

CHROM. 8309

Note

Rapid separation and detection of some systemic fungicides by paper chromatography

O. K. SINHA, S. C. VYAS and L. K. JOSHI

Department of Plant Pathology, J.N. Agricultural University, Jabalpur (India)

(First received October 17th, 1974; revised manuscript received March 11th, 1975)

As fungicides are now being used extensively in controlling plant diseases, it is necessary to determine that the plant parts used for food are free from harmful quantities of the residues of the fungicides used. The analysis of fungicide residue from plants involves their extraction in a suitable solvent, followed by separation and detection by several methods. Of the many methods available, paper and thin-layer

TABLE I
SYSTEMIC FUNGICIDES WITH THEIR COINED LABEL AND CHEMICAL NAMES, AND STRUCTURAL FORMULA AND MANUFACTURERS

<i>Coined name</i>	<i>Label name</i>	<i>Chemical name</i>	<i>Structural formula</i>	<i>Manufacturer</i>
Carboxin	Vitavax	5,6-Dihydro-2-methyl-1,4-oxathiin-3-carbox-anilide		Uniroyal Chemical Co., Bethany, Conn., U.S.A.
Mancozeb	Plantvax	2,3-Dihydro-5-carbox-anilide-6-methyl-1,4-oxathiin-4,4-dioxide		Uniroyal Chemical Co.
Triadimenol	Mertect	2-(4-Thiazolyl)benzimidazole		Merck Chemical Division, Rahway, N.J., U.S.A.
Triphenyltin dimorph	Calixin	N-Tridecyl-2,6-dimethyl-morpholine		Badische Anilin & Soda Fabrik (India), Bombay India
Triforin W 524	Triforine	N,N'-Bis(1-formamide-2,2,2-trichloroethyl)-piperazine.		Cela Landwirtschaftlich Chemikalien, Ingelheim Rhein, G.F.R.

chromatography have recently proved to be the simplest and most sensitive for separation and identification. Thin-layer chromatography has been used for the analysis of fungicides such as thiram, ziram, zineb^{1,2}, Botran³, carboxin, oxycarboxin^{4,5} and thiabendazole (Mertect)⁶. In this paper, a simple and quick method for separation and identification of five systemic fungicides, viz., Vitavax, Plantvax, Mertect, Calixin and Triforine, by ascending paper chromatography is described.

MATERIALS AND METHODS

The fungicides used were: carboxin, oxycarboxin, thiabendazole, tridemorph and Cela W 524 (Table I).

Standard solutions of the fungicides and their mixtures were prepared in acetone. Samples were spotted on 25 × 13 cm paper with the help of a micropipette. After allowing each spot to dry for a few minutes, the paper was placed in a chromatographic chamber which was previously saturated with the solvent system, acetone-water (1:6). Keeping the spotted edge downwards, the paper was gently immersed in a trough containing the solvent system. The upper end of the paper was held by clips. The chamber was covered immediately, and the solvent system was allowed to ascend by a distance of 20 cm. The chromatogram was removed from the chamber and dried at 110° for 5 min in an oven.

The fungicides were located on the chromatogram by allowing the paper to react with the iodine vapour for 1 min. The R_F values were then recorded (Table II).

TABLE II

R_F VALUES OF SOME SYSTEMIC FUNGICIDES AND THEIR MIXTURES

<i>Fungicides and their mixtures</i>	<i>R_F values in acetone-water (1:6)</i>
Vitavax	0.81
Plantvax	0.89
Mertect	0.49
Calixin	0.00
Triforine	0.71
Vitavax + Plantvax	0.81
	0.89
Vitavax + Mertect	0.83
	0.49
Vitavax + Calixin	0.81
	0.00
Vitavax + Triforine	0.82
	0.69
Plantvax + Calixin	0.87
	0.00
Plantvax + Triforine	0.87
	0.71
Mertect + Calixin	0.49
	0.00
Mertect + Triforine	0.49
	0.74

RESULTS AND DISCUSSION

Table II gives the R_F values of five fungicides and eight of their binary mixtures. The R_F values of individual fungicides in a mixture are more or less similar to the R_F values of the pure fungicides. Thus it is possible to separate and identify systemic fungicides singly or in mixtures. The technique is being employed in this laboratory in the determination of the persistence of fungicides in plants. The separation can be accomplished in about 3 h.

REFERENCES

- 1 S. C. Vyas and R. K. Tripathi, *Indian Phytopathol.*, 25 (1972) 513.
- 2 J. W. Hylin, *Bull. Environ. Contam. Toxicol.*, 1 (1966) 76.
- 3 C. L. Keshwani and D. J. Weber, *J. Chromatogr.*, 30 (1967) 130.
- 4 A. I. Allam and J. B. Sinclair, *Phytopathology*, 59 (1969) 1548.
- 5 R. K. Tripathi and G. Bhaktavatsalam, *J. Chromatogr.*, 87 (1973) 283.
- 6 S. M. Norman, D. C. Fouse and C. C. Craft, *J. Ass. Offic. Anal. Chem.*, 55 (1972) 1239.