Thin Layer Chromatography of Dithiocarbamate Fungicides

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During the course of studies on the transformation of dithiocarbamate fungicides on leaf surfaces, it became necessary to develop a procedure which would distinguish the residue of the applied substance from its transformation products. Thin layer chromatography proved to be the most effective method for this separation and the following procedure was developed.

Absorbent. Silica-gel G was applied to glass plates in layers 250 microns thick using conventional techniques.

Sample Preparation. Intact leaves were extracted with chloroform for 30 minutes on a mechanical shaker. The chloroform extract was filtered and concentrated to a small volume on a rotating evaporator. An aliquot of the concentrated extract was applied to the thin layer plate. Highly pigmented extracts were decolorized with a minimum amount of Darco G-60 activated charcoal.

Development. Benzene was the solvent used for ascending development of plates containing dimethyldithiocarbamates while benzene-methanol-acetic acid (48:8:4) was used for samples which contained ethylene-bis-dithiocarbamates.

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Visualization. The compounds of interest were located after development using the following spray reagent.(1)

a) 1.5 Gm cupric chloride and 3 gm ammonium chloride dissolved in 50 ml water containing 3 ml of concentrated ammonia.

b) 20 Gm hydroxylamine hydrochloride dissolved in 100 ml of water.

Equal volumes of a) and b) are mixed just prior to use.

Ziram, thiram, tetramethylthiuram monosulfide, and Zineb give bright yellow spots gradually changing to green, while Maneb yields a brown spot. The lower limit of detectability is approximately 2.5 micrograms.

TABLE

Rf values for dithiocarbamates

	Rf	
	S_1*	S_2
Thiram	.17±.02	.86±.02
Tetramethylthiuram monosulfide	.30±.02	-
Ziram	.68±.02	.94±.02
Maneb	.98±.02	.98±.02
Zineb	.95±.02	.88±.03

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* S_1 = Benzene, S_2 = Benzene-Methanol-Acetic Acid (48:8:4)

REFERENCE

1. F. FEIGL, Spot Tests in Organic Analysis, p 233(1956), Elsevier.