3836263 ENAT/M : MAJOR : APPROPRIATE TECHNOLOGY FOR RESOURCES AND ENVIRONMENTAL DEVELOPMENT ; M.Sc. (APPROPRIATE TECHNOLOGY FOR RESOURCES AND ENVIRONMENTAL DEVELOPMENT)

KEY WORDS : NEEM SEED KERNEL EXTRACT, *BRADYRHIZOBIUM* SP., RHIZOBIA, *VIGNA SINENSIS*, NON-TARGET ORGANISMS, NATURAL PESTICIDE, NITROGEN FIXATION, NODULATION

SUDSIRI KATATIKORN : EFFECTS OF NEEM SEED KERNEL EXTRACT ON *BRADYRHIZOBIUM* SPECIES CULTURES AND ON *BRADYRHIZOBIUM* SPECIES NITROGEN FIXATION AND NODULATION OF YARD-LONG BEAN (*VIGNA SINENSIS* VAR. *SESQUIPEDALIS*) : THESIS ADVISORS : SANSANEE CHOOWAEW, Ph.D., JOHN MILNE, Ph.D., PREECHA VADEESIRISAK, M.Sc., ACHARA NANTAKIT, Ph.D. 73 P.

ISBN 974-662-840-2

Extracts of parts of the neem tree (*Azadirachta indica*) are very useful natural insecticides and much less harmful to non-target organisms and the environment than synthetic insecticides. Such extracts are currently being promoted as additives to crop soils for direct control of insect pests in the soil and for systemic control of pests on the aerial parts of plants. Neem extracts also have bactericidal effects, which make them useful for plant disease control. Neem extracts can, therefore, be potentially harmful to useful soil bacteria such as rhizobial bacteria that occur in symbiotic association with their legume hosts. The aim of this research was to determine if methanol extract of hexane-defatted neem seed kernels, a neem insecticide commonly used in Thailand, would adversely affect a rhizobium species, i.e., *Bradyrhizobium* sp., associated with yard-long bean. Effects on *Bradyrhizobium* sp. growth in laboratory cultures and on nodulation and nitrogen fixation of the roots of yard-long bean grown in a glasshouse were investigated. Neem seed kernel extract (NSKE) was incorporated into broths at different concentrations of the major active ingredient, azadirachtin A (aza A), and the number of *Bradyrhizobium* sp. cells in each counted at different times after inoculation. The results indicated that *Bradyrhizobium* sp. was very sensitive to neem seed kernel extract. At concentrations of 54 ppm aza A or greater, cultures died. At concentrations just 2 ppm lower, i.e., 52 ppm aza A, cultures not only grew but culture growth was significantly greater than the 0 ppm aza A control. The greatest growth of all treatments occurred at 50 ppm aza A. In the glasshouse, yard-long bean was grown in soil that was drenched with nutrient solution containing NSKE concentrations ranging from 0-100 ppm aza A. After 4 and 6 weeks of plant growth, plants were harvested and the number of nodules, nodule dry weight, plant dry weight and acetylene reduction activity (a measure of nitrogen fixation) were determined. No NSKE treatment reduced the values of any of these four parameters below that of the 0 ppm aza A control. *Bradyrhizobium* sp. within yard-long bean nodules seemed much less sensitive to NSKE than *Bradyrhizobium* sp. grown in broth. NSKE, therefore, seems safe to *Bradyrhizobium* sp. in yard-long bean, but this needs e tested under field conditions.