World Journal of Pharmaceutical Sciences
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Available online at: https://wjpsonline.com/
Review Article

MONOCROTOPHOS USES AND DISADVANTAGES IMPACT ON SOCIETY

U D. Pawar[1], N V Rathod[3], A K Vishwakarma[1], J R Singh[1], S H Bhodoriya[1], C D. Pawar[2], R K. Pardeshi[4]*

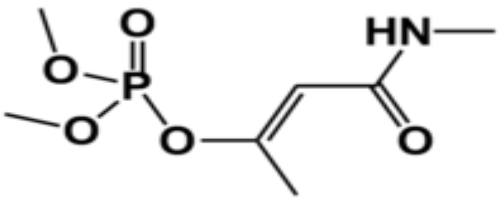
[1]Regional Forensic Science Laboratories Nanded. MS, India.
[2]Department chemical technology Dr Babasaheb Ambedkar Marathwada University Chhatrapati Sambhaji Nager .MS, India.
[3]Department of Forensic Science Dr Babasaheb Ambedkar Marathwada University Chhatrapati Sambhaji Nager .MS, India.
[4]Sant Ramdas College Ghansawangi, Jalna, MS, India.

Received: 15-08-2025 / Revised Accepted: 19-08-2025 / Published: 22-08-2025

ABSTRACT
Monocrotophos is a member insecticide organophosphorus compound, it is an important insecticide and has a diversified role in agriculture. In India is one of the major players in the agriculture sector worldwide and it is the approx. 55% of India's population. India has the largest area planted for wheat, rice, and cotton, and is the largest producer of milk, pulses, and spices in the world. It is the second-largest producer of fruit, vegetables, tea, farmed fish, cotton, sugarcane, wheat, rice, cotton, and sugar. The agriculture sector in India holds the record for second-largest agricultural land in the world generating employment for about half of the country's population. The organophosphorus insecticide Monocrotophos play an important role in agriculture.
Key words: Monocrotophos, Agriculture, uses, Disadvantages.

INTRODUCTION

Monocrotophos [(E)-dimethyl-1-methyl-3- (methylamino)-3-oxo-1-propenyl phosphate (9Cl); dimethyl phosphate ester with (E)-3-hydroxy- N-methyl crotonamide (8 Cl)], trade names include Monocrotophos and Azodrin, is a broad-spectrum organophosphate insecticide, acaricide, and termiticide against gall midge, cutworms, corn rootworms, cockroaches, leaf folder, and leaf hopper, etc [1]. Approximately 30,000 tons of Monocrotophos is used annually. As per data's Asia is the top user of Monocrotophos as; India (43%), South America (26%), China (15%), and Southeast Asia (9%) account for 90% of the use, internationally. In India Andhra Pradesh and Punjab are the chief consumers of Monocrotophos [2]. Easy availability of this compound is frequently en¬countered in forensic casework, since organophosphorus insecticides compounds are frequently misused in homicidal, accidental, and suicidal poisoning cases in year 2015[3], The chemical structure of monocrotophos below.



The Detection and identification monocrotophos in help of Instrumental methods such as spectrophotometry[4], LC-MS/MS[5], High performance liquid chromatography (HPLC)[6-8], gas chromatography (GC) [9-12] and GC-MS [13-18]. are reported in the literature for the determination of monocrotophos in Pesticide Residues in Vegetables. Although these methods are selective, there are limitations to their use in routine forensic work. Reason to their

Address for Correspondence: U D. Pawar, Regional Forensic Science Laboratories Nanded. MS, India., Email ID: upawar929@gmail.com.

How to Cite this Article: U D. Pawar, MONOCROTOPHOS USES AND DISADVANTAGES IMPACT ON SOCIETY, World J Pharm Sci 2025; 13(03): 92-95; https://doi.org/10.54037/WJPS.2022.100905

complex matrix which may damage the columns. And therefore, high-performance thin layer chromatography (HPTLC) is the method of choice for screening biological sample due to its speed, low cost, and versatility. Several chromogenic reagents reported example such as Mercurous nitrate [19], potassium iodate-starch[20], sodium carbonate-chloranil in acetone[21], mercuric nitrate diphenyl carbazone[22], palladium chloride[23], vanillin reagent[24], benzyl reagent[25], methanolic ferric chloride[26], 50% potassium iodate in 1:1ethanol-hcl[27],Cupric acetate[28-29], organometallic reagent[30] and chloranil reagent[31]etc. Our research group previously reported some chromogenic reagent for detection of insecticides by thin-layer chromatography in continuation of our research [32-33].

