Potential of Neem Extracts for Insecticide©

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INTRODUCTION

Synthetic pesticides often cause environmental contamination and can be a great risk to human health. As a consequence, there has been an intense search for safer pesticides. Neem (*Azadirachta indica* A. Juss, syn. *Melia azadirachta* L., *Antelaea azadirachta* (L.) Adelb.) is a tree in the mahogany family *Meliaceae*. It is the only species in the genus *Azadirachta*, and is native to India and Burma. It became naturally distributed throughout much of the Indian subcontinent, particularly in drier areas. The medicinal properties of the neem tree have been well known in the Indian subcontinent for thousands of years. The bark, leaves, flowers, seeds, and fruit of neem plants are used to treat a number of diseases, and the tree had a cherished place in all ancient Indian treatises on medicine (Musabyimana and Saxena, 1999). Neem oil is pressed from seeds of the neem tree and has powerful pest controlling activities and medicinal properties (Singh and Singh, 1998; Pavela et al., 2004). Of primary interest to research scientists is its activity as an insecticide. Major component of neem seed oil is azadirachtin, which is a chemical compound belonging to the limonoids. Azadirachtin has insect growth regulator characteristics and interferes with the molting process during growth. Therefore, it causes death only to immature stages (larvae and nymphs). However, it is known to have repellency to some adult insects. Pesticides made from the neem oil are much safer than synthetic pesticides. Use of neem products for plant protection will reduce the demand for chemical pesticides and thereby reduce the environmental load of these synthetic pesticides. In U.S.A., E.C., and China, the neem oil has been officially authorized as organic material.

However, in Japan the neem oil is not registered as an agricultural chemical, and it is not possible to use it for the purpose of controlling insect pests currently. Recently, neem and azadirachtin have gained momentum as specific agricultural chemicals recognitized as "safe" chemicals for human's health (The Ministry of Health, Labour and Welfare along with one Food Sanitation Law revision in May, 2003). This would support the safety of the element of the neem oil and neem in agricultural sector in the future. The objective of this research was to evaluate neem as a pest control material in plant cultivation.

MATERIALS AND METHODS

Two formulations were tested: "Neem Extract 1% EC AZA" (azadirachtin 10,000 ppm; Fortune Bio Tech, India) and "Neem oil Natural" (natural extracted material, ca 2000 ppm azadirachtin; Fortune Bio Tech, India). Dilutions of both materials (the range of 3 to 50 ppm) were applied to test plants using a handy spray. Water was used as a control. All tested plants in a greenhouse were damaged by various

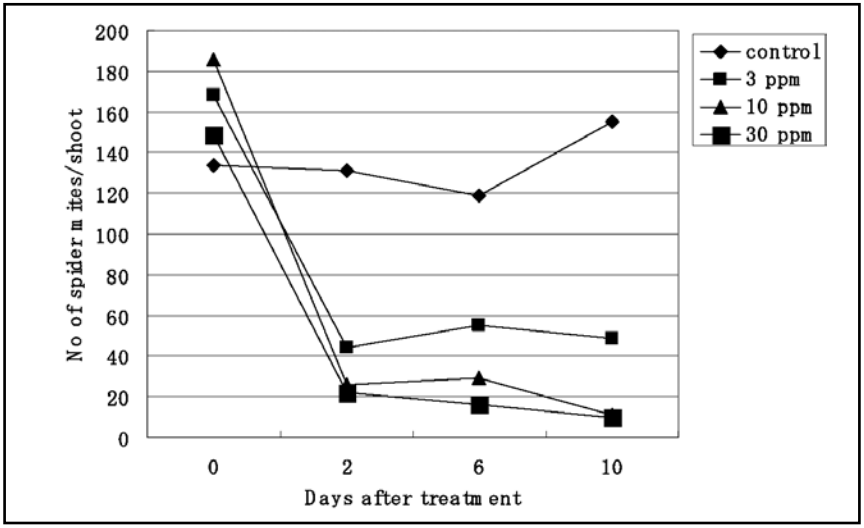

Figure 1. Effect of concentrations of the neem extract 1% EC AZA on number of two-spotted spider mite (*Tetranychus urticae*) on shoot of *Chrysanthemum* × *grandiflorum*.

