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Cultivation of Selenium-Enriched Vegetables in Large Scale

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Abstract:

This study was conducted to establish a practical method to cultivate selenium-enriched vegetables in a large scale. Due to the toxicity of inorganic selenium compounds used as a source of selenium, concerns are the safety of agricultural workers operating the system and also effects on environments, especially the pollution of the ground water.

also effects on environments, especially the pollution of the ground water. Barium selenate and barium selenite were selected as the selenium source for the cultivation because of the easiness of handlings, a slow diffusion into environments and the constant release of selenium in soil for an extended period of time. The cultivation was carried out in a concrete 10m×15m×1m frame equipped with a water tank beneath the frame. The frame was filled with a soil. The water tank was used to store the permeated water from the soil. The system was set in the ground. Barium selenate (500mg/m² as selenium) and barium selenite (500mg/m² as selenium) were applied on the soil and then the soil was plowed. Garlic and onion were planted in fall and harvested in the next autumn. Cabbage was planted in early winter and harvested in the next spring. Peanut, pepper, ginger, tomato, and eggplant were planted in spring and harvested in the late summer. Through the study period, selenium contents in the water permeated into the tank from the soil (Soil Water) were monitored. The selenium content in the soil in the frame was also determined. The selenium content in Soil Water reached the maximum value (1.4ppm) 14 months after the application of the selenium salts. On the other hand, the total selenium in the soil was slightly decreased during this period. Selenium contents in fresh edible portions of harvested vegetables as follow:

Garlic 130ppm, onion 20ppm, peanut 57ppm, pepper 7.1ppm, ginger 2.7ppm, cabbage 1.3ppm, tomato 2.9ppm, and eggplant 3.7ppm.

Major selenium compounds in these vegetables are selenoamino acids and their derivatives. Organic selenium components in the soil would participate with the selenium absorption by the vegetables.

Key words: <u>Selenium</u>, <u>selenium-enriched</u>, <u>barium selenite</u>, <u>barium selenate</u>, <u>garlic</u>, vegetables



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