CONCLUSIONS

Pesticides are intensively used to protect fruits, vegetables and other crops, which result in pesticide residues in or on the agricultural commodities and also contaminate the environment. Different techniques were used for the extraction and analysis of pesticide residues in fruits and vegetables as assess present status of residues local market samples.

1. Samples of vegetables collected from the local market results obtained showed that vegetable samples analyzed contained detectable level of the pesticides residues below the maximum residue limit (MRL) except few samples.

2. Samples of fruits collected from the local market results obtained showed that fruits samples analyzed contained detectable level of the pesticides residues below the maximum residue limit (MRL).

3. The overall contamination in the vegetables samples were found about 62% and in the fruits 83% with one or more pesticides. The analysed matrices showed the presence of pesticide residues but the level of residues was below in the permissible limits of FAO/WHO/PFA/Codex, except for few samples which has high concentrations. It could be due to the lack of proper guidelines/instructions by the manufacturers to the end users or other undifined artifacts. The permanent use of such contaminated fruits and vegetables must be avoided.

4. A comparative solvent extraction method developed for the determination of chlorpyrifos, cypermethrin and monocrotophos pesticides in vegetables samples. Samples of vegetable were extracted by using ethyl acetate and cleaned up with Florisil and activated charcoal column other solvent acetonitrile (MeCN) containing 1% of acetic acid, followed by cleanup of the extract was carried out with primary secondary amine (PSA) and magnesium sulphate and residues were analysed by GC-ECD and/or GC-MS. It was found that acetonitrile to be the most suitable solvent for extraction of a wide polarity range of pesticide residues from vegetables.
5. Persistence of chlorpyrifos, cypermethrin and monocrotophos on brinjal, residues of pesticides reached below detection limit (BDL) showing complete dissipation on 11, 13, 15 days, 11, 13, 15 days and 13, 15, 17 days respectively when it was applied 100, 200 and 300 a.i.h⁻¹ on brinjal. Brinjal treated with chlorpyrifos, cypermethrin and monocrotophos may be consumed safely 13-17 days after application respectively.

6. Persistence of chlorpyrifos, cypermethrin and monocrotophos on okra was studied following application at dose of 100, 200, 300 g a.i.h⁻¹ to work out the safe preharvest waiting period. Samples of okra fruits were collected on 0, 1, 3, 5, 7, 9, 11, 13, 15, 17 and 19 days at harvest after treatment of pesticide. It is therefore concluded that okra treated with chlorpyrifos, cypermethrin and monocrotophos may be consumed safely 15-19 days after application respectively.

7. The experiments were conducted to investigate the effects of household washing/processing on removal of organophosphate (chlorpyrifos and monocrotophos) and pyrethroid (cypermethrin) residues in vegetables samples. The household processes included washing separately with normal water, hot water, 2.0% NaCl, 1.0 % NaHCO₃, 0.5 % acetic acid and boiling in water. The chlorpyrifos residue reduced in capsicum and cauliflower from 25 to 42% after normal water washing, and 36-74% reduced with hot water washing. Whereas monocrotophos residue was reduced in capsicum and cauliflower 23 to 39% after normal water washing and 35-72% reduced after hot water washing.

8. The household processes included washing separately with water, 2.0% NaCl, 1.0 % NaHCO₃, 0.5 % acetic acid and boiling in water. Samples of brinjal and okra were collected from experimental field which were sprayed with different concentration of pesticide on the vegetables. In the household processes of brinjal, residues reduced by 29.5-99.2%, 30.2-92.1% and 65.6-99.7%, chlorpyrifos, cypermethrin and monocrotophos respectively. Whereas household processes of okra, residues reduced by 24.5-98.9%, 27.2-92.2% and 62.4-99.5%, chlorpyrifos, cypermethrin and monocrotophos respectively. Maximum residues were reduced by boiling (99.7%) reduction of pesticides was observed in brinjal
and okra by household processing. Boiling was found comparatively more effective than washing in dislodging the residues.

9. The experiments were conducted to investigate the effects of household washing/processing on removal of organophosphate (chlorpyrifos and monocrotophos) and pyrethroid (cypermethrin) residues in vegetables samples. The household processes included washing separately with normal water, hot water, 2.0% NaCl, 1.0 % NaHCO₃, 0.5 % acetic acid and boiling in water. The chlorpyrifos residue reduced in capsicum and cauliflower from 25 to 42% after normal water washing, and 36-74% reduced with hot water washing. Whereas monocrotophos residue was reduced in capsicum and cauliflower 23 to 39% after normal water washing and 35-72% reduced after hot water washing.

Use of pesticides on vegetables is an inevitable part of agriculture but their unscientific usage can cause significant health adversities. From the extensive review collected on the extent of dissipation of pesticide residues and mechanisms involved during household processing techniques, it is concluded that these can serve as an effective tool for reduction of residues within safe limits. There is a need to regulate pesticide intake for leading a healthy life. Processing substantially reduces the residues of pesticides in vegetables. These reductions are extremely important in evaluating the risk associated with ingestion of pesticide residues, especially in vegetables, which are eaten by almost all income group people. However, there is dearth of knowledge involving exact mechanism of action by which different processing treatments ought to reduce pesticide residues in different food items.