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Estimation of Pesticide Residues in Daily consumables

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ABSTRACT:

Agriculture is critical to the Indian economy, while farming's contribution to overall gross domestic product (GDP) has decreased from over 30% in 1990-91 to less than 15% in 2011-12, a tendency that is expected in any economy's growth process, farming remains the cornerstone of progress. The ordinary Indian continues to pay about half of its total food costs. Avaried range of pesticides is necessary to control pests and vector-borne diseases on tropical agricultural plants. However, occasional use has had negative consequences for public health as well as food quality, which has an effect on the environment, and has resulted in the development of pest resistance. Indiscriminate use in the food chain has a detrimental effect on the entire ecosystem, polluting soil, soil and surface water and air. In this study, estimated few of the commonly used pesticide residues in water, rice, fruits and vegetablesconsumed by peoplein kasargod, Kerala. Nearly one in three goods tested carried pesticide residues below the MRL and remaining goodsare above the MRL.

KEYWORDS: Agriculture, Pesticide, water, rice, fruits, vegetables, endosulfan, kasargod.

INTRODUCTION:

Numerous authorities have detected the presence of pesticides in the subsurface water in agriculturally developed areas. Pesticides can be impacted by direct runoff, sprinkling, and the reckless disposal of vacuum canisters and washing equipment, among other things . Pesticide contamination of rice grains occurs mostly as a result of field spraying and storage treatment. Rice grains are treated with pesticides in storage facilities and before to export to other countries, including organophosphates, carbamats, synthetic pyrethroids, and insect growth controller . Rice is mostly attacked by stem and leaf folder insect pests, blasts, and black disease.Many research publications on the development of methods for determining residues in rice using classic GC methodology and smart instruments (GC/MS) in conjunction with innovative extraction techniques have been published.The water and food samples were collected and analysed for pesticide residues by using GC-ECD/NPD.

Residual Pesticides in water samples from Kasargod:

From Kasargod, the samples were collected from the Kodenkari stream (WS3) and the Shiriya (WS4) rivers. The well samples were collected from wells Periya (WW3) and Cheemeni (WW4) in Kasargod. Individual pesticide concentrations in water samples obtained from various places in Kasargod are mentioned in Table 1.1. A comparison of residues in well and river water samples is made in Figure 1.1.

In water sample WW3, the residues of all the organochlorines analysed were found to be present except aldrin. But the concentration of endosulfan was found above MRL. Among organophosphates, dimethoate and quinalfos were detected but the values were below the residue limit. All of the pyrethroids analysed were present in the samples and the residues of fenvalerate found to be exceeding MRL. The concentration of carbofuran also exceeded the limit in the samples. In water sample WW4, among the organochlorines analyzed, residues of lindane, dieldrin and p,p'-DDT were detected

even though the concentrations exceeded in the case of lindane and dieldrin. Among organophosphates, profenofos, dimethoate and quinalphos were detected but the values were well below the residue limits. All of the pyrethroids analysed were present in the samples except cismethrin and the residue of fenvalerate and carbofuran were found to be exceeding MRL. In water sample WS3, among the organochlorines analyzed, residues of endosulfan, lindane, and DDT were detected and the concentrations exceeded MRL in the case of lindane in the samples. Among organophosphates, profenofos and chlorpyrifos were detected, but the concentration of profenofos was only found to be above MRL. All of the pyrethroids analysed were present in the samples except cismethrin and detected pesticides were within the limit except carbofuran and fenvalerate. In water sample WS4, residues of endosulfan, lindane, and p,p'-DDT were detected among organochlorine pesticides, but the values were below the residue limit, except for lindane. Among organophosphates, dimethoate and chlorpyrifos were foundand dimethoate was found to be above MRL. All of the pyrethroids analysed were present in the samples except deltamethrin, cismethrin, and carbofuran. The concentration of fenvalerate exceeded the limit in the samples.

