***"Monitoring of Human Diet for Organochlorine insecticide residues" by Shukla / Singh / Nigam / Tiwari Dept of Soil Science and Agricultural Chemistry, CS Azad University, Kanpur* (2002)**

The daily Aldrin intake in average vegetarian diet exceeded ADI by 442 per cent; in average non-vegetarian diet, by 1,500 percent. The daily Dieldrin intake in average vegetarian diet exceeded ADI by 514 per cent; in average non-vegetarian diet, by as much as 6,000 per cent.

Pesticide Research Journal Vol. 14(2): 302-307, December, 2002

Monitoring of Human Diet for Organochlorine Insecticide Residues

M.P. Shukla, Satya Pal Singh, R.C. Nigam and D.D. Tiwari

Department of Soil Science and Agricultural Chemistry, C.S.Azad University of Agriculture and Technology, Kanpur - 208002, India

Out of 20 samples of total-diet collected from in and around Kanpur during July to Oct. 1999 and analysed, 90% samples were found contaminated with pesticide residues. Magnitude of contamination was more in non- vegetarian than vegetarian diet. HCH, aldrin and dieldrin were the main contaminants. Average daily intake of their residues were more than their acceptable daily intakes (ADI) accounting 1448.22, 32.52 and 36.86 (jg/person/d through vegetarian and 1501.44, 95.93 and 367.02 ug/person/d through non- vegetarian diet, respectively.

ICMR Bulletin, 2001

Indian Council of Medical Research has also tested milk and milk products. Says their report: "In a multi-centric study to assess the pesticide residues in selected food commodities collected from different states of the country49, DDT residues were found in about 82 % of the 2205 samples of bovine milk collected from 12 states. About 37 % of the samples contained DDT residues above the tolerance limit of 0.05 mg/kg (whole milk basis). The highest level of DDT residues found was 2.2 mg/kg. The proportion of the samples with residues above the tolerance limit was maximum in Maharastra (74 %) followed by Gujarat (70 %), Andhra Pradesh (57 %), Himachal Pradesh (56 %) and Punjab (51 %). In the remaining states, this proportion was less than 10 %. Data on 186 samples of 20 commercial brands of infants formulae showed the presence of residues of DDT and HCH isomers in about 70 and 94 % of the samples with their maximum level of 4.3 and 5.7 mg/kg (fat basis) respectively.

Organochlorine and organophosphorus pesticide residues in breast milk from Bhopal, Madhya Pradesh, India

Hum Exp Toxicol February 2003 vol. 22 no. 2 73-76

Rashmi Sanghi, M KK Pillai, T R Jayalekshmi, A Nair

Abstract

HCH isomers, endosulfan, malathion, chlorpyrifos, and methyl-parathion were monitored in human milk samples from Bhopal, Madhya Pradesh. The endosulfan concentrations were highest and exceeded the S-HCH, chlorpyrifos, and malathion concentrations by 3.5-, 1.5-, and 8.4-fold, respectively. Through breast milk, infants consumed 8.6 times more endosulfan and 4.1 times more malathion than the average daily intake levels recommended by the World Health Organization. A

correlation analysis (r values) between mothers' age and the content of the chemicals accumulated in breast milk indicated a substantial degree of correlation for malathion (r–0.5). The other chemicals showed low to negligible correlation with donor age.

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http://www.toxicslink.org/art-view.php?id=143

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http://www.ncbi.nlm.nih.gov/pubmed/17568651
Chemosphere. 2007 Aug;69(1):63-8. Epub 2007 Jun 12.

Contamination of vegetables of different seasons with organophosphorous pesticides and related health risk assessment in northern India.

Bhanti M, Taneja A.Source School of Chemical Sciences, Department of Chemistry, St. John's College, Agra, UP 282002, India. mayankbhanti16@gmail.com

Abstract

India is an agrarian country. The use of pesticides, herbicides and fungicides were introduced in India during the mid-sixties, which are now being used on a large scale and is a common feature of Indian agriculture. The main intention of the introduction of pesticides was to prevent and control insects, pests and diseases in the field crops. Initially the use of pesticides reduced pest attack and paved way for increasing the crop yield as expected. Simultaneously, increased use of chemical pesticides has resulted in contamination of environment and also caused many long-term affect on the society. In the present study an effort has been made to evaluate the residual concentration of selected organophosphorous pesticides (methyl parathion, chlorpyriphos and malathion) in vegetables grown in different seasons (summer, rainy and winter). Data obtained was then used for estimating the potential health risk associated with the exposure to these pesticides. The pesticides residue concentrations in vegetables of different season shows that the winter vegetables are the most contaminated followed by summer and rainy vegetables. The concentration of the various pesticides were well below the established tolerances but continuous consumption of such vegetables even with moderate contamination level can accumulate in the receptor's body and may prove fatal for human population in the long term. The analysis of health risk estimates indicated that chlorpyriphos and malathion did not poses a direct hazard, however, exposure to methyl parathion has been found to pose some risk to human health.

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http://www.springerlink.com/content/d0533n7067p702hg/
Bulletin of Environmental Contamination and Toxicology
Volume 80, Number 1, 5-9, (2008) DOI: 10.1007/s00128-007-9276-6

Organochlorine Pesticide Residues in Bovine Milk

Subir K. Nag and Mukesh K. Raikwar

Abstract

Monitoring of bovine milk of different places in Bundelkhand region of India was carried out to evaluate the status of organochlorine pesticide (OCP) residues. Out of a total of 325 samples 206 (63.38%) were contaminated with residues of different OCPs. The average concentration of total HCH was 0.162 mg/kg. Among the different HCH isomers the frequency of occurrence of α-isomer was maximum followed by δ-, γ- and β. Endosulfan (α, β, sulfate) was detected in 89 samples with mean

concentration of 0.0492 mg/kg while total DDT comprising of DDT, DDE and DDD was present in 114 samples having mean concentration of 0.1724 mg/kg. Dicofol was positive in 17 samples.

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http://www.springerlink.com/content/927whv0673187506/
Environmental Monitoring and Assessment
Volume 129, Numbers 1-3, 349-357, (1999) DOI: 10.1007/s10661-006-9368-5

Pesticide Residues in Bovine Milk from a Predominantly Agricultural State of Haryana, India

H. R. Sharma, A. Kaushik and C. P. Kaushik

Abstract

One hundred forty seven samples of bovine milk were collected from 14 districts of Haryana, India during December 1998–February 1999 and analysed for the presence of organochlorine pesticide (OCPs) residues. ∑HCH, ∑DDT, ∑endosulfan and aldrin were detected in 100%, 97%, 43% and 12% samples and with mean values of 0.0292, 0.0367, 0.0022 and 0.0036 μg/ml, respectively. Eight percent samples exceeded the maximum residue limit (MRL) of 0.10 mg/kg as recommended by WHO for ∑HCH, 4% samples of 0.05 mg/kg for α-HCH, 5% samples of 0.01 mg/kg for γ-HCH, 26% samples of 0.02 mg/kg for β-HCH as recommended by PFAA and 24% samples of 0.05 mg/kg as recommended by FAO for ∑DDT. Concentrations of β-HCH and p,p′-DDE were more as compared to other isomers and metabolites of HCH and DDT.

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http://www.springerlink.com/content/q475825128g36472/

Hormonal Carcinogenesis V
Advances in Experimental Medicine and Biology, 2008, Volume 617, Part 12, 387-394, DOI: 10.1007/978-0-387-69080-3_37

Blood Levels of Organochlorine Pesticide Residues and Risk of Reproductive Tract Cancer Among Women from Jaipur, India

Vibha Mathur, Placheril J. John, Inderpal Soni and Pradeep Bhatnagar

Abstract

Residuesof organochlorine pesticides are integral part of our environment.Because of their strong lipophilic and non-biodegradable nature, organisms at higher trophic levels in the food chain tend to accumulate them. The aim of the present study was to assess the influence of organochlorine pesticides upon the occurrence of reproductive tract cancers in women from Jaipur, India. Blood samples were collected from 150 females. In that group, 100 females suffered from reproductive tract cancers like cervical, uterine, vaginal and ovarian cancers, while the rest did not suffer from cancers or any other major disease and were treated as control group. The collected blood samples were subjected to pesticide extraction and analyzed with the help of gas chromatography. The pesticides detected were benzene hexa chlororide and its isomers, dieldrin, heptachlor, dichloro diphenyl trichloro ethane and its metabolites. The data obtained indicate that the organochlorine pesticide residue levels were significantly higher in all the cancer patients as compared with the control group.

