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REFERENCES

1. Reynolds, J.E.F., Eds., In; Martindale, the Extra Pharmacopoeia, 31st Edn., the Pharmaceutical Press, London, 1996, 819.
2. Singh, S. and Jain, R., *Indian Drugs*, 1997, 34, 678.
3. Surekha, A. and Jain, N.K., *Indian Drugs*, 2000, 37, 351.
4. Zarakor, S.S., Kolte, S.S. and Rane, S.H., *Indian Drugs*, 1997, 34, 350.
5. Shimoka, K., Sawada, Y. and Talmatru, H., *J. Chromatogr., Biomed. Anal.*, 1989, 7, 1262.
6. Patel, Y.P., Patil, S., Bhoir, I.C. and Sundaresan, M., *J. Chromatogr.*, 1998, 828, 283.
7. Cosbey, S.H. and Carson, D. J.L., *J. Anal. Toxicol.*, 1997, 21, 221.
8. Yasuda, T., Tanaka, M. and Iba, K., *J. Mass Spectrom.*, 1996, 31, 879.
9. Patki, R.V., Tamhankr, C.P. and Tipnis, H.P. *Indian Drugs*, 1994, 31, 560.
10. Scharpt, F., Riedal, P.V., Laufen, H. and Leitold, M., *J. Chromatogr.*, 1994, 655, 225.
11. Pabbisetly, K. L., Kumar, B.A. and Karunandidhi, S.L., *Indian Drugs*, 2000, 37, 497.
12. Pandya, K.K., Satia, M. Gandhi, T.P., Modi, I.A. and Chakravarthy, B.K., *J. Chromatogr., B. Biomed. Appl.*, 1995, 667, 315.

Residue Determination of Dimethoate in Grapes and Tomatoes Using RP-HPLC

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Residues of dimethoate were analyzed in different grapes (paneer, green, seedless violet) and tomatoes (nattu and Bangalore). Analyses were performed by HPLC using a reversed-phase column (RP-18). Extractions from grapes and tomatoes were carried out with benzene. The residues found in grapes were lower than the admissible limits mentioned by FDA, whereas in case of tomatoes, the residues were found to exceed the limits prescribed by FDA to a slight extent

Toxic substances that are used to kill insects, mites, nematodes, rodents, mollusks, weeds that cause economic damage to crops and ornamental plants are called as pesticides¹⁻⁴. They are hazardous to the health of domestic animals and human beings if not handled properly. All pesticides interfere with normal metabolic processes in plants and are classified according to the type of organism they are intended to control, e.g. insecticides to control insects; acaricides to control mites; rodenticides to control rats; herbicides to control weeds; molluscicides to control snails, slugs; fungicides to control fungal infections; antibiotics to control bacterial, fungal, viral and mycoplasma infections. Hence in

recent years the role of pesticide in relation to human welfare has been discussed world over emotionally. Insecticides being toxic in nature, they should be used with extreme caution. Their misuse can lead to disastrous effects both on human being and environment. FDA limitation⁵ for Dimethoate in the following fruits and vegetables are apples-0.01 mg/kg, grapes-0.012 mg/kg and tomatoes-2 ppm. If these limitation⁶ is crossed it may cause serve adverse effect like numbness, tingling sensations, in coordination, headache, dizziness, tremor, nausea, abdominal cramps, sweating, blurred vision, difficulty in breathing respiratory depression and slow heart beat, very high doses may result in unconsciousness, incontinence and convulsions or fatality. Hence this paper aims at reporting the detection of the pesticides

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present in locally available grapes and tomatoes and to quantify in order to check whether the pesticides are within the limit using RP-HPLC.

Dimethoate was purchased from, The Consolidate Agro Trading Company, Coimbatore. The trade name of dimethoate is rogor from Bayer Company. Paneer grapes, green grapes and seedless violet grapes were collected from 3 different fields in Coimbatore. Nattu tomatoes and Bangalore variety tomatoes were obtained from 3 different local region of Coimbatore.