Table 1.1: Pesticide residues analyzed from the water samples (mg/L) collected from Kasargod

Pesticides	**WW3**	**WW4**	**WS3**	**WS4**
Organochlorines				
Endosulfan	0.019*±0.04	0	0.011±0.026	0.009±0.01
Lindane	0.006±0.008	0.012*±0.025	0.042*±0.028	0.028*±0.003
Dieldrin	0.005±0.023	0.018*±0.032	0	0
Aldrin	0	0	0	0
p,p'-DDT	0.012±0.008	0.01±0.031	0.037±0.019	0.042±0.02
Organophosphates				
Chlorpyrifos	0	0	0.033±0.017	0.025±0.006
Dimethoate	0.011±0.003	0.009±0.024	0	0.056*±0.004
Quinalphos	0.003±0.005	0.008±0.006	0	0
Profenophos	0	0.015±0.006	0.017*±0.008	0
Phorate	0	0	0	0
Synthetic pyrethroids				
Cypermethrin	0.018±0.007	0.004±0.007	0.053±0.007	0.004±0.03
Fenvalerate	0.015*±0.005	0.019*±0.008	0.042*±0.008	0.018*±0.04
Deltamethrin	0.002±0.006	0.023±0.005	0.018±0.006	0
Cismethrin	0.008±0.003	0	0	0
Carbofuran	0.028*±0.004	0.02*±0.002	0.038*±0.006	0
∑Mean level	0.009	0.008	0.06	0.018

NB; WS3, WS4, WW3 and WW4 denote samples collected from Kodenkari stream, Shiriya river and from wells of Periya and Cheemeni areas in Kasargod. Values are the mean of three samples analyzed in duplicate collected from each location. *values above corresponding MRL. The MRLs (mg/kg) for endosulfan: 0.02, lindane: 0.02, dieldrin; 0.01, aldrin: 0.01, DDT: 0.05, chlorpyrifos: 0.5, dimethoate: 0.02, quinalphos: 0.05, profenophos: 0.02, phorate: 0.02, cypermethrin: 0.5, fenvalerate 0.02, deltamethrin 0.05 cismethrin: 0.05 and carbofuran: 0.02.

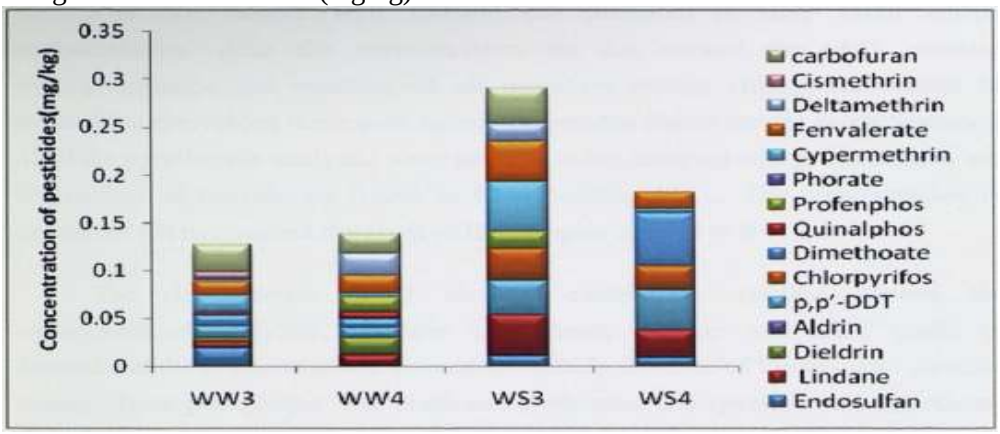

Figure 1.1: Pesticide residues obtained from the water samples (mg/L) collected from Kasargod. WS3, WS4, WW3 and WW4 denote samples collected from Kodenkari stream, Shiriya river and from wells of Periya and Cheemeni areas in Kasargod were evaluated for Residual pesticides using Gas Chromatography.