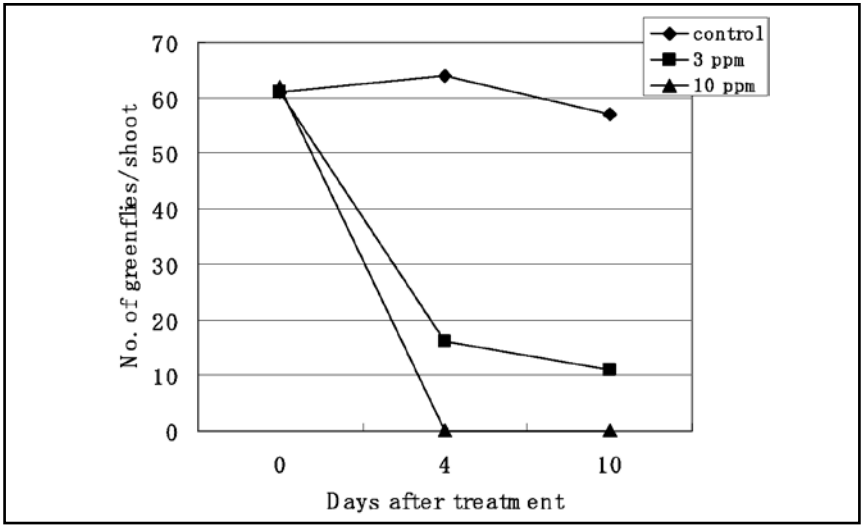

Figure 2. Effect of concentrations of the neem extract 1% EC AZA on number of greenflies (*Myzus persicae*) on shoots of *Kalanchoe blossfeldiana*.

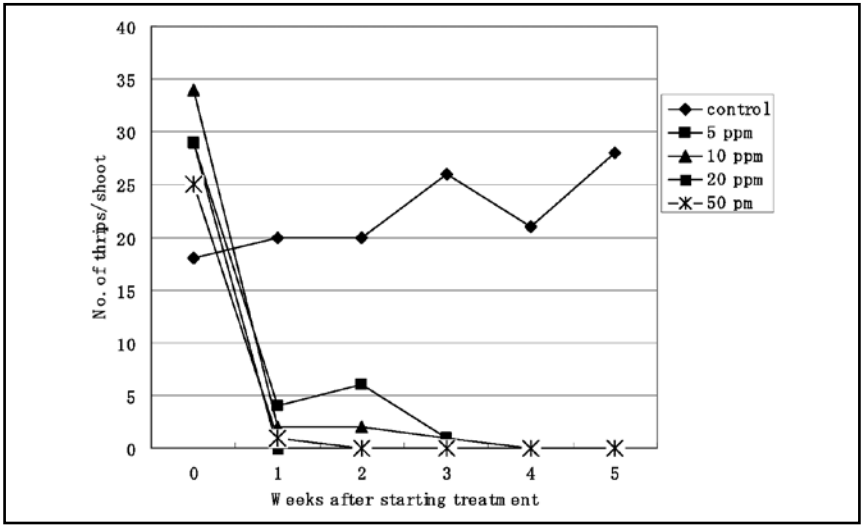

Figure 3. Effect of concentrations of the neem extract 1% EC AZA on number of western flower thrips (*Frankliniella occidentalis*) on shoot of *Petunia* × *hybrida* 'Fuller Red'. Treatment dilutions were applied every week.

harmful insects: *Chrysanthemum grandiflorum* (syn. *Dendranthema* × *grandiflorum*) by two-spotted spider mite (*Tetranychus urticae* Koch), *Kalanchoe blossfeldiana* cv. by greenflies (*Myzus persicae* Sulzer), and *Petunia* × *hybrida* 'Fuller Red' by western flower thrips (*Frankliniella occidentalis* Pergande). Treatment dilutions were thoroughly sprayed on 12- to 20-pot plantlets of each treatment in each test. For *P.* × *hybrida* 'Fuller Red', treatment dilutions were applied every week. After the treatment, shoots were collected from each plant and the effects of concentration of the treatment dilutions on the number of insects were investigated.

