

Reduction of Organophosphate and Carbamate Residues in Tomatoes, String Beans and Pechay by Soaking and Washing

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- ❑ Decline in the yield and quality of production of vegetables which is mainly caused by insects and pests and diseases
 - ❑ Pesticide is used by the vegetable growers
 - ❑ The most widely used pesticide types are organophosphates, carbamates and pyrethroids
 - ❑ The reported percentage distributions of pesticides in the Philippines are synthetic organophosphates (42%), carbamates (12%), synthetic pyrethroid (30%), organochlorine (12%), and others (6%)
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- ❑ Indiscriminate use of such during the fruiting stage of crops and usual practice of not adopting safe waiting periods which leads to accumulation of pesticide residues in consumable vegetables.
- ❑ Several studies have noted that different types of vegetables are contaminated with pesticide residues
- ❑ The three most important crops using pesticides are vegetables, banana and rice. Pesticides are used more intensively in vegetables

- Treatments : Washing (30 seconds) and Soaking (2 and 5 minutes) in water and vinegar solution (30 ml/1L)
- National Crop Protection Center (University of the Philippines Los Banos) Pesticide Residue Rapid Test Kit
- ANOVA and T-Test



Methodology

Extraction of samples

One hundred (100) grams of each vegetable samples (tomatoes, string beans and pechay) was used.

Trickling method of extraction was performed using 5ml of acetone.

The insecticide containing acetone was poured in another vial. Using an alcohol lamp, one (1) ml of the extract was concentrated to 0.1 ml.

The concentrated extract was left for 2 minutes to cool and was used for colorimetric spot test.

Rapid Test Kit For Organophosphate and Carbamate Residues

Organophosphate (OP) Test

The concentrated extract was spotted 5 times on a strip of filter paper treated with a drop of Solution 1 (4 p-nitrobenzyl) using a capillary tube.

The strip of filter paper was inserted between glass slides and was heated for 1 minute.

Positive results of the OP test were indicated by the presence of blue rings in the treated filter papers.

Color chart was used to interpret the results

Rapid Test Kit For Organophosphate and Carbamate Residues

Carbamate Test

The extract was spotted 5 times on the three carbamate treated filter paper spots.

Another glass slide was used to cover the treated filter paper with extract.

It was then heated for about 30 seconds. Carbamate (C*) solution was freshly prepared by dissolving refrigerated capsules in contents of 4ml methanol.

A drop of Solution C* was added in each filter paper to. The test was repeated twice as second trial.

Presence of residue was indicated by blue spots for carbaryl, purple spots for carbofuran, and pinkish spots for fenobucarb (BPMC). Results were referred to carbamates color chart

Rapid Test Kit For Organophosphate and Carbamate Residues

For organophosphates (Lebaycid [Fenthion] and Malathion - Pechay)

Tomato: soaking (5mins) vinegar solution, 91% > soaking (5mins) tap water, 74% > soaking (2mins) tap water, 62% > washing vinegar solution, 59% > soaking (2mins) vinegar solution, 40% > washing tap water, 29%

String beans: soaking (5mins) tap water, 81 % > soaking (5mins) vinegar solution, 82% > soaking (2mins) tap water, 58% > soaking (2mins) vinegar solution, 50% > washing tap water, 31% > washing vinegar solution, 12%

Pechay: soaking (5mins) vinegar solution, 100% = soaking (5mins) tap water, 100% = soaking (2mins) vinegar solution, 100% = soaking (2mins) tap water, 100% > washing vinegar solution, 42% > washing tap water, 26%

For carbamates (Lannate and Sevin - Pechay)

Tomato: soaking (5mins) vinegar solution, 83% > soaking (5mins) tap water, 72% > soaking (2mins) tap water, 38% > soaking (2mins) vinegar solution, 33% > washing vinegar solution, 25% > washing tap water, 16%

String beans: soaking (5mins) vinegar solution, 67% > soaking (5mins) tap water, 57% > washing vinegar solution, 21% > soaking (2mins) tap water, 17% > washing tap water, 16% > soaking (2mins) vinegar solution, 14%

Pechay: soaking (5mins) tap water, 86% > soaking (5mins) vinegar solution, 81% > washing vinegar solution, 80% > soaking (2mins) vinegar solution, 58% > soaking (2mins) tap water, 43% > washing tap water, 15%

Higher percentage of reduction in the concentrations of organophosphahate (74 -100%) and carbamate (56-86%) residues was recorded when the vegetable samples were soaked for 5 minutes in different solutions.

Generally, no significant difference on the effect of washing solutions used (tap water, and vinegar solution) was noted.

After washing and soaking the samples in both tap water and vinegar solution, the pesticide residues in all the samples remained within the generally prescribed safe limits of less than 3 mg/kg (CODEX, 2014).

Washing and soaking substantially lowers the organophosphates and carbamate residue levels of pesticides in tomatoes, string beans and pechay.

Washing and soaking were significantly different from each other with the following order of efficiency in general: soaking for 5 minutes > soaking for 2 minutes > washing.

The type of solution used for washing and soaking had no significant difference in terms of reducing pesticidal residues.

In terms of pesticide residues, much reduction in the concentration of organophosphahate residues was noted than the reduction in the concentration of carbamate residues.

Summary & Conclusion

THANK
YOU!