Residual Pesticides in samples of rice from Kasargod

Rice samples for analysis were collected from Kasargod, from Periya (RM3) and Cheemeni markets (RM4), and RF3 and RF4 were also collected from paddy fields in the same areas. The concentrations of individual pesticides in samples of rice were collected from various locations in Kasargod are mentioned in Table 1.2 and the values are compared in Figure 1.2.In rice sample RF3, the residues of organochlorines found were those of endosulfan and DDT and the concentrations of the residues were found to be below MRL. Among organophosphates, chlorpyrifos and quinalphos could be detected, but the values were well below the residue limit. All of the pyrethroids except cismethrin analysed were present in the samples, but the residual concentration of each of the membernever found to be exceeded MRL. Analysis of rice sample RF4 shows the presence of two of the organochlorine residues, DDT and lindane. Also, the concentration exceeded the MRL in the case of lindane. Among organophosphates, the residues of all members except dimethoate and phorate were detected, but the values were well below the residue limits except in profenophos. All of the pyrethroids analysed were present in the samples except cismethrin and the residues of fenvalerate, which were found to exceed MRL. The analysis of rice sample RM3 showed comparable results. Among the organochlorines analyzed, residues of endosulfan, lindane, and p,p'-DDT were detected, and the concentrations exceeded MRL in lindane and p,p'-DDT samples. Among organophosphates, the residues of all members except dimethoate and phorate were detected, but the values were well below the residue limits except in profenophos. In the case of pyrethroids, all of them were present in the samples except cismethrin and deltamethrin. The residual concentration of fenvalerate and carbofuran was found to be above the MRL. In rice sample RM4, residues of endosulfan, lindane, and p,p'-DDT could be detected among organochlorine pesticides, but the values were below the residue limit except for p,p'-DDT. Among organophosphates, the residues of all members except dimethoate and phorate could be detected, but the values were well below the residue limits except in profenophos. All of the pyrethroids analysed were present in the samples except cismethrin, and the concentrations of detected pesticides were

exceeded the limit in the samples. The table depicts that no samples were determined to be devoid of pesticide residue contamination. The most commonly detected residues were those of p,p'-DDT, lindane, cypermethrin, fenvalerate, deltamethrin, and carbofuran. It was also found that the residues of aldrin, dieldrin, phorate, and cismethrin could not be detected in any of the samples. The result also gives an idea about the maximum mean value for residual concentration in RM4 samples, followed by RM3, and then by RF3, which indicates that samples collected from market areas show comparatively more contamination than samples from fields, even though some residues are evaporated and lost during storage. This also provides evidence for the high application of pesticides during storage.

Table 1.2: Pesticide residues (mg/kg) present in the Rice samples collected from Kasargod

Pesticides	**RF3**	**RF4**	**RM3**	**RM4**
Organochlorines				
Endosulfan	0.003±0.015	0	0.005±0.05	0.011±0.008
Lindane	0	0.015*±0.007	0.039*±0.009	0.014±0.005
Dieldrin	0	0	0	0
Aldrin	0	0	0	0
p,p'-DDT	0.028±0.008	0.008±0.006	0.053*±0.008	0.074*±0.004
Organophosphates				
Chlorpyrifos	0.005±0.006	0.01±0.005	0.03±0.005	0
Dimethoate	0	0	0.01±0.003	0.052*±0.002
Quinalphos	0.043±0.008	0.023±0.004	0	0
Profenophos	0	0.027*±0.009	0.032*±0.004	0.019*±0.004
Phorate	0	0	0	0
Synthetic pyrethroids				
Cypermethrin	0.038±0.008	0.014±0.008	0.048±0.003	0.042±0.009
Fenvalerate	0.01±0.006	0.027*±0.006	0.038*±0.005	0.044*±0.008
Deltamethrin	0.032±0.008	0.011±0.004	0	0.058*±0.006
Cismethrin	0	0	0	0
Carbofuran	0.012±0.005	0.005±0.004	0.018±0.002	0.025*±0.005

NB: RM3, RM4, RF3 and RF4 denote rice samples collected from Periya and Cheemeni markets and from paddy fields from the same areas. Values are the mean of three samples analyzed in duplicate collected from each location Values above corresponding MRL.