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http://www.springerlink.com/content/f06w8017333323q5/
Environmental Monitoring and Assessment
Volume 116, Numbers 1-3, 1-7, (2006) DOI: 10.1007/s10661-006-7463-2

Organochlorine Pesticide Residues in Milk and Blood of Women from Anupgarh, Rajasthan, India

Ashok Kumar, Anju Baroth, Inderpal Soni, Pradeep Bhatnagar and P. J. John

Abstract

Anupgarh is the most fertile area of Rajasthan state where a variety of seasonal crops are grown. The availability of three manmade canals has enhanced the agricultural activities in this area. The farmers use huge amounts of pesticides to increase the crop productivity. Exposure of humans to these hazardous chemicals occurs directly in the fields and indirectly due to consumption of contaminated diet, or by inhalation or by dermal contact. The organochlorine pesticides are reported to be lipophilic and their presence in human milk and blood has been documented in different parts of the world. Blood and milk samples were collected from lactating women who were divided into four groups on the basis of different living standards viz residence area, dietary habits, working conditions and addiction to tobacco. The level of total organochlorine pesticides in blood ranged from 3.319mg/L—6.253mg/L while in milk samples it ranged from 3.209Mdash;4.608 mg/L. The results are in concurrence with the reports from other countries.

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http://www.springerlink.com/content/n46537m023274m47/
Indian Journal of Clinical Biochemistry
Volume 21, Number 2, 169-172, DOI: 10.1007/BF02912936

Organochlorine pesticides BHC and DDE in human blood in and around Madurai, India

Kallidass Subramaniam and Jebakumar Solomon

Abstract

In this study blood samples are taken from two groups of people, one that has direct exposure to pesticides (agriculturists & public health workers) the second group, which has indirect exposure to pesticides through food chain. The objective of our investigation is to analyze the blood of the patients with minimum health complaints and skin diseases for the residue of the banned organochlorine pesticides DDE and BHC using Gas Chromatography. High concentrations of both BHC&DDE were observed in the serum samples of the people who had direct exposure to the pesticides, namely agriculturalists and public health workers with few exceptions. The pesticide residue concentration in serum ranges from 0.006 to 0.130 ppm for BHC and 0.002 to 0.033 ppm for DDE. Significance of this study reveals that the presence of these banned pesticides in human serum.

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http://www.springerlink.com/content/w2k401x6p7888525/
Bulletin of Environmental Contamination and Toxicology
Volume 81, Number 2, 216-219, (2008) DOI: 10.1007/s00128-008-9459-9

Endosulfan and Other Organochlorine Pesticide Residues in Maternal and Cord Blood in North Indian Population

Rahul Pathak, Sanvidhan G. Suke, Rafat S. Ahmed, A. K. Tripathi, Kiran Guleria, C. S. Sharma, S. D. Makhijani, Meenu Mishra and B. D. Banerjee

Abstract

Humans are exposed to various environmental chemicals such as organochlorine pesticide residues, heavy metals, polychlorinatedbiphenyls (PCBs) etc. There is paucity of data regarding the present blood levels of organochlorine residues in North Indian population with reference to reproductive health. The present study was designed to analyze the levels of organochlorine pesticide residues in maternal and cord blood samples of normal healthy women with full term pregnancy to gain insight

into the current status of pesticide burden in newborns. Hexachlorocyclohexane (HCH) contributed maximum towards the total organochlorine residues present in maternal and cord blood followed by endosulfan, *pp*′ DDE and *pp*′ DDT being the least. This is also the first report indicating endosulfan levels in this population. Our data indicates a transfer rate of 60–70% of these pesticides from mothers to newborns and this high rate of transfer of pesticides is of great concern as it may adversely affect the growth and development of newborn.

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http://www.springerlink.com/content/28027113840w3204/
Bulletin of Environmental Contamination and Toxicology
Volume 78, Number 5, 330-334, (2007) DOI: 10.1007/s00128-007-9187-6

Occurrence of DDT and HCH Insecticide Residues in Human Biopsy Adipose Tissues in Punjab, India

R. S. Aulakh, J. S. Bedi, J. P. S. Gill, B. S. Joia, P. A. Pooni and J. K. Sharma

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http://www.springerlink.com/content/861333g720363018/
Environmental Monitoring and Assessment
Volume 144, Numbers 1-3, 329-340, DOI: 10.1007/s10661-007-9996-4

Pesticide residues in river Yamuna and its canals in Haryana and Delhi, India

C. P. Kaushik, H. R. Sharma, S. Jain, J. Dawra and A. Kaushik

Abstract
Yamuna, a prominent river of India covers an extensive area of 345,843 km^2 from Yamunotri glacier through six Indian states. Residues of organochlorine pesticides (OCPs) namely, isomers of HCH and endosulfan, DDT and its metabolites, aldrin, dieldrin, were analysed in water of river Yamuna along its 346 km stretch passing through Haryana–Delhi–Haryana and the canals originating from it. β-HCH, *p.p*′-DDT, *p.p*′-DDE and *p.p*′-DDD had maximum traceability in test samples (95–100%) followed by γ-HCH, α-HCH and *o.p*′-DDD (60–84%) and *o.p*′-DDT, δ-HCH and *o.p*′-DDE (7–30%) while aldrin, dieldrin, α and β endosulfan remained below detection limits (BDL). The concentration of ΣHCH and ΣDDT at different sites of the river ranged between 12.76–593.49 ng/l (with a mean of 310.25 ng/l) and 66.17–722.94 ng/l (with a mean of 387.9 ng/l), respectively. In canals the values were found between 12.38–571.98 ng/l and 109.12–1572.22 ng/l for ΣHCH and ΣDDT, respectively. Water of Gurgaon canal and Western Yamuna canal contained maximum and minimum concentration, respectively both of ΣHCH and ΣDDT residues. Sources of these pesticides and suggested measures to check pesticide pollution of this major Indian river, keeping in view its vital link with life, are discussed in this paper.

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http://www.springerlink.com/content/j8363943k3086338/
Environmental Monitoring and Assessment
Volume 125, Numbers 1-3, 147-155, DOI: 10.1007/s10661-006-9247-0

Persistent Organochlorine Pesticide Residues in Soil and Surface Water of Northern Indo-Gangetic Alluvial Plains

Kunwar P. Singh, Amrita Malik and Sarita Sinha

Abstract

This study reports the concentration levels and distribution pattern of the organochlorine pesticide (OCPs) residues in the soil and surface water samples collected from the northern Indo-Gangetic alluvial plains. A total of 31 soil and 23 surface water samples were collected from the study region in Unnao district covering an area of 2150 km^2 and analyzed for aldrin, dieldrin, endrin, HCB, HCH isomers, DDT isomers/metabolites, endosulfan isomers (α and β), endosulfan sulfate, heptachlor and its metabolites, α-chlordane, γ-chlordane and methoxychlor. In both the soil and surface water samples β- and δ-isomers of HCH were detected most frequently, whereas, methoxychlor was the least detected pesticide. The results showed contamination of soil and surface water of the region with several persistent organic pesticides. The total OCPs level ranged from 0.36–104.50 ng g^{-1} and 2.63–3.72 $\mu g\ L^{-1}$ in soil and surface water samples, respectively.

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http://www.springerlink.com/content/r1330016t2g76824/
Integrated Pest Management: Innovation-Development Process
2009, 113-129, DOI: 10.1007/978-1-4020-8992-3_5

Economic and Ecological Externalities of Pesticide Use in India

P.K. Shetty and Marium Sabitha

Abstract

India is among the largest agricultural societies in the world as the agricultural sector provides livelihood to the majority of its one billion people. Modern agriculture use inputs such as chemical fertilizers, pesticides, seeds of high yielding varieties and mechanization that aided in increased yields ushering an era of green revolution in the country. Synthetic pesticides are one of the major agro-inputs that significantly contributed to the agricultural production in the country. These chemicals have become an inevitable input and constitute an integral part of modern crop-management practices. Pesticides may have helped in enhancing agricultural production, but at the same time these chemicals have caused adverse effects. This paper discusses the economic and ecological implications of pesticide use in India.

