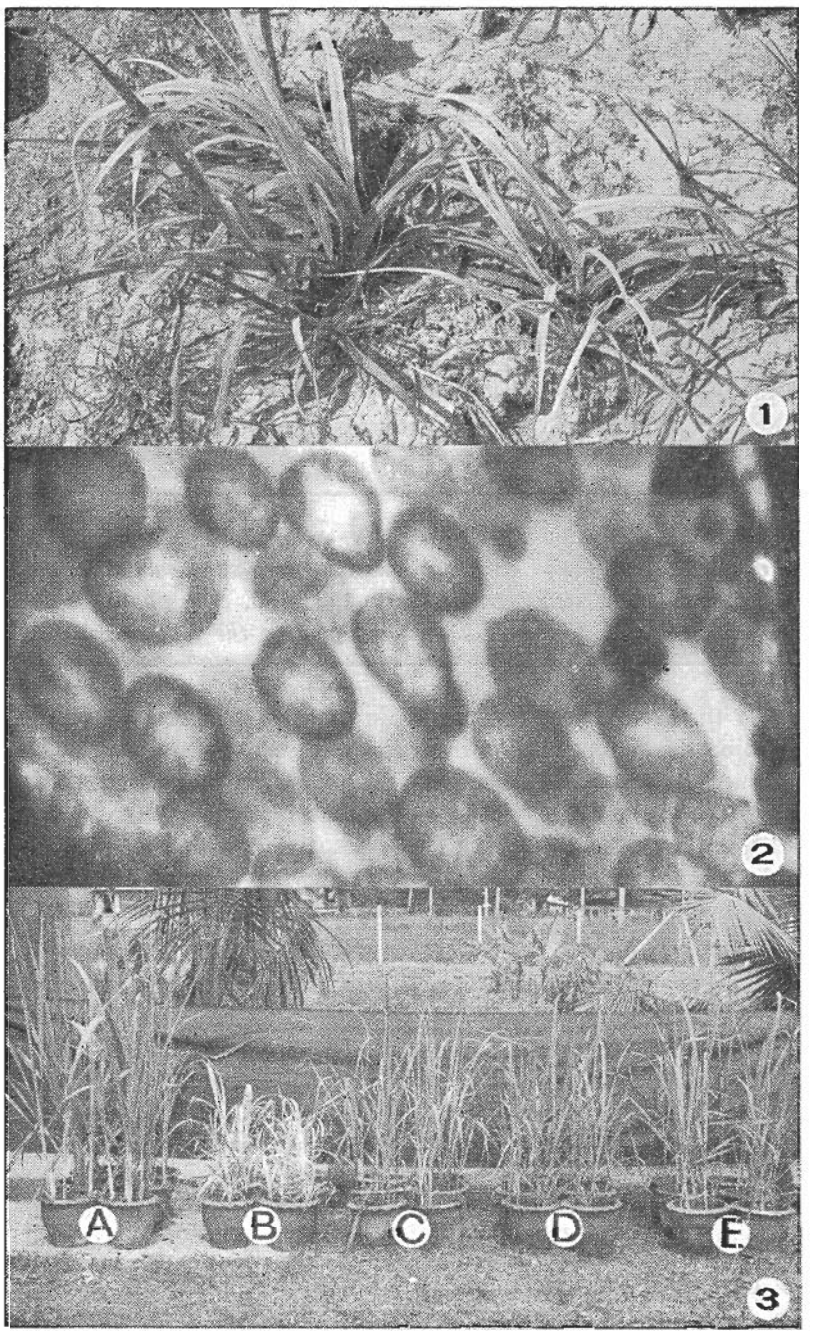

Fig. 1.
Sugarcane showing white leaf symptom

Fig. 2.
Ultra structure of phloem tissue of infected sugarcane showing mycoplasma like bodies (X45,000)

Fig. 3.
Sugarcane observed 4 weeks after treatment for 24 hours as follows: A. Healthy cane dipped in distilled water B. Infected cane dipped in distilled water C,D,E. Infected cane dipped in 200, 300 and 500 ppm. of tetracyline respectively

Twenty infected sugarcane cuttings with 2 full grown buds each were separately dipped in 200, 300 and 500 ppm tetracycline suspension and distilled water for 24 h. They were planted in 12 inches clay pot, 2 cuttings in each pot. Twenty healthy cuttings were dipped in distilled water for the same period of time to serve as a control. Treated plants were checked for 15 weeks at weekly intervals. The same expariments were repeated three times.

Ultra thin sections of infected phloem tissue revealed numerous membrane bound pleomorphic bodies in sieve tube elements (Fig. 2). The bodies were mostly round of about 60–1500 nm in diameter similar to those reported by Lin and Lee[3] on sugarcane white leaf in Taiwan.

In the experiment on the effect of tetracycline on symptom of sugarcane white leaf, it was found that leaves grown from cane treated with tetracycline at all concentrations showed up white for the first two weeks. After the second week they gradually turned light green and became completely green in the fourth week while those dipped in distilled water remained white (Fig. 3).

The leaves stayed green for 8 weeks then the white leaf symptom recurred. After 15 weeks all of them were completely white. This same effect had been reported for this disease pattern of reaction.[4]

The result from our experiment using these two approaches showed conclusively that mycoplasma-like organism was associated with sugarcane white leaf in Thailand.

References

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บทคัดย่อ

ได้พบ mycoplasma-like organism ใน phloem ของอ้อยที่เป็นโรคใบขาว เมื่อแช่ท่อนอ้อยที่เป็นโรคใน tetracycline เข้มข้น 200, 300, 500 ppm.24 ชั่วโมงก่อนปลูก ทำให้อาการหายไปใน 4 สัปดาห์ แต่ในสัปดาห์ที่ 10 อาการของโรคจะปรากฏขึ้นมาอีก