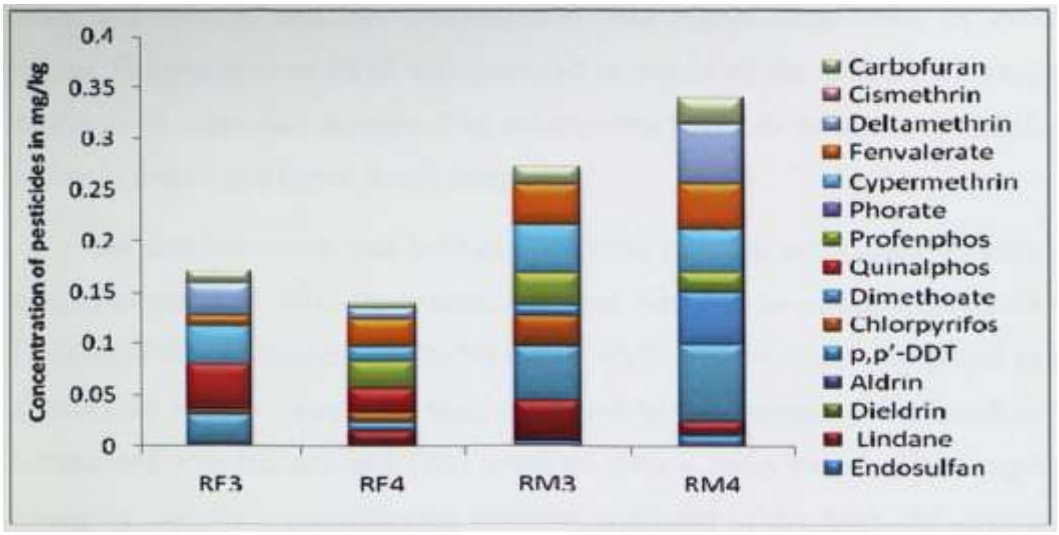

Figure 1.2: Pesticide residues (mg/kg) obtained from the Rice samples collected from Kasargod. RM3, RM4, RF3 and RF4 denote rice samples collected from Periya and Cheemeni markets and also from paddy fields RF3 and RF4 respectively from the same areas were evaluated for Residual pesticides using Gas Chromatography.

Organophosphate residual pesticide in fruit & vegetable samples from Kasargod:

Analysis of four common organophosphate pesticides, chlorpyriphos, dimethoate, profenofos, quinalphos, and phorate, which are widely applied on fruits and vegetables, was carried out and the residue levels are illustrated in Table 1.3 and Figure 1.3. Chlorpyrifos was detected in grapes and mango samples and was found to be present in all of the vegetable samples except carrots. But the residual level is comparatively lesser than the specified levels in all samples except for tomato. None of samples were found Dimethoate residues except for grapes, spinach and carrots. Residue level is above in grapes and carrots. All fruit samples contain Profenophos except mangoes. But contamination level is within the limit in all the samples. The vegetable samples analysed did not show a detectable concentration of the residues except in tomatoes.Quinalphos could be detected in all the fruit samples tested, except in orange and mango. Grapes showed a high residueconcentration. Likewise, quinalphos residue present in all vegetables except in bitter gourd. Also, the quantities were above the limit in the tomato samples. The presence of phorate recorded an alarming level of contamination in the samples of fruits and vegetables, including orange, banana, mango, tomato, spinach, and carrot. The mean level of concentration from the table illustrated for various organophosphate residual pesticide in vegetable & fruit samples, phorate concentration is high, precede by chlorpyrifos and dimethoate. However, quinalphos was the major organophosphate in most of the samples, followed by phorate and chlorpyrifos.

