

LT-M mixture for the management of plant-parasitic nematode diseases

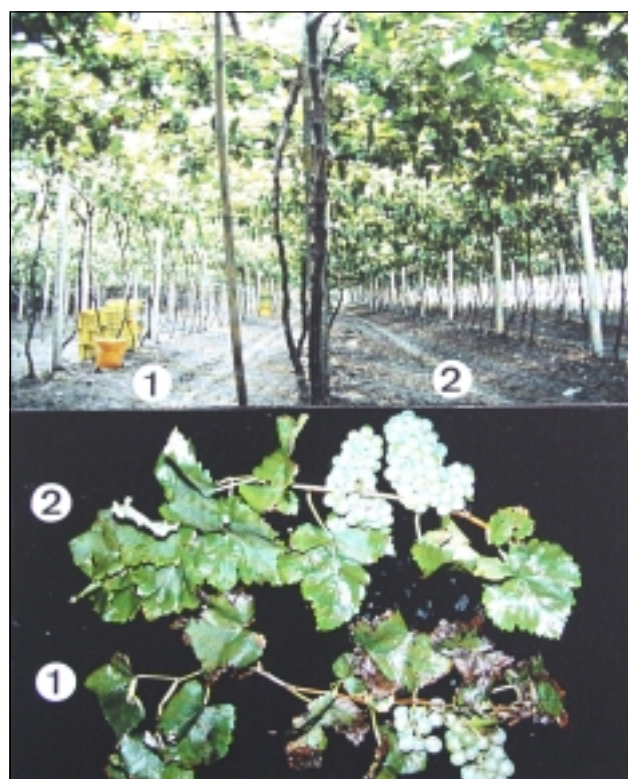
Plant diseases caused by parasitic nematodes are widespread in Taiwan, the most destructive species of which is the root-knot nematode, *Meloidogyne incognita*. *M. incognita* causes serious damage on a number of economically important agricultural crops such as grape, papaya, guava, tomato, tobacco, and watermelon. Current management of *M. incognita* primarily relies on nematicide application. However, because chemicals pose hazard to the environment and to human health, alternatives to nematicides have been developed.

Effectiveness

Based on its effectiveness in controlling nematodes in the greenhouse, the Lively Tiller Mixture (LT-M) was tried as an alternative to chemical nematicides in the field. The mixture consisted of: 40% crab shell powder, 40% castor pomace, 5% soybean powder, 10% marine algae powder, and 5% molasses; *Streptomyces saraceticus* was added into the formulation.

LT-M, applied at the rate of 2,000 kg/ha to a grape garden, significantly ($P = 0.05$) reduced the root-knot and other disease indices from 67.8% and 69.5%, to 47.5% and 42.8% during the summer and winter harvests, respectively, compared to untreated control (Fig. 1). LT-M also increased cluster weight to 57 and 76 g more, and sugar content to 3° and 5°Brix more during the two harvest seasons, respectively. Anti-nematodal properties were enhanced when LT-M was applied for 2 years continuously. It was also as good as chemical nematicides in controlling citrus nematode, *Tylenchulus semipenetrans*, and gave a more vigorous growth among the declined citrus plants (Fig. 2). LT-M in the soil also reduced the population of *T. semipenetrans* and lesion nematode, *Pratylenchus coffeae*, by 94.1% and 63.6% during the two harvest seasons, respectively, compared

Fig. 1. Effect of LT-M amendment (2) on natural *M. incognita*-infected grape field plot as compared to the control (1)



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to the control. Application of LT-M also significantly ($P = 0.05$) controlled root-knot nematode disease on African daisy and bitter gourd (Fig. 3).

Soil amendments

Among the 14 tested organic wastes, crab shell powder, soybean powder, castor pomace, marine algae powder, rice bran, and molasses amended in the soil increased the population of *S. saraceticus*. While the byproducts

that decomposed from saw dust, rice bran, and pig dung caused paralysis of juveniles of *M. incognita*, castor pomace, chicken dung, and crab shell powder were lethally toxic to the nematodes. Hatching rates of egg masses or dispersed eggs were inhibited only by castor pomace among those tested organic materials. Marine algae powder used as soil amendment reduced the attraction to juveniles of *M. incognita* to 36.0%, *T. semipenetrans* to 30.1%, and *P. coffeae* to 44.0% in the roots of the host plant.