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http://www.springerlink.com/content/vq1278x63qw872x2/
Bulletin of Environmental Contamination and Toxicology (2012)
DOI: 10.1007/s00128-012-0546-6

Organochlorine Pesticide Residues in Blood Samples of Agriculture and Sheep Wool Workers in Bangalore (Rural), India

V. Dhananjayan, B. Ravichandran and H. R. Rajmohan

Abstract

To describe exposure level of organochlorine pesticides (OCP) among workers occupationally engaged in agriculture and sheep wool associated jobs, the present study was carried out in rural neighborhood of Bangalore city, India. Thirty participants were interviewed and obtained informed consent before blood sample collection. The maximum concentrations of OCP were detected in blood samples of agriculture workers than sheep wool workers. Among the metabolites of HCH and DDT, lindane (γ-HCH) and *p,p'*-DDE were the most contributed to the total OCP. There were no differences in pesticide residues found between sex and work groups. It was observed that about 30% of samples exceeded the tolerance limits of 10 μg/L prescribed for HCH under the prevention of food adulteration act. Therefore, the present study recommends continuous monitoring with larger sample size.

http://www.springerlink.com/content/q11h4j22m01552h6/
Bulletin of Environmental Contamination and Toxicology
Volume 80, Number 5, 428-430, DOI: 10.1007/s00128-008-9423-8

Residues of Dioxin in Egg Samples Collected from West Zone of India

Rekha Kashyap, Vijay Bhatnagar, Harsiddha G. Sadhu, Bhavana Arora, Nisha Jhamb and Rupal Karanjkar

Abstract

The residues of the congeners of dioxin and furan have been identified in the egg samples collected from the western zone of the India. The samples were collected from the chicken grown in sites where Municipal Corporation incinerates the municipal and hazardous wastes. All the samples showed the presence of the residues of PCDDs/Fs. The mean TEQ of dioxin and furan were 7.10 pg/g and 0.39 pg/g respectively.

http://www.springerlink.com/content/r6r2864r714n8488/
Environmental Monitoring and Assessment
Volume 174, Numbers 1-4, 327-335, DOI: 10.1007/s10661-010-1460-1

Persistent organochlorine pesticide residues in animal feed

Subir Kumar Nag and Mukesh K. Raikwar

From the issue entitled "Special Issue: Long-term ecosystem research: Understanding the present to shape the future"

Abstract

Animal products like milk and meat are often found to be contaminated with residues of persistent pesticides and other toxic substances. The major source of entry of these compounds to animal body is the contaminated feed and fodder. So, unless the residues are managed at this stage, it is very difficult to prevent contamination in milk and meat. Therefore, the status of residue level of most persistent organochlorinated pesticides (OCP) in feed and fodder should be monitored regularly. The frequency of occurrence and contamination levels of OCP residues in different kinds of animal concentrate feed and straw samples collected from Bundelkhand region of India were determined. Out of 533 total samples, 301 i.e. 56.47% samples were positive containing residues of different OCPs like hexachlorocyclohexane (HCH) isomers, dichlorodiphenyltrichloroethane (DDT) complex, endosulfan and dicofol. Among different HCH isomers, the mean concentration of β-HCH was highest, and total HCH varied from 0.01 to 0.306 mg kg^{-1}. In case of DDT complex, i.e. DDD, DDE and DDT, the concentration ranged between 0.016 and 0.118 mg $kg^{□□□1}$ and the pp^{l} isomers were more frequently encountered than their op^{l} counterparts. Endosulfan was also found in some samples in concentration ranging from 0.009 to 0.237 mg/kg, but dicofol could be recorded in very few samples. Although feed samples were found to contain OC residues, after comparing their levels in positive samples with the limiting values of respective pesticides, only very few were found to exceed the threshold level. Otherwise, they were mostly within safe limits.

http://www.springerlink.com/content/p0853270388632g1/
Environmental Monitoring and Assessment
Volume 87, Number 3, 311-318, DOI: 10.1023/A:1024869505573

Magnitude of Pesticidal Contamination in Winter Vegetables from Hisar, Haryana

Beena Kumari, R. Kumar, V. K. Madan, Rajvir Singh, Jagdeep Singh and T. S. Kathpal

Abstract

Monitoring of 80 winter vegetable samples during 1997–1998 for pesticidal contamination was carried out on GC-ECD and GC-NPD systems with capillary columns following multiresidueanalytical technique. The tested samples were found 100% contaminated with low but measurable amounts of pesticideresidues. Among the four major chemical groups, residue levels oforganophosphorous insecticides were highest followed bicarbamates, synthetic pyrethroids and organochlorines. About 32%of the samples showed contamination with organophosphorous and carbamate insecticides above their respective MRL values. On thebasis of observations made in these studies, it is suggested thatmore extensive monitoring studies covering all vegetable cropsfrom different agro-climatic regions of the state be carried outto know exact level of pesticidal contamination, which may serveas basis for future policy on chemical use.

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http://www.springerlink.com/content/vhuc15ew5vka3f3b/
Environmental Monitoring and Assessment
Volume 74, Number 3, 263-270, DOI: 10.1023/A:1014248827898

Monitoring of Seasonal Vegetables for Pesticide Residues

Beena Kumari, V. K. Madan, R. Kumar and T. S. Kathpal

Abstract

Market samples (60) of six seasonal vegetables were monitored during 1996–1997 to determine the magnitude of pesticidal contamination. The estimation of insecticide residues representing four major chemical groups i.e. organochlorine, organophosphorous, synthetic pyrethroid and carbamate, was done by adopting a multi-residue analytical technique employing GC-ECD and GC-NPD systems with capillary columns. The tested samples showed 100% contamination with low but measurable amounts of residues. Among the four chemical groups, theorganophosphates were dominant followed by organochlorines,synthetic pyrethroids and carbamates. About 23% of the samples showed contamination with organophosphorous compounds above their respective MRL values. More extensive studies covering different regions of Haryana state are suggested to get a clear idea of the magnitude of vegetable contamination with pesticide residues.

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http://www.springerlink.com/content/m751262231108610/
Environmental Monitoring and Assessment
Volume 136, Numbers 1-3, 239-244, DOI: 10.1007/s10661-007-9679-1

Status of insecticide contamination of soil and water in Haryana, India

Beena Kumari, V. K. Madan and T. S. Kathpal

Abstract

Twelve samples each of soil and ground water were collected from paddy-wheat, paddy-cotton, sugarcane fields and tube wells from same or near by fields around Hisar, Haryana, India during 2002–2003 to monitor pesticide residues. Residues were estimated by GC-ECD and GC-NPD systems equipped with capillary columns for organochlorine, synthetic pyrethroid and organophosphate insecticides. In soil, HCH (0.002–0.051 □g $g^{□1}$), DDT (0.001–0.066 □g $g^{□1}$), endosulfan (0.002–0.039 □g $g^{□1}$) and chlordane (0.0002–0.019 □g $g^{□1}$) among organochlorines, cypermethrin (0.001–0.035 □g $g^{□1}$) and fenvalerate (0.001–0.022 □g $g^{□1}$) among synthetic pyrethroids and chlorpyriphos (0.002–0.172 □g $g^{□1}$), malathion (0.002–0.008 □g $g^{□1}$), quinalphos (0.001–0.010 □g

g$^{\square 1}$) among organophosphates were detected. Dominant contaminants were DDT, cypermethrin and chlorpyriphos from the respective groups. In water samples, HCH, DDT, endosulfan and cypermethrin residues were observed frequently. Only chlorpyriphos among organophosphates was detected in 10 samples. On consideration of tube well water for drinking purpose, about 80% samples were found to contain residues above the regulatory limits.

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http://www.springerlink.com/content/lg12163075757550/
Environmental Monitoring and Assessment
Volume 90, Numbers 1-3, 65-71, DOI: 10.1023/B:EMAS.0000003566.63111.f6

Monitoring of Pesticidal Contamination of Farmgate Vegetables from Hisar

Beena Kumari, V. K. Madan, Jagdeep Singh, Shashi Singh and T. S. Kathpal

Abstract

Analysis of 84 farm gate samples of seasonal vegetables carried out on GC-ECD and GC-NPD systems equipped with capillary columns by using a multi residue analytical technique revealed that 26% samples contained residues above MRL values. The contamination was mainly with organophosphates followed by synthetic pyrethroids and organochlorines. Among organophosphates, residues of monocrotophos, quinalphos and chlorpyriphos exceeded the MRL value in 23% samples. Residues of monocrotophos were higher than MRL value in 3 samples of brinjal and one sample each of okra, cauliflower and smooth gourd, of chlorpyriphos in 3 samples of cauliflower and 8 of cabbage and of quinalphos in one sample each of okra and cauliflower. Among synthetic pyrethroids, cypermethrin was the major contaminantand its residue exceeded the MRL value in one sample each of brinjal, okra and cucumber. Only aldicarb among the carbamates was detected in potato. The residues of some organochlorines,i.e. HCH, DDT and endosulfan were found in all the samples but did not exceed the tolerence limit.