Table 1.3: Organophosphate pesticide residues (mg/kg) obtained from the fruits and vegetable samples collected from Kasargod

Pesticides	Chlorpyrifos	Dimethoate	Profenphos	Quinalphos	Phorate
Apple	0	0	0.013±0.005	0.004±0.02	0
Orange	0	0	0.019±0.018	0	0.015*±0.005
Grapes	0.043±0.014	0.049*±0.04	0.031±0.005	0.038*±0.04	0
Banana	0	0	0.007±0.016	0.008±0.05	0.006±0.029
Mango	0.02±0.016	0	0	0	0.04*±0.023
Tomato	0.049*±0.04	0	0.016±0.018	0.02*±0.006	0.008±0.014

Bittergourd	0.027±0.018	0	0	0	0
Spinach	0.018±0.011	0.003±0.003	0	0.003±0.012	0.018*±0.003
Cabbage	0.008±0.014	0	0	0.006±0.022	0
Carrot	0	0.04*±0.016	0	0.013±0.005	0.11*±0.004
∑Mean level	0.018	0.018	0.011	0.012	0.033

N.B Values are the mean of three samples analyzed in duplicate collected from each locations. *values above corresponding MRL. The MRLs (mg/kg) for chlorpyrinfos: 0.5, dimethoate: 0.02, quinalphos: 0.05, profenophos: 0.02 and phorate: 0.02.

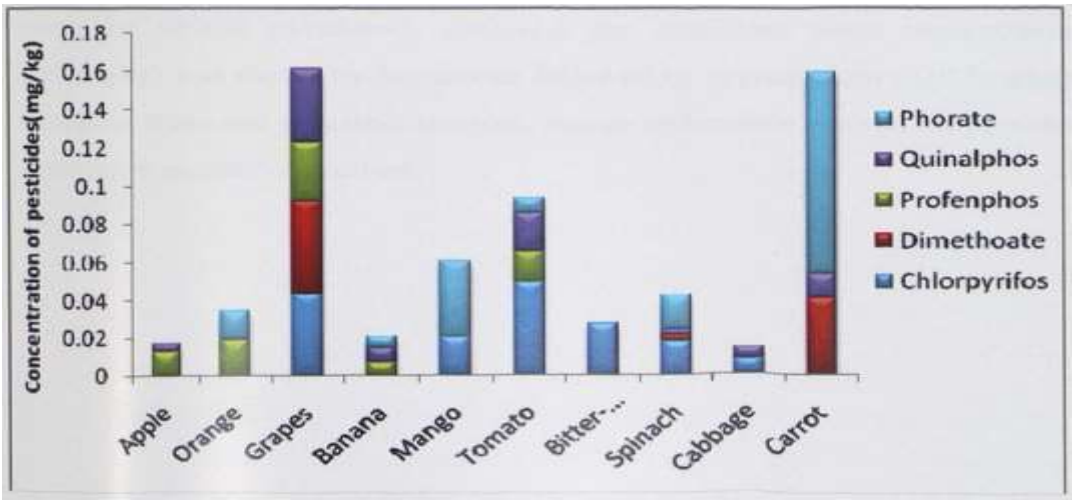

Figure1.3: Organophosphate pesticide residues (mg/kg) obtained from the fruits and vegetable samples collected from Kasargod

CONCLUSION:

The current investigation demonstrates that residues of pesticide were found in well-nigh all the samples of water, rice, fruit, & vegetable collected from various places around Kasargod. In fruits and vegetables, pesticide residues of organophosphate were found 24.7%. Dieldrin quickly converts aldrin to its epoxide (GESAMP, 1993). The presence of an average of 0.004 mg/kg aldrin in orange and 0.014 mg/kg dieldrin in tomato in the analysed samples indicates that aldrin may be converted to dieldrin in biological systems via epoxidation (Rumsey and Bond, 1974), and thus dieldrin is expected to be found at relatively higher concentrations than aldrin. Lindane is a relatively stable chemical that decomposes only under alkaline circumstances to form trichlorobenzene. This result is consistent with the reported mean concentration levels of 0.002 mg per kg and 0.004 mg per kg in the Nigerian and Indian markets, respectively (Bhanti and Taneja, 2007; Adeyeye and Osibanjo, 1999). This further indicates that lindane is widely utilised in the agricultural sector for the cultivation of fruits and vegetables.Additionally, 61% of fruits and vegetables samples tested positive for contamination, with 18.7% of samples testing positive for pesticide residues above the MRL and 42.3 percent testing positive for pesticide residues below the MRL. Only 39% of samples evaluated did not contain detectable levels of the pesticides being monitored. The conclusions presented here are consistent with those of other independent studies done in Egypt, Pakistan, & India (Somashekar and Seyed, 2010; Singh et al. 2008a; Gyana et al. 2007; Mukeherjee et al. 2007; Kumari et al. 2006; Shahi et al. 2005; Parveen et al. 2004; Dogehim et al. 2001; Reddy et al. 1998, Ahuja et al. 1998; Mukherjee and Gopal 1996; Masud, 1992).Overall, almost 70%

of samples tested positive for contamination, with around 25% of samples testing positive for pesticide residues above the MRL. Based on the findings of these investigations, it is suggested that a more comprehensive research encompassing all food and water in all of Kerala's districts be conducted to ascertain the precise degree of pesticide contamination.

REFERENCES:

[1] Agrawal GD Diffuse agricultural water pollution in India, Water Sci. Technol. 39; (1999) 33-47.

[2] Agnihotri NP, Vijay P, Kumar T, Mohapatra M, Salja P Organochlorine insecticide residue in Ganga River, water near Farrukhabad, Environmental monitoring and assessment, 30(2); (1994)12-105.

[3] Ahmad S, Zia-Ul-~aq M, Imran M, Iqbal S, Iqbal JM, Ahmad Determination of residual contents of pesticides in rice (Oriza sativa L.) Crop from different regions of Pakistan Pak. J. Bot., 40(3); (2008)1253-1257.

[4] Amaraneni SR Distribution of pesticides, PAHs and heavy metals in prawn ponds near Kolleru lake wetland, India, Environ. Int. 32 (2006) 294-302.

[5] Yogeesh N, "Mathematical maxima program to show Corona (COVID-19) disease spread over a period.", TUMBE Group of International Journals, 3(1), 2020, 14 -16

[6] Anonymous Joint FAO/WHO Food Standards Programme Codex Alimentarious Commission Codex Alimentarius. Section 2, Pesticide Residues in Food. Section 3, Recommended Methods of Sampling for the Determination of Pesticide Residues (1993).

[7] Anonymous Pesticides in Bottled Water, The Times of India, New Delhi, 16 October (2003). Anonymous Public health-impact of pesticides used in agriculture. World Health Organization, Geneva, (1990) pp. 47-49.

[8] Ahmad I "Pesticide Residues in Fortified Water, Soil, Food, Fruits and Vegetable Samples in Pakistan," Journal of Experimental Zoology India. 7(1); (2004) 67-72.

[9] Yogeesh N, "Solving Linear System of Equations with Various Examples by using Gauss method", International Journal of Research and Analytical Reviews (IJRAR), 2(4), 2015, 338-350

[10] Ahamad S, Ajmal M, Nomani AA Organochlorines and polycyclic aromatic hydrocarbons in the sediments of Ganges River (India). Bull. Environ Contamn Toxicol. 57: (1996) 794-802.

[11] Bouwer H Agriculture and Ground water quality. Civil Engg 59: (1989) 60-63.

[12] Yogeesh N, "A Study of Solving linear system of Equations By GAUSS-JORDAN Matrix method-An Algorithmic Approach", Journal of Emerging Technologies and Innovative Research (JETIR), 3(5), 2016, 314-321

[13] Cbiron S, Valverde A Fernandez-Alba A, Barcelo D. Automated sample preparation for monitoring ground water pollution by carbamate-insecticides and their transformation products. J AOAC. 78: (1995) 1346-1352.