RESULTS AND DISCUSSIONS

The damages by various harmful insects has decreased by spraying neem extracts compared with the water control. There are no differences observed on the effect of both Neem Extract 1% EC AZA and Neem oil Natural (Figs. 1 to 3). The treatment concentration influenced the control. However, under higher treatment concentrations plant growth of *P.* × *hybrida* 'Fuller Red' was exhibited and those flowers were damaged by neem (Figs. 4 and 5). As a result of the study, neem materials were able to achieve a constant effect of control if properly used. Therefore, the possibility of contributing to a new pest control system that considers the environment was shown by using neem materials as parts of a rotation in the pest control program.

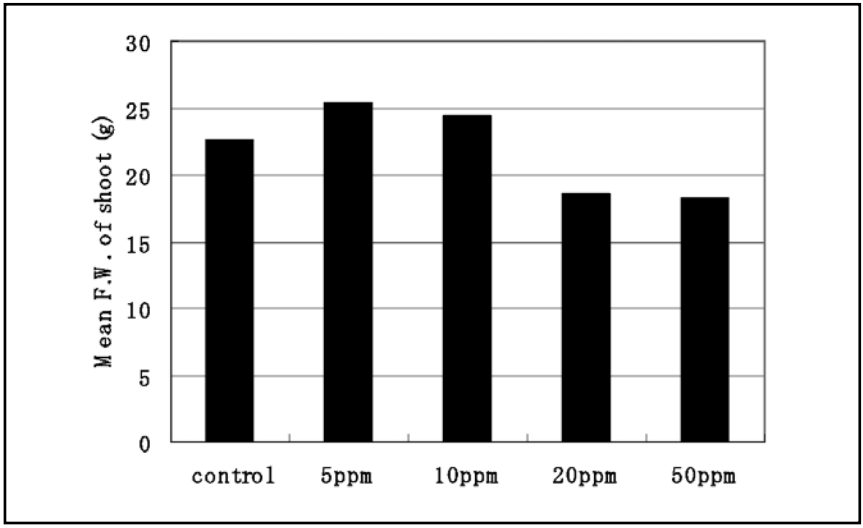

Figure 4. Effect of concentrations of the neem extract 1% EC AZA on fresh weight (F.W.) of shoot of *Petunia* × *hybrida* 'Fuller Red' after 6 weeks. Treatment dilutions were applied every week.

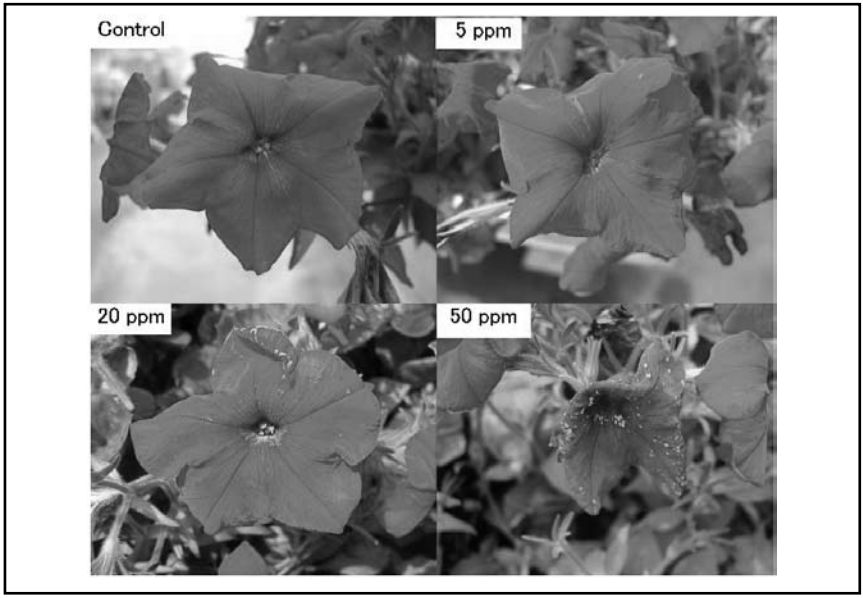

Figure 5. Effect of concentrations of the neem extract 1% EC AZA on flowers of *Petunia* × *hybrida* 'Fuller Red' after 6 weeks. Treatment dilutions were applied every week.

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