



ENVIRONMENTAL IMPACT OF PESTICIDES

PRACTICAL EXERCISE

LABORATORY REPORT

TITLE OF EXPERIMENT: DETERMINATION OF TOLYLFLUANID ON APPLE THROUGH
GAS CHROMATOGRAPHY-MASS SPECTROMETRY

Submitted By:

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1. INTRODUCTION

Pesticide is a general term for substances used to control pests. The synthetic pesticides are popular due to their simplicity in application and their efficacy in pest control. Pesticide residue is the residual amount of active compounds of a particular pesticide or group of pesticides found in water, soil, and food [1]

In modern agriculture the production of fruits, vegetables and cereals involves the application of pesticides. The pesticides can be applied both in pre and post harvesting period to protect the fruits from pests and fungi. Apple fruits are among the fruits which can be attacked by pests and fungi. The control of the pests and fungi on apple involve the use of pesticides to protect and preserve the quality of this fruit [2]

Pesticides can accumulate on apple and cannot be washed by the rain or other washing method, therefore the probability of consuming the pesticide residue for human is becoming high. This can lead to high risk as some pesticides are characterized by high toxicity; others are moderately dangerous with possible carcinogenic, endocrinological or toxic effects and act on cholinesterase inhibitors.[3]

Tolyfluanid is one of the pesticides used to control the fungi that damage apples, it is a non-systemic fungicide, and it is a member of the phenylsulfamide fungicides. It is effective in preventing the germination of fungal conidia. The experiment was conducted to determine the amount of the tolylfluanid residues on apples. The experiment consisted of extraction and the analysis of extract was done by using Gas Chromatography Mass Spectrometer (GC-MS). The effect of processing methods before consumption like peeling and cooking, peeling, washing and juicing on reducing the residues of tolylfluanid on apple was determined in this experiment.

2. OBJECTIVE OF THE EXPERIMENT

The objective of this experiment was to determine the residues of tolylfluanid on apple and to evaluate the different processes on the concentration of tolylfluanid on apple. The processes evaluated include peeling and cooking, cooking, washing and juicing.

3. MATERIAL AND METHOD

3.1.Reagents and materials

The following reagents were used during experiment: ethyl acetate, sodium sulfate and Hexane for the extraction of the tolylfluanid. Materials used include: rotavapor, blinder, flasks, and beakers, Mixer,, filter, Florence asks, Gas chromatograph -MS

3.2. Extraction procedure

The processes of peeling and cooking, peeling, washing and juicing were first done. After the processing, 25 g was weighed and 100 ml of ethyl acetate was added, the content was mixed for 3 minutes and then a half of cup of sodium sulfate was added to remove traces of water. The mixture was allowed to settle and was filtered. 5 ml of extract was evaporated in the rotavapor at 40 degree centigrade. The remaining after evaporation was dissolved in 5 ml of hexane and analyzed by Gas Chromatography-Mass Spectrometry.

4. ANALYSIS

Standards, blank apple, standard apple with a known concentration and samples extracts were analyzed by using Gas Chromatography Mass Spectrometer (GC-MS). Calibration curve was constructed from the standards by using excel and used in the calculation of the samples concentration.

5. RESULTS

Table1: results of the analyzed 6 standards used for the calibration curve

Standards	Concentration in mg/l	peak area
1	0.02	32
2	0.04	73.78
3	0.1	216.46
4	0.5	1327
5	1	2730

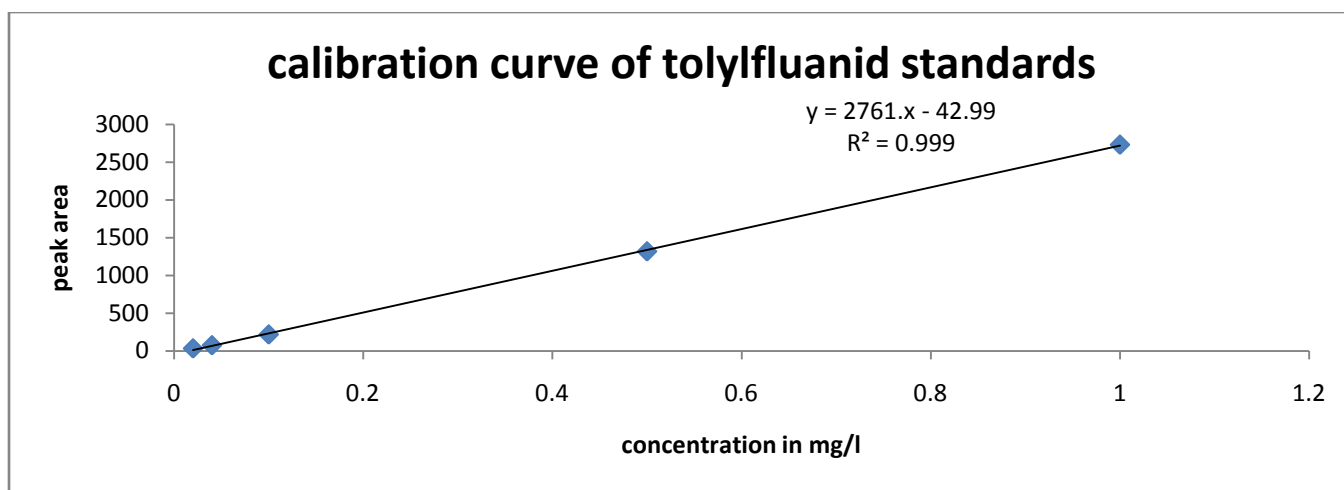


Figure1: calibration curve for tolylfluanid standards

Table2: Results of tolylfluanid concentration in mg/kg

	Unpeeled	peeled	Cooked	juiced	washed	recovery	blank
group A	0.92	0.30	0.12	0.44	0.65		0.08
GROUP 2	1.01	0.35	0.19	0.88	0.75		ND
GROUP 3	1.37	0.32	0.13	0.52	0.85	108.5	
GROUP 4	0.95	0.31	0.16	0.33	0.85	106.5	
average	1.06±0.2	0.32±0.02	0.15±0.03	0.54±24	0.77±0.095	107.5±1.4	
Process factor		0.30	0.14	0.51	0.73		
Extraction efficiency						107.5%	