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http://www.springerlink.com/content/nuk87x31761v1m23/
Environmental Monitoring and Assessment
Volume 105, Numbers 1-3, 111-120, DOI: 10.1007/s10661-005-3159-2

Monitoring of Butter and Ghee (Clarified Butter Fat) for Pesticidal Contamination from Cotton Belt of Haryana, India

Beena Kumari, Jagdeep Singh, Shashi Singh and T. S. Kathpal

Abstract

Butter (45) and ghee (55) samples were collected from rural and urban areas of cotton growing belt of Haryana and analysed for detecting the residues of organochlorine, synthetic pyrethroid and organophosphate insecticides. The estimation was carried out by using multi residue analytical technique employing GC-ECD and GC-NPD systems equipped with capillary columns. Butter samples were comparatively more contaminated (97%) than ghee (94%), showing more contamination with organochlorine insecticides from urban samples. About 11% samples of butter showed endosulfan residues above MRL value and 2% samples had residues of synthetic pyrethroids and organophosphates each above their respective MRL values. In ghee, residues of HCH & DDT both and of endosulfan exceeded the MRL values in 5 and 20% samples, respectively. Among organophosphates, only chlorpyriphos was detected with 9% samples showing its residue above MRL value. Irrespective of contamination levels, residues above the MRL values were more in ghee. More extensive study covering other agricultural regions/zones of Haryana has been suggested to know the overall scenario of contamination of milk products.

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http://www.springerlink.com/content/75u0414852342489/
Environmental Monitoring and Assessment
Volume 110, Numbers 1-3, 341-346, DOI: 10.1007/s10661-005-8043-6

Monitoring of Organochlorine Pesticide Residues in Summer and Winter Vegetables from Agra, India – A case study

Mayank Bhanti and Ajay Taneja

Abstract

Analysis of summer and winter vegetable samples during 2002–2003 for pesticidal contamination was carried out on Gas Chromatograph-Electron Capture Detector with capillary columns. The contamination levels of winter vegetables (average concentration of 4.57, 6.80 and 5.47 ppb respectively for Lindane, Endosulphan and DDT) were found to be slightly higher than the summer vegetables (average concentration of 4.47, 3.14 and 2.82 ppb respectively for Lindane, Endosulphan and DDT). The concentration of these organochlorine pesticides in summer and winter vegetables were well below the established tolerances but continuous consumption of such vegetables even with moderate contamination level can accumulate in the receptor's body and may lead to chronic effects that could be fatal.

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http://www.ncbi.nlm.nih.gov/pubmed/20632088
Environ Monit Assess. 2011 May;176(1-4):465-72. Epub 2010 Jul 16.

Monitoring of pesticide residues in market basket samples of vegetable from Lucknow City, India: QuEChERS method.

Srivastava AK, Trivedi P, Srivastava MK, Lohani M, Srivastava LP.

Abstract

The study was conducted on 20 vegetables including leafy, root, modified stem, and fruity vegetables like bitter gourd, jack fruit, french-bean, onion, colocassia, pointed gourd, capsicum, spinach, potato, fenugreek seeds, carrot, radish, cucumber, beetroot, brinjal, cauliflower, cabbage, tomato, okra, and bottle gourd. Forty-eight pesticides including 13 organochlorines (OCs), 17 organophosphates (OPs), 10 synthetic pyrethriods (SPs), and eight herbicides (H) pesticides were analyzed. A total number of 60 samples, each in triplicates, were analyzed using Quick, Easy, Cheap, Effective, Rugged, and Safe method. The quantification was done by GC-ECD/NPD. The recovery varies from 70.22% to 96.32% with relative standard deviation (RSD) of 15%. However the limit of detection ranged from 0.001-0.009 mg kg(-1)for OCs, SPs, OPs, and H, respectively. Twenty-three pesticides were detected from total 48 analyzed pesticides in the samples with the range of 0.005-12.35 mg kg(-1). The detected pesticides were: ☐-HCH, Dicofol, ☐-Endosulfan, Fenpropathrin, Permethrin-II, ☐-cyfluthrin-II, Fenvalerate-I, Dichlorvos, Dimethoate, Diazinon, Malathion, Chlorofenvinfos, Anilophos, and Dimethachlor. In some vegetables like radish, cucumber, cauliflower, cabbage, and okra, the detected pesticides (☐-HCH, Permethrin-II, Dichlorvos, and Chlorofenvinfos) were above maximum residues limit (MRL) (PFA 1954). However, in other vegetables the level of pesticide residues was either below detection limit or MRL.

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http://www.ncbi.nlm.nih.gov/pubmed/12858967
Environ Monit Assess. 2003 Aug;86(3):265-71.

Pesticides residues in vegetables in and around Delhi.

Mukherjee I.

Source: Division of Agricultural Chemicals, Indian Agricultural Research Institute, New Delhi, India. drirani@yahoo.com

Abstract

This article presents the development of a multiresidue method for the estimation of 30 insecticides, 15 organochlorine insecticides and 6 organophosphorus insecticides, 9 synthetic pyrethriods and 2 herbicides and their quantification in vegetables. The monitoring study indicates that though all the vegetable samples were contaminated with pesticides, only 31% of the samples contained pesticides above the prescribed tolerance limit.

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http://www.ncbi.nlm.nih.gov/pubmed/15138033
Toxicology. 2004 May 20;198(1-3):83-90.

Pesticide exposure--Indian scene.

Gupta PK.

Source: Toxicology Consulting Services Inc., C-44, Rajinder Nagar, Bareilly 243122, UP, India. drpkg_brly@sancharnet.in

Abstract

Use of pesticides in India began in 1948 when DDT was imported for malaria control and BHC for locust control. India started pesticide production with manufacturing plant for DDT and benzene hexachloride (BHC) (HCH) in the year 1952. In 1958, India was producing over 5000 metric tonnes of pesticides. Currently, there are approximately 145 pesticides registered for use, and production has increased to approximately 85,000 metric tonnes. Rampant use of these chemicals has given rise to several short-term and long-term adverse effects of these chemicals. The first report of poisoning due to pesticides in India came from Kerala in 1958 where, over 100 people died after consuming wheat flour contaminated with parathion. Subsequently several cases of pesticide-poisoning including the Bhopal disaster have been reported. Despite the fact that the consumption of pesticides in India is still very low, about 0.5 kg/ha of pesticides against 6.60 and 12.0 kg/ha in Korea and Japan, respectively, there has been a widespread contamination of food commodities with pesticide residues, basically due to non-judicious use of pesticides. In India, 51% of food commodities are contaminated with pesticide residues and out of these, 20% have pesticides residues above the maximum residue level values on a worldwide basis. It has been observed that their long-term, low-dose exposure are increasingly linked to human health effects such as immune-suppression, hormone disruption, diminished intelligence, reproductive abnormalities, and cancer. In this light, problems of pesticide safety, regulation of pesticide use, use of biotechnology, and biopesticides, and use of pesticides obtained from natural plant sources such as neem extracts are some of the future strategies for minimizing human exposure to pesticides.

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http://www.ncbi.nlm.nih.gov/pubmed/12597566
J Environ Biol. 2002 Jul;23(3):247-52.

Evaluation of organochlorine insecticide residue levels in locally marketed vegetables of Jaipur City, Rajasthan, India.

Bakore N, John PJ, Bhatnagar P.

Source: Environmental Toxicology Unit, Department of Zoology, University of Rajasthan, Jaipur 302 004, India.

Abstract

Considerable quantities of organochlorine insecticides are still used worldwide and their persistent residues are widely distributed throughout the environment. Various researchers from different parts of India and abroad have highlighted the extent of pollution caused by these insecticides. In view of the above facts the present study was conducted during 1993-1996 to investigate the magnitude of contamination of organochlorine insecticides in vegetables which were brought for sale to the consumers in the local markets of Jaipur city, Rajasthan, India. Samples of vegetables (potato, tomato, cabbage, cauliflower, spinach and okra) were collected at beginning, middle and end of the seasons with respect to different vegetables and organochlorine levels were assessed using Gas Liquid Chromatograph (GLC) equipped with Electron Capture Detector (ECD). Most of the collected samples were found to be contaminated with residues of DDT and its metabolites (DDD, DDE) isomers of HCH (alpha,beta and gamma-HCH), heptachlor, heptachlor epoxide and aldrin. Some of the detected insecticides exceeded the limit of tolerance prescribed by WHO/FAO.

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http://www.ncbi.nlm.nih.gov/pubmed/11944799
Environ Monit Assess. 2002 Mar;74(3):263-70.

Monitoring of seasonal vegetables for pesticide residues.

Kumari B, Madan VK, Kumar R, Kathpal TS.

