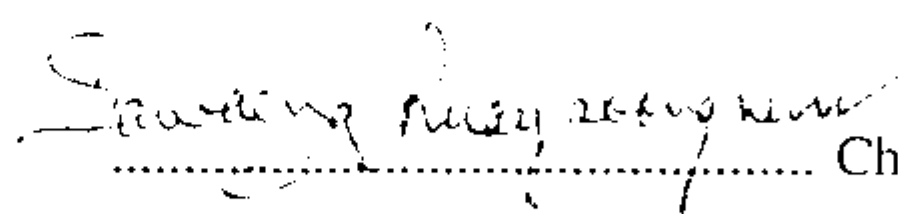


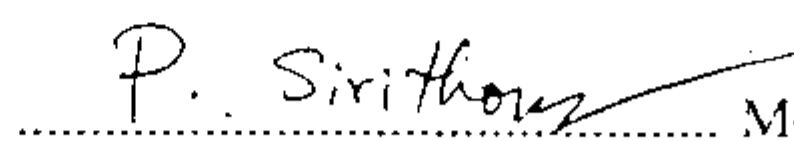
THESIS TITLE : EFFECTS OF BENOMYL, MANCOZEB, METHOMYL AND
CARBOFURAN ON SOIL CHEMICAL PROPERTIES,
NUTRIENT UPTAKE AND YIELD OF CHINESE -KALE

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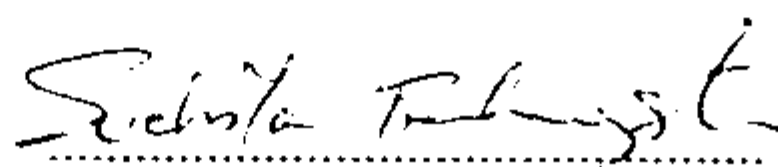
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ABSTRACT

Pesticides have been used for production of various crops especially vegetables and high value ones. Inappropriate uses of the chemicals are expanding and produce various negative effects through contamination to the surroundings and environment. The outcomes could alter soil fertility status, plant growth, and crop yield. From review, benomyl, mancozeb, methomyl and carbofuran are common pesticides used by farmer as fungicides and insecticides, respectively. Therefore a study was conducted to determine the effects of benomyl, mancozeb, methomyl and carbofuran on soil chemical properties and nutrient uptake and yield of Chinese-kale under field condition at Vegetable Section, Department of Horticulture, Khon Kaen University, Khon Kaen. The study was carried out during 29 November 1995 to 25 January 1996.

Objectives of the study were to investigate (1) effects of the pesticides on chemical properties of soil and nutrient status on Yasothon soil series and (2) effects of the pesticides on nutrient uptake and yield of Chinese-kale in Yasothon series. A Randomized Complete

Block Design with 3 replications, and 1 control totally 13 treatments. The pesticides were applied at 3 levels (low, medium and high rate) to simulate potential ranges of persistent of the chemicals in farmer fields. The application of methomyl, mancozeb and benomyl was done by preparation of suspension and pouring onto the soil using water cans and followed by mixing remaining solid portion into the soil at the depth of 5 cm. For carbofuran, the application was done by broadcasting of granules. Chinese-kale seed was sown on the same day in furrows at depth of 1-cm and 20 cm row spacing. Watering was done twice a day, morning and afternoon, by sprinklers according to official recommendation. Other horticultural practices were also done as suggested by the official recommendation. Thinning (and considered as the first harvest) was done at 20 days and final harvesting was done at 55 days.

The result showed that application of pesticides significantly lowered extractable Cu and significantly increased extractable Mn and extractable Zn.

At 55 days the pesticide treatments significantly increased EC and $\text{NH}_4^+ \text{-N}$ but significantly decreased pH, CEC, exchangeable Mg, exchangeable Na, and extractable Cu.

After 20 and 55 days, the application of pesticides significantly lowered fresh weight and dry weight of Chinese-kale. Also the application of pesticides showed phytotoxic symptom in high level pesticides especially carbofuran and mancozeb.

For nutrient uptake, the application of pesticides into the soil significantly lowered phosphorus, magnesium and copper concentration at age of 20 days. At both harvest, Chinese-kale planted in the pesticide treatments showed significantly lowered calcium concentration. Moreover, the pesticide treatments also significantly manganese concentration in the Chinese-kale. The application of high level methomyl significantly lowered zinc concentration but high level mancozeb increased zinc concentration in the test plant.

The short-term study indicated that the pesticide application could produce detrimental effects to soil fertility, soil productivity, plant productivity and their nutrient contents. Hence it is necessary to limit the ill effects through proper uses of those chemicals. Measures could be through crop selection, appropriate site selection and agroecological zoning to reduce necessity to use chemicals. Soil improvement that could also increase plant resistance to pest would reduce chemical uses. Further longer term study should be done to investigate more

precise information on long-term effects of persistent pesticide on soil ecosystem, plant growth and surrounding environment .