ND: Not Detected

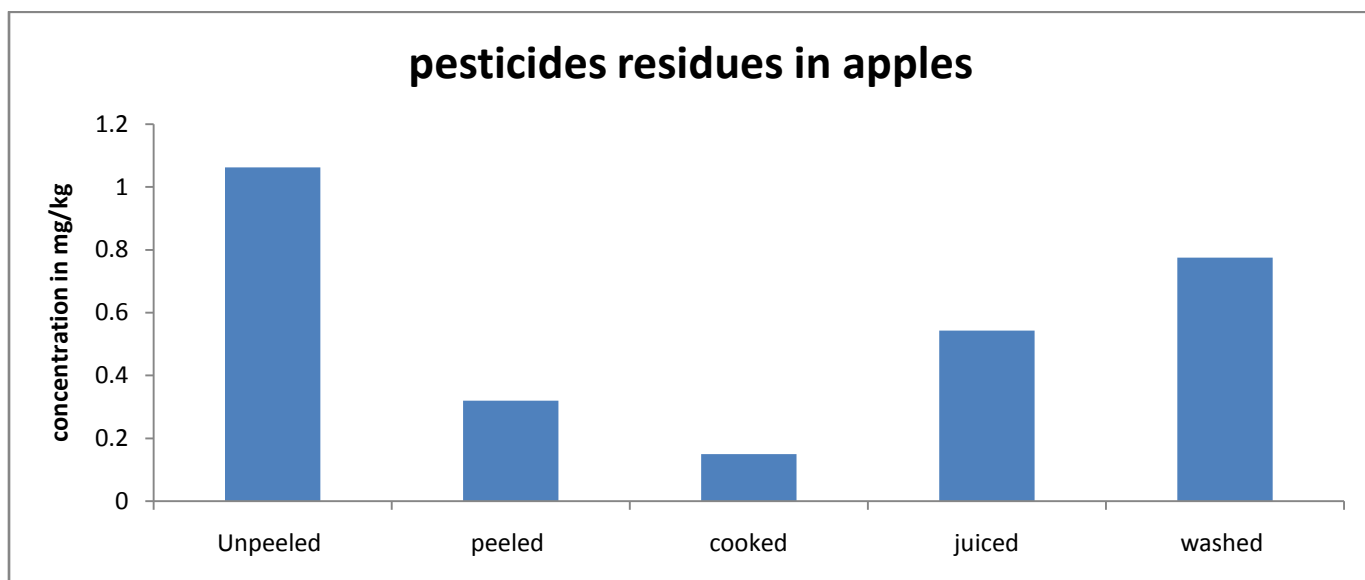


Figure2: comparison of processing methods in reducing tolylfluanid residues

6. DISCUSSION

The method used showed a good recovery of 107.7%. The results showed that the process factor is lower in cooking (0.14) and high process factor in washing (0.73), the process factor was 0.30 and 0.51 for peeling and juicing respectively.

Peeling has reduced the tolylfluanid residues on apple but not at the same extend as peeling and cooking, the concentration of residues on apple when peeled ranged from 0.30 to 0.35 mg/kg. The results showed a decrease in concentration of tolylfluanid residues when it is peeled and cooked, the lower concentration of pesticides residues were observe when the apple is peeled and cooked the concentration of residues tolylfluanid ranged from 0.12-0.19 mg/kg , this high decrease in tolylfluanid residues may be due to the combined effect of peeling which removes the surface layer which has more pesticides and the degradation of tolylfluanid by high temperature and volatilisation. An increase in temperature leads to an increase in degradation rate of pesticides [4]; pesticides departs through volatilization at high temperature [5]

The other processing methods reduced the residues but the reduction is not too much, the concentration of residues on apple when washed ranged from 0.65-0.85mg/kg, which is higher than when peel. This reduction may be due to the dissolution of pesticides by water. Washing reduce pesticides that are loosely attached to the surface while peeling removes even those that have penetrated the cuticles of the fruits or vegetables [6]

The effects of juicing showed a better reduction of the residues than washing, the concentration of residues ranged from 0.33 to 0.88 mg/l.

The best process method is the one which reduce the concentration of the pesticide residues which is peeling and cooking, this process will take time for someone to eat an apple and the cooking effect will change the test of the apple which cannot be preferable by the consumers. Due all these problems raised, the preferable method to eat an apple is to peel before eating, this reduce the concentration of pesticide residues, the test remains the same and take less time than cooking

7. CONCLUSION

During experiment, the practical skills on determination of pesticides residues on apple were acquired. The results showed that the analyzed apples had tolylfluanid residues and the consumption of uncooked apple results in the consumption of these residues. According to the results of this experiment, cooking and peeling are good processes that can reduce the pesticides on apple, washing and juicing also reduce the pesticides residues but not at the same extend as cooking and peeling. The experiment showed that the amount of pesticides residues that someone can consume depends on processing of the apple before consumption. The experiment showed that the good method to consume apple is peeling before consumption.

8. REFERENCES

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