Wide Uses

This study reports Insecticide their wide uses. Broad-spectrum, fast-acting, contact and systemic organophosphate. Used to control a wide range of pests, including sucking, chewing and boring insects such as aphids, caterpillars, bollworm, mites, moths, jessed, budworm, scale, stem borer, and locusts. In India, most use is on cotton, rice, pulses, groundnuts, vegetables (especially tomato and brinjal/ aubergine) and fruits (especially mango and grapes), also chilies, cardamom, coconut, coffee, tea, castor, citrus, olives, maize, sorghum, sugar cane, sugar beet, pea, potatoes, soybeans, cabbage, mustard, onion, pepper, ornamentals and tobacco.

Disadvantage

The wide uses in agriculture are shown some disadvantages such as conclude that monocrotophos is insecticide in India and having high toxicity level for living beings especially to birds. Monocrotophos cause the histopathological, genotoxic, acute, hyperglycemic and stressogenic effects and significant dermal exposure with an impact on cholinesterase, genotoxicity and cardiotoxicity activities.

Results and Discussion

Exposure to Monocrotophos can cause rapid, severe, organophosphate poisoning with headache, dizziness, blurred vision, tightness in the chest, sweating, nausea and vomiting, diarrhea, muscle twitching, convulsions, coma and death. In India we seen monocrotophos was used to deliberate Suicides, Accidental deaths cases sent toxicology department in forensic science laboratories for further instrumental analysis.

Conclusions

In this paper we generally seen the uses and the disadvantages of monocrotophs organophosphorus insecticide role in India, Monocrotophos show novel role in agriculture used but due to some hazardous impacts are also very important to show in Society.

In agriculture, a wide range of Organophosphorus compounds has been employed to boost crop yield, quality, and storage life. However, due to the ever-increasing population and rapid urbanization, pesticide use has grown in recent years. These compounds are exceedingly poisonous to humans, so many poisoning cases occurred.

Acknowledgment

Authors are grateful to Dr V J Thakre, Director, Forensic Science Laboratories, State of Maharashtra, Mumbai, India, for helpful discussion and suggestions.

References

1 Bhadbhade,B.J, etal(2002). Bioremediation of an industrial effluent containing monostrophes. Current microbiology, 45(5), 346-349.

2 WHO. 2009. Health implications from monocrotophos use: a review of the evidence in India, ISBN 978-92-9022-345-0 © World Health Organization (2009).

3 Pawar, U. D., et al. (2018). Retrospective Study of Homicide Cases in Marathwada and four districts of Vidarbha region. WJPR, 7(5), 1825-1829.

4 Training Manual of Pesticide Formulation Analysis, National Plant Protection Training Institute Hyderabad, India, 2003,66–68.

5 M.Rajasri,M.Hymavati.B.Ramesh.C.S.Rao.U,S.Bhushan,.AsianJournalofChemistry.Vol.**29**, No,**3**(2017)665-668.

6 Islam, S. et al, Analysis of some pesticide residues in cauliflower by high performance liquid chromatography. American J. Environmental Science, 2009. 5(3):325-329.

7 Debayle, D.et al (2008). Multi-residue analysis of traces of pesticides and antibiotics in honey by HPLC-MS-MS. Analytical and Bioanalytical Chemistry, 391(3), 1011-1020.

8 Sheu, C., et al (2009). Simultaneous determination of macrolide pesticides in fruits and vegetables by liquid chromatography. Journal of Food and Drug Analysis, 17(3), 10.

9 Duhan, A., et al. (2011). Behaviour of endosulfan in cabbage (Brassica oleracea L.). Toxicological & Environmental Chemistry, 93(10).

10 Fenoll, José, et al. "Multiresidue method for analysis of pesticides in pepper and tomato by gas chromatography with nitrogen–phosphorus detection." Food chemistry 105.2 (2007): 711-719.

11 Lal, Asha, et al. "Multiresidue analysis of pesticides in fruits and vegetables using solid-phase extraction and gas chromatographic methods." Analytical Sciences 24.2 (2008): 231-236.

12 Abhilash, P. C., et al. "Simplified determination of combined residues of lindane and other HCH isomers in vegetables, fruits, wheat, pulses and medicinal plants by matrix solid-phase dispersion (MSPD) followed by GC–ECD." Food Chemistry 113.1 (2009): 267-271.