Source: Department of Entomology, CCS Haryana Agricultural University, Hisar, India. coag.hau@hau.nic.in

Abstract

Market samples (60) of six seasonal vegetables were monitored during 1996-1997 to determine the magnitude of pesticidal contamination. The estimation of insecticide residues representing four major chemical groups i.e. organochlorine, organophosphorous, synthetic pyrethroid and carbamate, was done by adopting a multiresidue analytical technique employing GC-ECD and GC-NPD systems with capillary columns. The tested samples showed 100% contamination with low but measurable amounts of residues. Among the four chemical groups, the organophosphates were dominant followed by organochlorines, synthetic pyrethroids and carbamates. About 23% of the samples showed contamination with organophosphorous compounds above their respective MRL values. More extensive studies covering different regions of Haryana state are suggested to get a clear idea of the magnitude of vegetable contamination with pesticide residues.

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http://www.ncbi.nlm.nih.gov/pubmed/19297972
J Environ Biol. 2008 Nov;29(6):813-26.

Pesticide usage pattern in tea ecosystem, their retrospects and alternative measures.

Gurusubramanian G, Rahman A, Sarmah M, Ray S, Bora S.

Source: Department of Zoology, Mizoram Central University, Tanhril, Aizawl 796 001, India. gurus64@yahoo.com

Abstract

Tea is a perennial plantation crop grown under monoculture providing favorable conditions for a variety of pests. The concept of pest control has undergone a considerable change over the past few decades. In recent years there has been a greater dependence on the use of pesticides (7.35-16.75 kgha(-1)) with little importance laid on other safe control methods for the management of tea pests. Due to this practice, the tea pests showed a higher tolerance/ resistance status due to formation of greater amount of esterases, glutathione S-transferase and acetylcholinesterase. Thus, over reliance on pesticides end up with pesticide residue in made tea (DDT - 10.4-47.1%; endosulfan - 41.1-98.0%; dicofol- 0.0-82.4%; ethion - 0.0-36.2%; cypermethrin - 6.0- 45.1%). The growing concern about the pesticide residue in made tea, its toxicity hazards to consumers, the spiraling cost of pesticides and their application have necessitated a suitable planning which will ensure a safe, economic as well as effective pest management in tea. At present it is a global concern to minimize chemical residue in tea and European union and German law imposed stringent measures for the application of chemicals in tea and fixed MRL values at < or = 0. 1 mgkg(-1) for the most commonly used pesticides which will not be met out in the real practice and has been a major constraint to tea exporting countries like India. In order to regulate the situation of the Indian market at global level, central insecticide board and prevention of food adulteration regulation committee have reviewed the MRL position for tea and has recommended 10 insecticides, 5 acaricides, 9 herbicides and 5 fungicides for use in tea and issued the tea distribution and export control order 2005 which will help the country to limit the presence of undesirable substances in tea. This review attempts to provide the readers with a comprehensive account of pesticide use in North East in tea, surveillance report of the European community regarding the residue level in Assam and Darjeeling tea, recent amendments by international and national regulatory bodies, revised MRL values of pesticides in tea, an update about the current strategies for the management of tea pests with more focus on the use of biological control agents and a possible beneficial role or judicious use of chemical pesticides in complement with other alternative measures to achieve optimum effects in terms of limiting agricultural input, lowering production costs, reducing environmental contamination and the effect on non-target organisms, delaying the development of resistant pest biotypes and above all minimizing the pesticide residues in tea to increase the exports.

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http://www.ncbi.nlm.nih.gov/pubmed/19081675
J Hazard Mater. 2009 Jun 15;165(1-3):1-12. Epub 2008 Nov 1.

Pesticide use and application: an Indian scenario.

Abhilash PC, Singh N.

Source: Eco-Auditing Group, National Botanical Research Institute, Council of Scientific and Industrial Research, Rana Pratap Marg, Lucknow, Uttar Pradesh, India.

Abstract

Agricultural development continues to remain the most important objective of Indian planning and policy. In the process of development of agriculture, pesticides have become an important tool as a plant protection agent for boosting food production. Further, pesticides play a significant role by keeping many dreadful diseases. However, exposure to pesticides both occupationally and environmentally causes a range of human health problems. It has been observed that the pesticides exposures are increasingly linked to immune suppression, hormone disruption, diminished intelligence, reproductive abnormalities and cancer. Currently, India is the largest producer of pesticides in Asia and ranks twelfth in the world for the use of pesticides. A vast majority of the

population in India is engaged in agriculture and is therefore exposed to the pesticides used in agriculture. Although Indian average consumption of pesticide is far lower than many other developed economies, the problem of pesticide residue is very high in India. Pesticide residue in several crops has also affected the export of agricultural commodities in the last few years. In this context, pesticide safety, regulation of pesticide use, proper application technologies, and integrated pest management are some of the key strategies for minimizing human exposure to pesticides. There is a dearth of studies related to these issues in India. Therefore, the thrust of this paper was to review the technology of application of pesticides in India and recommend future strategies for the rational use of pesticides and minimizing the problems related to health and environment.

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http://www.ncbi.nlm.nih.gov/pubmed/18506381
Bull Environ Contam Toxicol. 2008 May;80(5):417-22. Epub 2008 May 28.

Pesticide residues in honey samples from Himachal Pradesh (India).

Choudhary A, Sharma DC.

Abstract

Honey, being a natural product manufactured by honey bees is considered to be free from any extraneous material. The over-reliance on pesticides caused several environmental problems including pesticide residues in food. This constitutes a potential risk for human health, because of their sub acute and chronic toxicity. Therefore this study was carried out to know the extent of pesticide residue in honey produced in the various parts of Himachal Pradesh. Among different pesticides analysed in honey; HCH and its isomers were the most frequently detected followed by DDT and its isomers. Of the studied synthetic pyrethroids, only cypermethrin was found in honey samples. Residues of organophosphates viz. acephate, chlorpyriphos, ethion and monocrotophos were not detected, however malathion's residue was found exceeding the MRL (5 ppb) proposed by the Ministry of Commerce, Government of India. More over honey from natural vegetation contained lesser residues. It can be concluded that honey from Himachal Pradesh had low pesticide residues.

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http://www.ncbi.nlm.nih.gov/pubmed/18472552
J Environ Sci Eng. 2007 Jan;49(1):7-12.

Organochlorine residuals in groundwater of Pondicherry region.

Sivasankaran MA, Reddy SS, Govindaradjane S, Ramesh R.

Source: Department of Civil Engineering, Pondicherry Engineering College, Pondicherry.

Abstract

Nineteen representative water samples were collected from surface and ground water sources, covering urban, rural area, shallow and deep aquifers in Pondicherry region. The samples were analysed for various pesticide residues such as HCH, Aldrin and DDT. Both surface and ground water sources found to exhibit the residuals of various pesticides. The residual levels of organochlorine pesticides were found to be three to four times more in ground water sources of agricultural areas than in urban areas, indicating the impact of usage of pesticides for agriculture. It is evident that total residuals of organochlorine pesticides are more in tanks followed by shallow wells and deep wells. However, the residual levels of pesticides were found well below the maximum acceptable level of 100 ng/L for individual pesticides for drinking purpose in the study area. Though the residual levels of pesticides in the study area were well below the acute toxicological problems, the major concern is for long term, chronic exposure from compounds that may be carcinogenic.

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http://www.ncbi.nlm.nih.gov/pubmed/12068943

Bull Environ Contam Toxicol. 2002 May;68(5):747-51.

Monitoring of pesticide residues in farmgate and market samples of vegetables in a semiarid, irrigated area.

Singh B, Gupta A.

Source

AICRP on Pesticide Residues, Agricultural Research Station, Durgapura, Jaipur, India.

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http://www.eco-web.com/edi/index.html

Multiresidue Analysis of Pesticides in Grapes in Bijapur District

By U. S. Pujeri, A. S. Pujari, S. C. Hiremath and M. S. Yadawe
June 2010

The Authors are lecturers at the S.B. Arts and K.C.P. Science College, in Bijapur, 586 103, Karnataka, India

Abstract
Fruit samples of grapes analyzed for pesticide residues employing multiresidue analysis by gas liquid chromatography. All the fruit samples showed the presence of residues with one or other group of pesticides. Some of the grape samples exceeded the quantification limit. The increasing interest in the study of pesticides in grapes is justified from an enological point of view, since some pesticides can interfere with fermentative microflora used in wine production, as well as affect consumer safety. In this paper, pesticide mobility on grapes was studied. There were no significant differences between some pesticide levels found in the whole grape (skin and pulp) and in the grape skin, chlorpyrifos, captan, dichlorvos, oxyfluorfen, fipronoil, 4-bromo-2-chlorophenol and indoxycarb were detected in the grape. Nevertheless, consumer intake of pesticides from grapes studied in this work should be decreased as a result of water washing of the grapes. In this paper, multiresidue determination of pesticides are discussed using GCMS-MS.

