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Short Note

Monitoring of Chlorinated Hydrocarbon Insecticides and Chlorpyriphos Residues in Market Samples of Egg

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Egg samples were collected from retail shops at Coimbatore commencing from November 2001 and continued at weekly intervals till March 2002. A gross sample of 10 eggs was purchased once in a week. The residue level in the poultry egg samples varied from BDL-0.031 µg/g. None of the samples were contaminated with γ and β-HCH. Residues of α-HCH was found in only one sample. Out of 18 weekly samples collected and analysed, o,p,-DDT were detected in only one sample (0.023 µg/g). Regarding country hen egg samples, two out of 18 samples were contaminated with endosulfan sulphate residues (0.008 µg/g) and only one sample with o, p'-DDT (BDL-0.046 µg/g). Out of 18 samples, 2 samples were contaminated with dieldrin (0.025 µg/g). None of the egg samples was contaminated with any of the organochlorine and chlorpyriphos residues above the maximum residue limit (MRL).

Key words: Chlorinated hydrocarbon insecticides, chlorpyriphos, residues, eggs.

Biological activity of the pesticides is not only restricted to target organisms, but also extends to non-target organisms (Singh and Dhaliwal, 1993). Among the various classes of pesticides, chlorinated hydrocarbons are regarded as having low acute toxicity, but possess a greater potential for chronic toxicity due to their lipophilic nature. Among the food commodities, eggs being rich in fat, contamination by the persistent and liphophilic chlorinated hydrocarbons is more likely when compared to other pesticides like organophosphates, carbamates etc., Considering these, the present study on monitoring of chlorinated hydrocarbon insecticides and chlorpyriphos residues in eggs was carried out as an attempt to assess the current level of pesticides contamination.

Materials and Methods

Egg samples of White leghorn and country hen were collected from retail shops at Coimbatore commencing from November 2001 and continued at weekly intervals till March 2002. A gross sample of 10 eggs was purchased once in a week. The eggs were wrapped in aluminium foils and placed in plastic containers to retard moisture loss. These eggs were refrigerated until processing. Egg volumes were measured to the nearest 1.0 ml by water displacement technique before the contents were removed. After the egg contents (albumin and yolk) were homogenized in a mixer, a 5 g subsample was transferred to a clean beaker prewashed with dilute nitric acid and a free flowable powder made by the addition of 5 g anhydrous sodium sulphate and 5 g celite. The contents were loaded on to a wet chromatographic column packed with 2.5 cm layer each of anhydrous sodium sulphate and deactivated alumina in distilled hexane. The egg powder was eluted with 150 ml of hexane and the contents were condensed to 10 ml for further clean up. The concentrated n-hexane extracts were transferred to a glass separating funnel. Then 50 ml of concentrated sulphuric acid taken in another separating funnel was added drop wise @ 4 ml/minute by holding above, till the n-hexane layer became clear. The spent up sulphuric acid was discarded and the n-hexane layer was washed with 20 ml portions of distilled water repeatedly, till neutral to litmus. Then, the hexane layer was dried by passing through anhydrous sodium sulphate and concentrated to a suitable volume of 1-5 ml (Kapoor *et al.*, 1981). HCH isomers *viz.* a, g, b and d HCH, a and b endosulfan, endosulfan sulphate DDT-R and chlorpyriphos residues in egg samples were estimated by Chemito model 3800 gas chromatograph equipped with ^{63}Ni electron capture detector (ECD). The operating conditions were as follows:

Column : Chromato pack (6' long x 0.25' dia) packed with 1.5% OV 17 + 1.95% QF 1 on 80-100-mesh chw/HP.
Temperature (°C) : Oven - 200; injector - 220; detector base - 240; detector source - 260
Carrier gas flow rate : 60 ml/minute
Attenuation : 8-32
Aliquot injected : 2 µl

The amount of residues was measured by comparing the sample response with the response of the standard using the formula:

$$\text{Residues in ppm} = \frac{H_S}{H_{std}} \times \frac{M}{M_1} \times \frac{V}{V_1}$$

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Where,

H_s - Peak height of the sample

H_{std}- Peak height of the standard

M - Weight of the standard in ng

M_1 - Weight of the sample in g/ml

V - Volume of the final extract in ml

V_1 - Quantity of the sample injected in µl

Results and Discussion

The results on the analysis of white leghorn egg samples collected from retail shops at Coimbatore revealed that the samples were contaminated with HCH. The residue level in the samples varied from BDL-0.031 µg/g. None of the samples were contaminated with γ and β-HCH. Residues of α-HCH was found in only one sample. Regarding endosulfan residues, none of the samples was contaminated with α and β endosulfan and endosulfan sulphate. Out of 18 weekly samples collected and analysed, o,p,-DDT was detected in only one sample (0.023 µg/g). None of the samples was contaminated with other metabolites of DDT-R. All the samples were free from dieldrin, heptachlor and chlorpyriphos residues.

All the samples of country hen were free from the residues of α, γ, β and δ-HCH, α-endosulfan, β-endosulfan, o, p'-DDE, p, p'-DDD, p, p'-DDT, heptachlor and chlorpyriphos. Out of 18 samples, two samples were contaminated with endosulfan sulphate residues (0.008 µg/g) and only one sample with o, p'-DDT (BDL-0.046 µg/g). Out of 18 samples, 2 samples were contaminated with dieldrin (0.025 µg/g).

In the present investigation, few samples of poultry eggs and country hen eggs drawn at weekly intervals at Coimbatore were contaminated with endosulfan sulphate, o, p'-DDT and dieldrin residues. None of the egg samples was contaminated with any of the organochlorine and chlorpyriphos residues above the maximum residue limit.

Residues of HCH and DDT in the poultry and country hen eggs were not high in the present investigation as compared to the higher residue levels determined earlier in 1992 in poultry eggs (0.233 and 1.316 µg/g), country hen (0.274 and 0.595 µg/g), for HCH and DDT, respectively, in Tamil Nadu (Regupathy and Kuttalam, 1992). Poultry egg samples collected from different parts of the country showed the presence of HCH residues in the range of 0.02 to 0.62 µg/g (Banerji, 1989). The maximum levels of DDT detected were 0.5 to 2.1 µg/g in Bombay (Khandekar *et al*., 1981), 0.07 µg/g in Hyderabad (Lakshminarayana and Menon, 1972), 0.40 µg/g in Delhi (Agnihotri *et al*., 1974), 0.97 µg/g in Ludhiana (Kalra and Chawla, 1983) and 0.04 µg/g in Pantnagar (Tripathi, 1966).

In the case of poultry birds, contaminated feed materials may be the source of contamination. The rice bran and cereals constitute the major components of poultry feed. Since HCH was recommended for the management of rice brown plant hopper and earhead bug (Regupathy *et al*., 1989), the bran harboured most of the residues (Handa and Sharma, 1991). In addition, organochlorine insecticides such as DDT and HCH were used against mosquitoes under National Malaria Eradication Programme. A part from these, cross contamination may also be the source of contamination.Differences in residue levels among the country birds might be due to differences in diet, feeding habits, occurrence and levels of environmental pollutants in the feeding habits and in feeding locations and physiology of the birds.

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