Chromatographic system consisted of Shimadzu-LC 10A HPLC system, the stationary phase was C_{18} , Waters Spherisorb, S_5ODS_2 , 150 x 4.6 mm. The pump was LC-10AT, detector was SPD-10A. Isocratic elution method in a mobile phase comprised of water:acetonitrile (60:40 v/v), at a flow rate 1 ml/min was used. Injection volume was 15 μ l injected using Rheodyne injector, pesticides were detected at 221 nm.

Grapes obtained from various farms were crushed, and 3 ml of the above homogenate was shaken for 5 min, with 3 ml of the organic solvent (benzene). After centrifugation for 10 min at 1000 rpm, the organic layer was separated. One milliliter of the supernatant liquid was evaporated to dryness under reduced pressure passing nitrogen Gas and the residue was dissolved with 0.5 ml of mobile phase and then the sample was injected directly into C_{18} column.

A total of 50 g of tomatoes were taken crushed, 3 g of the above homogenous mixture was mixed with 3 ml of cyclohexane:benzene (80:20 %v/v) mixture in a screw capped centrifuge tube. After the sample was centrifuged for 10 min at 1000 rpm. One milliliter of the organic layer was dried under reduced pressure using nitrogen cylinder and the residue was recovered with 0.5 ml of mobile phase and then the sample was injected directly into C_{18} column.

The grapes were extracted with benzene and then centrifuged for 10 min at 1000 rpm, one milliliter of the supernatant liquid was evaporated and the residue was reconstituted in 0.5 ml of mobile phase.

Nattu variety and Bangalore tomatoes obtained from 3 various fields were extracted with cyclohexane:benzene (8:2) mixture and then centrifuged for 10 min at 1000 rpm. One milliliter of the organic layer was evaporated using nitrogen gas and the residue was admixed with the mobile phase. Dimethoate (0.5 ml) was pipetted into 250 ml of standard flask and made up to the volume with mobile phase.

This concentration is 700 μ g/ml. The estimation of dimethoate carried out in various variety of grapes and tomatoes are as mentioned in Table 1.

TABLE 1: PESTICIDE CONCENTRATION DETERMINED BY RP-HPLC

Types of Fruits	Conc. of Dimethoate* (ppm)
Paneer Grapes	2.7 \pm 0.04
Green Grapes	2.38 \pm 0.04
Seedless violet Grapes	1.85 \pm 0.02
Nattu Tomato	2.48 \pm 0.02
Bangalore Tomato	2.85 \pm 0.02

* Values are the results of 3 runs (mean \pm S.E.M.) and the samples on each occasion in duplicate

From the result obtained, it was observed that paneer grapes contain 2.7 ppm of dimethoate green grapes contained 2.38 ppm, seedless violet grapes contained 1.85 ppm, Nattu tomatoes contained 2.48 ppm/kg and Bangalore tomatoes contained 2.85 ppm/kg. The amount of dimethoate in grapes were found to be within the legal limit of 12 ppm, whereas in both the variety of tomatoes, a slight increase of about 0.4 to 0.8 ppm, were observed from the admissible limit of 2 ppm. Hence it may be concluded that the concentrations of dimethoate residues found in grapes are remarkably low and they have no toxicological importance whereas the amount present in tomatoes are slightly more than the allowed legal limit.

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REFERENCES

1. Beck, E.W., Johnson, J.C. Getz, M.E., Skinner, F.B., Dawsey, L.H., Woodham, D.W. and Derbyshire, J.C., *J. Econ. Ent.*, 1968, 61, 605.
2. Noble, A., John, J., Walsh. and Robert, A., *Pesticide Science*, 1990, 29, 307.
3. Stephen, G.N.A. and Newell, G., *Pesticide Science.*, 1985, 16, 143.
4. Young, W.L., Neil., D.W., and Westcott, V., *J. Agri. Food Chem.*, 1981, 29, 860.
5. Cabras, P., Meloni, M., Perra, M and Pinsi, F.M *J. Chromatogr.*, 1979 b 180, 184
6. Hoodles, R. A., Sidwell, J.A., Skinner, J.C. and Treble, R.D., *J. Chromatogr.*, 1978, 166, 279.
7. Cabras, P., Diana, P., Meloni, M. and Filippo, M.P., *J. Agri. Food Chem.*, 1982, 30, 569.