

Thesis Title Nitrate in Green Leafy Vegetables and Its Role on the Possible in Vivo Formation of N-Nitroso proline in School Children

Name Anchanee Utaipatanacheep

Degree Doctor of Science (Nutrition)

Thesis Supervisor Committee

Songsak Srianujata, Ph.D.

Voranunt Suphiphat, Ph.D.

Thirayudh Glinsukon, D.Sc.

Chairerk Suwannarat, Dr.agr.

Date of Graduation 10 August B.E. 2536 (1993)

Abstract

Vegetable has been the main source of nitrate consumed by man it was purposed to be converted to nitrosating agent for the formation of Nitroso compound (NOCs), a possible cause of human cancer. Vegetable nitrate was related to the use fertilizer. Therefore, this study was to investigate the effect of fertilizer on nitrate content of vegetable, and possibility of endogenous formation of NOCs in normal and malnourished children after taking nitrate containing vegetables. The study consisted of 3 experiments.

In experiment I, by the statistical design of split-plot in CRD, urea, compost and the combination of urea and compost fertilizers were applied to kangkong and green onion, as N-source at 7g-N and 14g-N levels. The outcome indicated that the highest nitrate accumulation was found in vegetables treated

with urea fertilizer while the lowest was with compost fertilizer. Nitrate accumulative levels of vegetables increased with the increasing levels of fertilizer. However, at 14g-N level of urea application, growth retardation and green yellowish leaves were observed which indicate some toxic effect of this chemical fertilizer. Type and level of fertilizers, including the cultivars of vegetables, itself influenced on the nitrate accumulation of vegetables.

Experiment II. Fried vegetables supplemented to regular diet were given for 3 consecutive days to 14 normal and 14 malnourished children, aged 9-12 years. Urine and saliva samples were collected for nitrate and nitrite analysis. Endogenous nitrosation was estimated from 24-hour urinary NPRO excretion. Salivary nitrate/nitrite, urinary nitrate/nitrite and NPRO levels of either normal or malnourished groups were significantly correlated with nitrate intake. Urinary nitrate and NPRO excretion were also correlated with salivary nitrate. The endogenous NPRO formation in mild malnourished state was not significantly different from the normal state, but there was a tendency of increasing NPRO formation in severe malnourished state since the conversion rate of nitrate to nitrite by oral bacteria was higher in the malnourished group (28% VS 32% of ingested nitrate).

Experiment III. The in vitro NOCs formation in the simulated saliva and gastric juice, mimicing child aged 9-12 years at pH2, NDMA was the main product found in every food samples. Canned sardine in tomato sauce gave the highest value of NDMA (5.678 ppb) while among the vegetable foods, the highest NDMA value was observed in green onion with plara sub sample (2.196 ppb). NPYR and NDEA were found in trace amount only in canned fish sample.