Distribution of pesticides in different commonly used vegetables from Hyderabad, India

Sukesh Narayan Sinha a,□, M. Vishnu Vardhana Rao b, K. Vasudev a

Accepted 22 September 2011; Food Research International 45 (2012) 161–169

Abstract

In this study, we assessed the exposure of urban populations to different classes of organophosphate pesticides due to the consumption of different types of vegetables. Liquid chromatography–mass spectrometry was used for quantification, while the quick, easy, cheap, effective, rugged and safe extraction method was used to isolate eighteen organophosphate pesticides found in vegetable samples (eggplant, ladyfinger, cauliflower, cabbage, tomato and chili) at concentration of □g/kg. This method was accurate (≥ 99.5%) and possessed a limit of detection and quantification in the range of 0.002–0.099 and 0.009–0.337 □g/kg respectively. The coefficients of variation (≥ 0.9999) were less than 2% at the low end of the linear range of the method. The mean recovery ranged between 94 and 103%, and the % relative standard deviation (RSD) was generally below 10%.

These results demonstrate that the methodology is both highly efficient and robust. The proposed method was successfully applied to the analysis of vegetable samples collected from different government farmer markets and street shops in urban areas. The mean concentration of chlorpyrifos in eggplant (24.02 □g/kg), cabbage (10.55 □g/kg), cauliflower (2.85 □g/kg), tomato (178.87 □g/kg) and ladyfinger (2.49 □g/kg) differed significantly (p b 0.002). Similarly, the mean concentration of triazophos in eggplant (0.863 □g/kg), cabbage (2.21 □g/kg), cauliflower (0.491 □g/kg), tomato (3.01 □g/kg) and ladyfinger (2.49 □g/kg) differed significantly (p b 0.007). A similar trend was observed for acephate, fenitrothion and phosalone. This study may be helpful in developing a regional exposure database and in facilitating assessment of health risks from pesticide exposure in our day-to-day lives.

Journal of Environmental Protection, 2011, 2, 511-524
doi:10.4236/jep.2011.25059 Published Online July 2011 (http://www.scirp.org/journal/jep)

Assessment of Organochlorine Pesticide Residues in the Surface Sediments of River Yamuna in Delhi, India

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ABSTRACT
The present study reports the concentration levels and distribution patterns of the organochlorine pesticide residues in the surface sediments of river Yamuna in the Indian capital state, Delhi. Analytical measurements were carried out for twenty organochlorine pesticides (*OCPs*) *in the Pre-monsoon, Monsoon and Post-monsoon seasons, at six different sampling locations along the* 22 *km stretch of the river Yamuna in Delhi. The results revealed contamination of the surface sediments with several persistent organochlorine pesticides. Endrin aldehyde, Endosulfan sulfate and DDT showed the highest percentage composition of OCP at all the sampling sites in all the three seasons. The total organochlorine pesticides level ranged from* 157.71 - 307.66 *ng/g in Pre-monsoon to* 195.86 - 577.74 *ng/g in Monsoon and* 306.9 - 844.45 *ng/g in the Post-monsoon season. This not only demonstrates the pollution of the river with pesticide residues, but also the necessity of a continuous long-term monitoring of the affected environment.*

Pesticide Research Journal Vol. 14(2): 302-307, December, 2002

Monitoring of Human Diet for Organochlorine Insecticide Residues

M.P. Shukla, Satya Pal Singh, R.C. Nigam and D.D. Tiwari

Department of Soil Science and Agricultural Chemistry
C.S.Azad University of Agriculture and Technology, Kanpur - 208002, India

Out of 20 samples of total-diet collected from in and around Kanpur during July to Oct. 1999 and analysed, 90% samples were found contaminated with pesticide residues. Magnitude of contamination was more in non- vegetarian than vegetarian diet. HCH, aldrin and dieldrin were the main contaminants. Average daily intake of their residues were more than their acceptable daily intakes (ADI) accounting 1448.22, 32.52 and 36.86 (jg/person/d through vegetarian and 1501.44, 95.93 and 367.02 ug/person/d through non- vegetarian diet, respectively.

Ecotoxicology and Environmental Safety
Volume 59, Issue 3, November 2004, Pages 324–331

Contamination of liquid milk and butter with pesticide residues in the Ludhiana district of Punjab state, India

R.S. Battu, Balwinder Singh, B.K. Kang

Pesticide Residue Laboratory, Department of Entomology, Punjab Agricultural University, Ludhiana, Punjab 141004, India

Abstract

An analysis of 92 samples of liquid milk from Ludhiana, India, during 1999–2001 revealed the presence of DDT in 6 (7.4%) samples and of these 2 samples were found to exceed the maximum residue limit (MRL) of DDT fixed at 0.05 mg $kg^{\square 1}$ (on a whole milk basis). HCH residues were detected in 49 (53.3%) samples and constituted only □-HCH (lindane). The MRL of lindane is fixed at 0.01 mg $kg^{\square 1}$ (whole milk basis), and all 49 liquid milk samples exceeded this value. These results are indicative of contamination of bovine milk with pesticideresidues as a result of the ban on the use of DDT and HCH in agriculture and public health programs. Similarly, analysis of 40 samples of butter showed the presence of DDT and HCH in 28 and 8 samples, respectively. However, none of the samples exceeded the MRL value of either DDT or any isomer of HCH. DDT residues comprised mainly *p*,*p*-DDE and *p*,*p*-TDE, whereas HCH residues were present as lindane in 6 samples, and 2 samples revealed the presence of □-HCH. The estimated daily intake of lindane through the consumption of contaminated liquid milk exceeded its acceptable daily intake value for children. Interestingly, none of the liquid milk or butter samples revealed the presence of any commonly used organophosphorus or synthetic pyrethroid insecticides at their detection limit of 0.01 mg $kg^{\square 1}$.

Environmental Pollution
Volume 85, Issue 2, 1994, Pages 147–151

Organochlorine pesticide residues in human milk in Punjab, India

- R.L. Kalra, Balwinder Singh, R.S. Battu
- Department of Entomology, Punjab Agricultural University, Ludhiana, Punjab, India
- Available online 7 July 2003.

Abstract

Human milk samples collected from areas having intensive cotton cultivation and sparse cotton cultivation in Punjab (India) were analysed for organochlorine insecticides. Both DDT and HCH were detected in almost all the samples analysed. The average levels of □-DDT and □-HCH residues in samples from cotton-growing areas were significantly higher than in those from areas where cotton is sparsely grown. Residues of □-DDT mainly comprised *p*, *p*□-DDT and *p*, *p*□-DDE, while those of □-HCH residues were mainly in the form of its □-isomer. Median values of 0·52 □g $g^{\square 1}$ of □-DDT and 0·19 □g $g^{\square 1}$ of □-HCH in samples of human milk from cotton-growing areas of Punjab (India) were higher than those reported from most other countries in the World.

Environmental Monitoring and Assessment
Volume 98, Numbers 1-3 (2004), 381-389, DOI: 10.1023/B:EMAS.0000038197.76047.83

Organochlorine Pesticide Residues in Wheat and Drinking Water Samples from Jaipur, Rajasthan, India

Neela Bakore, P. J. John and Pradeep Bhatnagar

Abstract

The organochlorine pesticide contamination in dietary sources has caused serious threat to the human progeny. The present study was therefore conducted to evaluate the pesticide contamination in wheat flour and drinking water from Jaipur City, Rajasthan, India using Gas Chromatograph. All the wheat and water samples were found to be contaminated with various organochlorine pesticide residues of DDT and its metabolites, HCH and its isomers, heptachlor and its expoxide and aldrin. The amount of pesticide detected in wheat flour was higher than the permissible limits prescribed by WHO/FAO. In drinking water only a few pesticides exceeded the permissible limits. Seasonal variations of pesticides residues were also observed during the study period.