13 Thanh DN, et al (2008) A multiresidue method for the determination of 107 pesticides in cabbage and radish using QuEChERS sample preparation method and gas chromatography mass spectrometry, Food Chemistry, 110(1): 207-213.

14 Takatori, Satoshi, et al. "A rapid and easy multiresidue method for the determination of pesticide residues in vegetables, fruits, and cereals using liquid chromatography/tandem mass spectrometry." Journal of AOAC International 91.4 (2008): 871-883.

15 Raina, Renata, and Patricia Hall. "Comparison of gas chromatography-mass spectrometry and gas chromatography-tandem mass spectrometry with electron ionization and negative-ion chemical ionization for analyses of pesticides at trace levels in atmospheric samples." Analytical chemistry insights 3 (2008): ACI-S1005.

16 Wang, Libing, et al. "A Rapid Multi-Residue Determination Method of Herbicides in Grain by GC—MS-SIM." Journal of chromatographic science 46.5 (2008): 424-429.

17 Cunha, S. C., et al. "Fast low-pressure gas chromatography–mass spectrometry method for the determination of multiple pesticides in grapes, musts and wines." Journal of Chromatography A 1216.1 (2009): 119-126.

18 Barrada, H., et al. "Surveillance of pesticide residue in fruits from Valencia during twenty months (2004/05), 2010." Food Control 21.1: 36-44.

19 Katkar, H. N., and V. P. Barve. "A new spray reagent for the identification and determination of organophosphorus insecticides by thin layer chromatography." Current Science 45.18 (1976): 662-664.

20 Patil, Vitthal B., et al "Use of potassium iodate for thin-layer chromatographic detection of sulphur-containing organophosphorus insecticides." Analyst 112.12 (1987): 1765-1766.

21 Patil, Vitthal B., et al. "A new chromogenic spray reagent for the detection and identification of monocrotophos." JPC–Journal of Planar Chromatography–Modern TLC 14.3 (2001): 210-212.

22 V.D.Joglekar and H.S.Mahal,Arch.Kriminologia 142 (1968)170.

23 Bäumler, J., and S. Rippstein. "Dünnschichtchromatographischer Nachweis von Insektiziden." Helvetica Chimica Acta 44.4 (1961): 1162-1164.

24 Chandegaonkar, Vijay, et al. "A new chromogenic spray reagent for detection and identification of monocrotophos." JPC-Journal of Planar Chromatography-Modern TLC 21.3 (2008): 199-200.

25 V.R.Chandegaonkar. et al ,A New Chromogenic Spray Reagent for Detection and Identification of Monocrotophos,Journal Planar Chromatography.22(2009)6,457-458.

26 K.V.Kulkarni, et al, A New Chromogenic Spray Reagent for Detection and Identification of Monocrotophos Journal Planar Chromatography22 (2009) 2, 133–135.

27 Deshpande, A. S et al. "A NEW SPRAY REAGENT FOR THE IDENTIFICATION OF MONOCROTOPHOS BY THIN LAYER CHROMATOGRAPHY." Current Science 50.18 (1981): 814-815.

28 Mirashi, S. V., et al. "A NEW SPRAY REAGENT FOR THE IDENTIFICATION AND DETERMINATION OF QUINALPHOS, DISULFOTON AND MONOCROTOPHOS BY THIN LAYER CHROMATOGRAPHY." Current Science 54.13 (1985): 635-635.

29 Patil, Vitthal B., et al. "Thin-layer chromatographic detection of monocrotophos in biological materials." Talanta 41.12 (1994): 2127-2130.

30 Pathan, Asif M., et al. "Application of an organometallic reagent sodium nitroprusside for the detection of organophosphate insecticide monocrotophos." JPC–Journal of Planar Chromatography–Modern TLC 30.3 (2017): 216-218.

31 Pawar, Umakant D., et al. "New chromogenic reagent for high-performance thin-layer chromatographic detection of organophosphorus insecticide monocrotophos in biological materials." JPC-Journal of Planar Chromatography-Modern TLC 32.1 (2019): 61-64.

32 Pawar, Umakant D., et al. "Use of cupric ferrocyanide reagent for the thin-layer chromatographic detection of organophosphate insecticide profenophos." J Planar Chromatogr-Mod TLC 31 (2018): 405-407.

33 Pawar, Umakant D., et al. "Use of diphenylamine reagent for high-performance thin-layer chromatographic detection of organochloro insecticide endosulfan in biological samples." JPC-Journal of Planar Chromatography-Modern TLC 32.1 (2019): 65-68.