BIODIVERSITY AND SUSTAINABLE INTENSIFICATION OF PESTICIDE-FREE VEGETABLE PRODUCTION FOR SMALLHOLDERS IN THE PERI-URBAN OF NORTHERN THAILAND

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Sustainable production of pesticide-free vegetables is seen as one alternative to enhance better life quality of smallholders in the peri-urban area of northern Thailand who have limited farm size and family labour. The intensification of species mixture of vegetables should provide food and generate income in comparable to or better than other waged earning activities. The production plot was initiated in March 1992. The crop mixture consisted of main vegetable species capable of producing throughout the year, and supplemented with seasonal vegetables in rotation. A minimum plot size of 16 m^2 was allocated for each species at each planting time. Yellow pan-traps and sticky traps were installed over 1600 m^2 field plot to reduce insect population. A mixture of fertilizer and compost was applied at each planting. Distribution and abundance of insect population was studied from collection of swinging net and yellow traps. The cultivation of 1600 m^2 plot was managed by two full-time field workers.

The annual production of the first three years (1992-94) showed the decline of vegetable yields from 3388, 3211 to 1754 kg/1600m^2 (21.2, 20.1 and 11.0 t/ha), respectively. The main attributes of yield declines were non-adapted vegetable species and seasonal insect damage. Selection of vegetable species was then reviewed in the fourth year (1995). The modification included major vegetable species such as leaf vegetables with short growing season: *Brassica oleraceae* var. *alboglabra*, *B. parachinensis, Ipomoea aquatica, Amaranthus spp. and Lactuca sativa* var *crispa*; leaf vegetables with long growing season: *Allium chinense, Ocium sanctum, O. basilicum* and *Coriandum sativum*; and fruit vegetables: *Solanum melongena, and Phaseolus vulgaris.* These were then supplemented with seasonal vegetables such as *B. pekinensis, Spinacia oleracea*, *L. sativa* var. *capitata, B. oleracea* L. *cv. group Broccoli, Cucumis sativus, Luffa acutangula*, etc. Consequently the annual production from the fourth year (1995) had increased to 4086 kg (25.5 t/ha) 4733 kg (29.6 t/ha) in 1996, and 5225 kg/1600 m^2 (32.6 t/ha) in 1997.

The planting methods were either direct seeding or transplanting. The former could provide better weed control and production of young leaf vegetables with selective harvesting, but the crop would stay longer in the field. The transplanting method provided uniform growth and shorter duration in the field. However, it required hand weeding. The survey of insect population revealed that there were 14 key pests of mainly *Aphids* and *Psyllids,* 21 species identified as predator, and 3 species of parasites. In addition, it was observed the increasing frog population with active insect control during the rainy season.

The six-year production plots had shown that the sustainable intensification of pesticide-free vegetables was viable. The pest incidence caused serious damage in the third year, but with species selection, the incidence was less damaging and yield had increased. The stability of the production system seemed to depend on compatibility of vegetable mixture, its interaction with pests, predators and parasites. The integrated nutrient management still provided enhancing vegetable productivity with present level of intensification.