Concentrations of pesticide residues in tissues of fish from Kolleru Lake in India

S. R. Amaraneni*, R. R. Pillala

Article first published online: 15 NOV 2001

Environmental Toxicology, Special Issue: 5th International Conference on Toxic Cyanobacteria Volume 16, Issue 6, pages 550–556, 2001

Abstract

Kolleru Lake is the largest natural freshwater lake of Andhra Pradesh in India. It is situated between latitudes 16°32□ and 16°47□N and longitudes 81°05□ and 81°27□E. The use of pesticides for agricultural purposes is widespread in the Kolleru Lake region. The biological indicators like fish help in the studies of aquatic pollution by pesticides. Fish species *Channa striata* and *Catla catla* and water samples were collected from Kolleru Lake in each of three seasons over a period of three years. Fish samples were analyzed according to a modified method which is proposed for the gas chromatographic determination for the pesticides viz., □-BHC, □-BHC, malathion, chloirpyrifos, isodrin, endosulfan, dieldrin, and p,p-DDT. Water samples were analyzed for selected physico-chemical parameters. The extraction efficiency for the selected pesticides is between 82.8% and 91.2%. The maximum concentrations of pesticide residues in Kolleru Lake fish on wet weight basis are 123.8 □g/g for □-BHC, 98.7 □g/g for □-BHC, 2.5 □g/g for malathion, 88.6 □g/g for chlorpyrifos, 0.91 □g/g for isodrin, 76.5 □g/g for endosulfan, 1.98 □g/g for dieldrin, and 157.4 □g/g for p,p□-DDT. These analyses were used to evaluate the baseline data and the pesticide pollution in the lake's ecosystem. Environ Toxicol 16: 550–556, 2001

Organochlorine pesticide residues in poultry feed, chicken muscle and eggs at a poultry farm in Punjab, India

Rabinder S Aulakh, Jatinder Paul S Gill, Jasbir S Bedi, Jagdish K Sharma, Balbir S Joia, Herbert W Ockerman

Journal of the Science of Food and Agriculture, Volume 86, Issue 5, pages 741–744, 15 April 2006

Abstract

Animals intended for human food may absorb pesticides from residues in their feed, water or during direct/indirect exposure in the course of pest control. The objective of the present investigation was to monitor organochlorine pesticide residues in poultry feed, chicken muscle and eggs at a selected poultry farm. The samples were Soxhlet extracted for 8 h in 200 mL hexane–acetone (1:1, v/v) mixture. The clean-up of the samples was performed by silica gel column chromatography and analysis was done on a gas chromatograph equipped with an electron capture detector. The mean total hexachlorocyclohexane (HCH) and dichlorodiphenyltrichloroethane (DDT), endosulfan sulfate

and heptachlor epoxide residues were 0.65, 0.91, 0.42 and 0.02 mg $kg^{\square 1}$, respectively, in feed while respective values for chicken muscle were 0.11, 0.24, 0.10 and 0.07 mg $kg^{\square 1}$. Higher residues were encountered in eggs as compared to muscle. None of the muscle samples exceeded maximum residue limits (MRL) for organochlorine pesticides, while all egg samples had values above the MRL for HCH and heptachlor epoxide and seven egg samples exceeded MRL for DDT residues. The results indicated that poultry feed could be one of the major sources of contamination for chicken and eggs. These residues are present despite complete ban on the use of technical HCH and DDT for agricultural purposes in India.

Environmental Monitoring and Assessment
Volume 74, Number 3 (2002), 263-270, DOI: 10.1023/A:1014248827898

Monitoring of Seasonal Vegetables for Pesticide Residues

Beena Kumari, V. K. Madan, R. Kumar and T. S. Kathpal

Abstract

Market samples (60) of six seasonal vegetables were monitored during 1996–1997 to determine the magnitude of pesticidal contamination. The estimation of insecticide residues representing four major chemical groups i.e. organochlorine, organophosphorous, synthetic pyrethroid and carbamate, was doneby adopting a multiresidue analytical technique employing GC-ECD and GC-NPD systems with capillary columns. The tested samples showed 100% contamination with low but measurable amounts of residues. Among the four chemical groups, the organophosphates were dominant followed by organochlorines, synthetic pyrethroids and carbamates. About 23% of the samples showed contamination with organophosphorous compounds above their respective MRL values. More extensive studies covering different regions of Haryana state are suggested to get a clear idea of the magnitude of vegetable contamination with pesticide residues.

Risk assessment through dietary intake of total diet contaminated with pesticideresidues in Punjab, India, 1999–2002

R.S. Battu, Balwinder Singh, B.K. Kang, B.S. Joia

Pesticide Residue Laboratory, Department of Entomology, Punjab Agricultural University, Ludhiana, Punjab 141004, India

Ecotoxicology and Environmental Safety, Volume 62, Issue 1, September 2005, Pages 132–139

Abstract

Forty-six samples each of vegetarian and non-vegetarian total diet consumed from March 1999 to December 2002 by male subjects in the age group of 19–24 years were analyzed to assess their risk through dietary intake with respect to pesticide residues. The results revealed low dietary intake of levels of □-dichlorodiphenyltrichloroethane (DDT) and which were almost comparable to levels reported in developed countries. The results are indicative of contamination of total diet with pesticide residues despite a ban on the use of DDT and restricted use of lindane in agriculture only. Predominance of lindane residues indicates that liquid milk was a main contributory source as it comprises almost 21% to the total diet consumed per day. Concerted efforts by regulatory authorities and emphasis on judicious use of agrochemicals in pest control are required to decrease the burden of these chemicals in food stuffs to levels safe for dietary intake

Environmental Monitoring and Assessment
Volume 133, Numbers 1-3 (2007), 467-471, DOI: 10.1007/s10661-006-9601-2

Pesticide residues in rain water from Hisar, India

Beena Kumari, V. K. Madan and T. S. Kathpal

Abstract

Presence of pesticide residues was studied in rain water during 2002 employing multi residue analysis method by gas liquid chromatography equipped with ECD and NPD detectors and capillary columns. The presence of pesticide residues in surface aquatic system triggered the investigation of the presence of pesticides in rain water. A total of 13 pesticides were detected in rain water samples. Among the different groups of pesticides, organochlorines were present in the range of 0.041–7.060 ppb with maximum concentration of p,p′-DDT up to 7.060 □g $l^{□1}$. Synthetic pyrethroids were present ranging from 0.100 to 1.000 □g $l^{□1}$ and organophosphates in the range of 0.050–4.000 □g $l^{□1}$ showing maximum contamination with cypermethrin (1.000 □g $l^{□1}$) and monocrotophos (4.000 □g $l^{□1}$) of the respective groups. Almost 80% samples showed the residues above MRL of 0.5 ppb fixed for multi residues and on the basis of single pesticide, 16–50% samples contained residues above the MRL value of 0.1 ppb.

Environmental Monitoring and Assessment
Volume 128, Numbers 1-3 (2007), 209-215, DOI: 10.1007/s10661-006-9306-6

Original Article

Organochlorine pesticide residues in ground water of Thiruvallur district, India

R. Jayashree and N. Vasudevan

Abstract

Modern agriculture practices reveal an increase in use of pesticides and fertilizers to meet the food demand of increasing population which results in contamination of the environment. In India crop production increased to 100% but the cropping area has increased marginally by 20%. Pesticides have played a major role in achieving the maximum crop production, but maximum usage and accumulation of pesticide residues was highly detrimental to aquatic and other ecosystem. The present study was chosen to know the level of organochlorines contamination in ground water of Thiruvallur district, Tamil Nadu, India. The samples were highly contaminated with DDT, HCH, endosulfan and their derivatives. Among the HCH derivatives, Gamma HCH residues was found maximum of 9.8 □g/l in Arumbakkam open wells. Concentrations of pp-DDT and op-DDT were 14.3 □g/l and 0.8 □g/l. The maximum residue (15.9 □g/l) of endosulfan sulfate was recorded in Kandigai village bore well. The study showed that the ground water samples were highly contaminated with organochlorine residues.

Food and Chemical Toxicology, Volume 46, Issue 7, July 2008, Pages 2533–2539

Pesticide residues and reproductive dysfunction in different vertebrates from north India

Pratap B. Singh, Vandana Singh, P.K. Nayak

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Abstract

Organochlorines (isomers of hexachlorocyclohexane – HCHs and metabolites of dichlorodiphenyltrichloroethane – DDTs, aldrin and endosulfan) and organophosphate (chlorpyrifos) insecticide residues were investigated by gas liquid chromatography in the blood of fish, chick, goat and man. The plasma levels of testosterone (T) and estradiol-17□ (E2) was measured by radioimmunoassay in the catfish *Rita rita* captured from unpolluted reference site and polluted river Gomti during prespawning phase. Results indicated that in *R. rita* the □DDT, □HCH, endosulfan, aldrin, chlorpyrifos in blood levels were in preferential order (□DDT > □HCH > endosulfan > aldrin > chlorpyrifos) of their bioaccumulation. The blood levels of □HCH and □DDT also showed high levels in chick, goat and man, and preferential order of bioaccumulation was goat > chick > man > fish. The □DDT also showed preferential order (man > chick > goat > fish) of bioaccumulation. Among the different tissues of fish (blood, liver, brain and ovary) the □DDT was very high as compared to □HCH as well as the rest of tissues which was very selective bioconcentration in different tissues of fish during prespawning phase. The gonado-somatic index, T and E2 declined in the catfish captured from polluted river when compared with the catfish captured from reference site affecting reproductive physiology. Our results indicated that increase of insecticides in blood level in vertebrates causes reproductive dysfunction and suggested that for human beings food like fish, chick and goat containing beyond permissible limit of insecticides must be avoided.