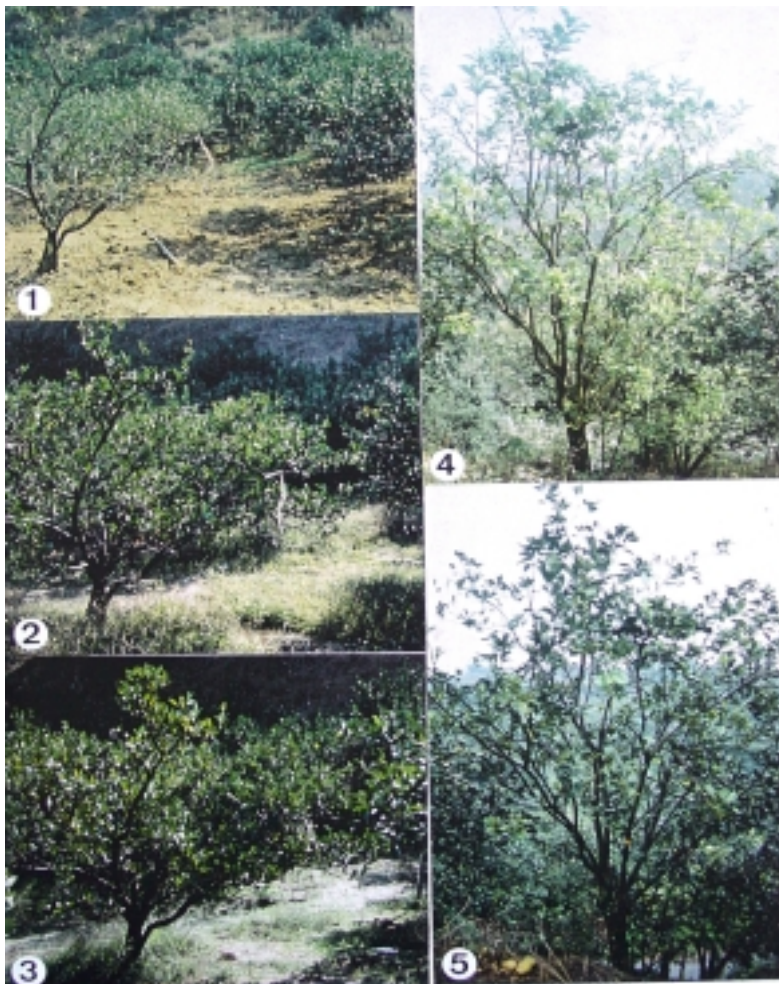


Fig. 2. Improvement in vigor (1 & 4) among declined citrus plants caused by citrus nematode infection, as a result of LT-M amendment for one year (2 & 5) and two years (3)

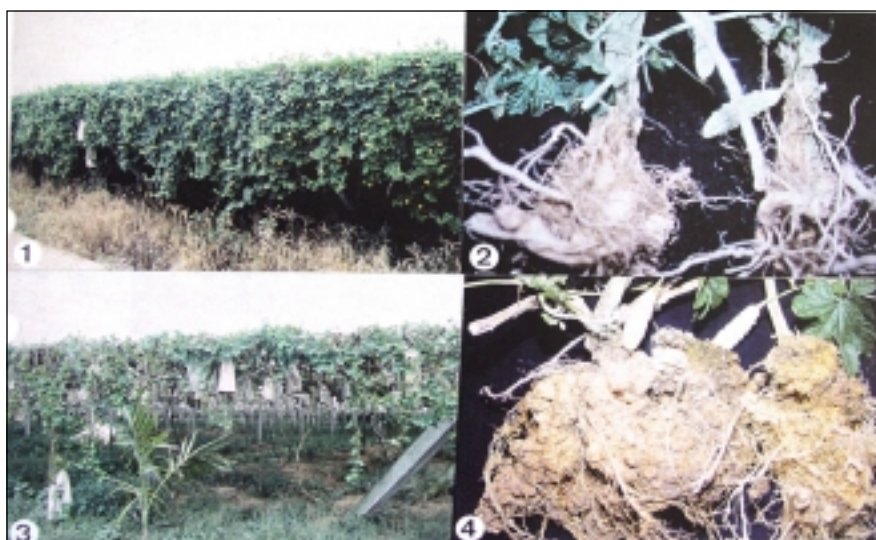


Fig. 3. Effect of LT-M on the growth and development of bitter gourd (1 & 2) in the field compared to control (3 and 4)