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Pesticide residue level in tea ecosystems of Hill and Dooars regions of West Bengal, India

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Abstract

In the present study we quantified the residues of organophosphorus (e.g. ethion and chlorpyrifos), organochlorine (e.g. heptachlor, dicofol, □-endosulfan, □-endosulfan, endosulfan sulfate) and synthetic pyrethroid (e.g. cypermethrin and deltamethrin) pesticides in made tea, fresh tea leaves, soils and water bodies from selected tea gardens in the Dooars and Hill regions of West Bengal, India during April and November, 2006. The organophosphorus (OP) pesticide residues were detected in 100% substrate samples of made tea, fresh tea leaves and soil in the Dooars region. In the Hill region, 20% to 40% of the substrate samples contained residues of organophosphorus (OP) pesticides. The organochlorine (OC) pesticide residues were detected in 33% to 100% of the substrate samples, excluding the water bodies in the Dooars region and 0% to 40% in the Hill region. The estimated mean totals of studied pesticides were higher in fresh tea leaves than in made tea and soils. The synthetic pyrethroid (SP) pesticide residues could not be detected in the soils of both the regions and in the water bodies of the Dooars. Sixteen percent and 20% of the made tea samples exceeded the MRL level of chlorpyrifos in Dooars and Hill regions respectively. The residues of heptachlor exceeded the MRL in 33% (April) and 100% (November) in the Dooars and 40% (April) and 20% (November) in the Hill region. Based on the study it was revealed that the residues of banned items like heptachlor and chlorpyrifos in made tea may pose health hazards to the consumers.

Assessment of risk to public health posed by persistent organochlorine pesticide residues in milk and milk products in Mumbai, India

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The risk posed by the presence of organochlorine pesticides in milk and milk products was estimated for the population of Mumbai. To determine the levels of organochlorine pesticides in milk and milk products, a monitoring study was carried out in and around Mumbai City. 520 samples of milk and milk products of different brands were considered in this study. A survey was also conducted to determine the mean daily consumption of milk and milk products by different age groups and this data was used to evaluate the daily exposure to the public. Non-cancer effects were evaluated by comparing the predicted exposure distributions to the published guidance values. For chemicals identified as potential human carcinogens, cancer risk was evaluated using standard methodology. The majority of the chlorinated pesticides identified in the milk and milk product samples studied were found to be at levels which do not pose unacceptable risks to the public, with the exception of ☐-HCH. The cancer risk estimated for this chemical slightly exceeds the US EPA guidance value.

Contamination of vegetables of different seasons with organophosphorous pesticides and related health risk assessment in northern India

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Abstract

India is an agrarian country. The use of pesticides, herbicides and fungicides were introduced in India during the mid-sixties, which are now being used on a large scale and is a common feature of Indian agriculture. The main intention of the introduction of pesticides was to prevent and control insects, pests and diseases in the field crops. Initially the use of pesticides reduced pest attack and paved way for increasing the crop yield as expected. Simultaneously, increased use of chemical pesticides has resulted in contamination of environment and also caused many long-term affect on the society. In the present study an effort has been made to evaluate the residual concentration of selected organophosphorous pesticides (methyl parathion, chlorpyriphos and malathion) in vegetables grown in different seasons (summer, rainy and winter). Data obtained was then used for estimating the potential health risk associated with the exposure to these pesticides. The pesticides residue concentrations in vegetables of different season shows that the winter vegetables are the most contaminated followed by summer and rainy vegetables. The concentration of the various pesticides were well below the established tolerances but continuous consumption of such vegetables even with moderate contamination level can accumulate in the receptor's body and may prove fatal for human population in the long term. The analysis of health risk estimates indicated that chlorpyriphos and malathion did not poses a direct hazard, however, exposure to methyl parathion has been found to pose some risk to human health.

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Pesticide bioaccumulation and plasma sex steroids in fishes during breeding phase from north India

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Abstract

The investigation was done to monitor the total hexachlorocyclohexane (∑HCH) and total dichlorodiphenyltrichloroethane (∑DDT), aldrin, endosulfan and chlorpyrifos in liver, brain and ovary, gonadosomatic index (GSI) and plasma levels of testosterone (T) and estradiol-17□ (E2) during breeding season of captured catfishes and carps from the unpolluted ponds of Gujartal, Jaunpur (reference site) and polluted rivers Gomti, Jaunpur and Ganga, Varanasi. Results have indicated that catfishes have higher bioaccumulation of pesticides than the carps, which was beyond the permissible limits for ∑HCH whereas ∑DDT only by catfishes of polluted rivers. The GSI and plasma levels of T and E2 were lowered in the fishes captured from the polluted rivers. In conclusion, the fishes from river Gomti and Ganga showed a high degree of contamination and disrupted reproductive axis when compared to those from the reference site reflecting the degree of pesticide pollution present in those water bodies.

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Marine Pollution and Ecotoxicology

Organochlorine pesticide contamination of ground water in the city of Hyderabad

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Abstract

Organochlorine pesticides are ubiquitous and persistent organic pollutants used widely throughout the world. Due to the extensive use in agriculture, organic environmental contaminants such as HCH, DDT along with other organochlorine pesticides are distributed globally by transport through air and water. The main aim of present study is to determine contamination levels of organochlorine pesticides in the ground water of Hyderabad City. Water samples were collected from 28 domestic well supplies of the city. For this study, random sampling technique was applied, all the samples were collected in high purity glass bottles and refrigerated at 4 °C until analysis. Solid Phase Extraction (SPE) is used for the extraction of organochlorine pesticideresidues in water sample. The collected water samples were pre-filtered through a 0.45 □g glass fiber filter (Wattman GF/F) to remove particulate matter and were acidified with hydrochloric acid (6N) to pH 2.5. Methanol modifier (BDH, for pesticideresidue analysis, 10 mL) was added to water sample for better extraction. SPE using pre-packed reversed phase octadecyl (C-18 bonded silica) contained in cartridges was used for sample preparation. Prior to the extraction, the C-18 bonded phase, which contains 500 mg of bonded phase, was washed with 20 mL methanol. The sample was mixed well and allowed to percolate through the cartridges with flow rate of 10–15 mL/min under vacuum. After sample extraction, suction continued for 15 min to dry the packing material and pesticides trapped in the C-18 bonded phases were eluted by passing 10 mL hexane and fraction was evaporated in a gentle steam of Nitrogen. In all samples pesticideresidues were analyzed by GC (Chemito-8510) with Ni^{63} ECD detector. Helium was used as carrier gas and nitrogen was used as make up gas. The injection technique was split/split less. All the samples analyzed were found to be contaminated with four pesticides i.e. DDT, □-Endosulfan, □-Endosulfan and Lindane. DDT was found to range between 0.15 and 0.19 □g $L^{□1}$, □-Endosulfan ranges between 0.21 and 0.87 □g $L^{□1}$, □-Endosulfan ranges between 1.34 and 2.14 □g $L^{□1}$ and Lindane ranges between 0.68 and 1.38 □g $L^{□1}$ respectively. These concentrations of pesticides in

the water samples were found to be above their respective Acceptable Daily Intake (ADI) values for Humans.

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Status of insecticide contamination of soil and water in Haryana, India

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Abstract

Twelve samples each of soil and ground water were collected from paddy-wheat, paddy-cotton, sugarcane fields and tube wells from same or near by fields around Hisar, Haryana, India during 2002–2003 to monitor pesticide residues. Residues were estimated by GC-ECD and GC-NPD systems equipped with capillary columns for organochlorine, synthetic pyrethroid and organophosphate insecticides. In soil, HCH (0.002–0.051 □g g$^{□1}$), DDT (0.001–0.066 □g g$^{□1}$), endosulfan (0.002–0.039 □g g$^{□1}$) and chlordane (0.0002–0.019 □g g$^{□1}$) among organochlorines, cypermethrin (0.001–0.035 □g g$^{□1}$) and fenvalerate (0.001–0.022 □g g$^{□1}$) among synthetic pyrethroids and chlorpyriphos (0.002–0.172 □g g$^{□1}$), malathion (0.002–0.008 □g g$^{□1}$), quinalphos (0.001–0.010 □g g$^{□1}$) among organophosphates were detected. Dominant contaminants were DDT, cypermethrin and chlorpyriphos from the respective groups. In water samples, HCH, DDT, endosulfan and cypermethrin residues were observed frequently. Only chlorpyriphos among organophosphates was detected in 10 samples. On consideration of tube well water for drinking purpose, about 80% samples were found to contain residues above the regulatory limits.