7. Kuriachen, P. I., *Cytologia*, 1968, **32**, 500.
8. Panigrahi, G. and Patnaik, S. N., *J. Indian Bot. Soc.*, 1964, **43**, 311.

FUNGICIDAL ACTIVITY OF TOLCLOFOS METHYL IN GROUNDNUT PLANT AND IN SOIL ON *SCLEROTIUM ROLFSII*

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TOLCLOFOS methyl (Rizolex) is a systemic fungicide (Sumitomo, Japan (Code No. S-3349), and Rallis, India). Chemically it is *O,O*-dimethyl-*O*-(2,6-dichloro-4-methylphenyl)-phosphorothioate and belongs to the organophosphate group of chemicals. It is reported to be effective against *Sclerotium rolfsii* and *Typhula*[1] spp. and also against *Rhizoctonia solani*[1-3]. The fungicide is also effective against *Thanatephorus cucumeris* (perfect state of *R. solani*)[4] and *Ustilago maydis*[5]. However, there is no information on translocation and persistence of the chemical in the plant system and its persistence in soil. Hence the present investigation was taken up.

Seeds of groundnut cultivar TMV-2 were treated with the fungicide at 1 and 2 g/kg of seed as dry mix. The treated seeds were sown in pots (30 cm diameter) each containing 3 kg of sandy loam soil and watered regularly. Untreated seeds were also sown to provide control plants. The plants raised from untreated and treated seeds were collected at regular intervals and presence of the fungicide was checked by bioassay of tissue extracts[6]. The plants collected were thoroughly washed with sterile distilled water, blotted with sterile paper towels, and separated into different parts depending upon the age of the plant:

Days after germination		Plant parts
1, 3	:	Whole plant
7	:	Whole plant, root and shoot
14, 21, 28, 35, 42, 49 and 56	:	Whole plant, root, shoot and leaves.

Five grams of plant material was ground thoroughly in a mortar with 10 ml of acetone. The ground material was filtered through cheesecloth, the filtrate collected in sterile glass vials (100 × 25 mm) and the acetone evaporated. The residue was taken up in 5 ml of sterile distilled water. This was added to 95 ml of molten potato dextrose agar and the agar was poured into petri plates (90 mm) after mixing. Tissue extracts

Table 1 *Characteristics of different soils employed in persistence studies*

	Red loam	Black loam	Sandy loam
Place of collection	Narakoduru (A.P.)	Agricultural College Farm, Bapatla (A.P.)	Agricultural College Farm, Bapatla (A.P.)
Previous crop	Coccinia	Groundnut	Groundnut
pH (1:2) Beckman pH meter (glass electrode) (Richards, 1954)	7.61	8.40	7.46
EC (mmho cm^{-1} Solubridge (Richards, 1954)	1.74	0.40	0.48
CEC (m.e./100 g soil) Neutral ammonium acetate method (Jackson, 1967)	9.40	50.00	7.60
Mechanical analysis (Piper, 1950)			
Sand %	64.97	43.10	84.45
Silt %	12.00	17.04	7.48
Clay %	18.00	39.86	6.94

Table 2 *Fungicidal activity of tolclofos methyl in groundnut plant following dry seed treatment*

	*Radial growth of *Sclerotium rolfsii* (mm)															
Days after germination	Whole plant				Root tissues				Shoot tissues				Leaf tissues			
	1000 ppm	2000 ppm	Control	Mean	1000 ppm	2000 ppm	Control	Mean	1000 ppm	2000 ppm	Control	Mean	1000 ppm	2000 ppm	Control	Mean
1	23.00	16.00	82.66	40.55	—	—	—	—	—	—	—	—	—	—	—	—
3	27.33	20.33	82.66	43.44	—	—	—	—	—	—	—	—	—	—	—	—
7	34.66	25.66	82.33	47.55	36.00	25.66	83.00	48.22	38.33	32.66	82.66	51.21	—	—	—	—
14	40.00	32.33	82 66	51.66	42.66	33.33	82.66	52.88	45.00	39.33	82.33	55.55	41.66	32.00	83 00	52.22
21	45.66	38.33	82.66	55.55	46.66	39.66	82.33	56.21	51.66	45.33	82.33	59.77	46.00	38.33	82.66	55.66
28	50.33	44.33	83.00	59.22	52.00	45.66	83.00	60.22	57.33	51.33	82.66	63.77	51.33	43.66	82.33	59.10
35	56.00	49.66	82.33	62.66	58.00	51.33	82.66	63.99	62.33	56.66	82.33	67.10	57.33	49.66	83.00	63.33
42	60.66	58.00	82.66	67.10	62.33	58.33	82.33	67.66	67.33	60.66	83.00	70.33	62.66	57.66	82.66	67.66
49	65.00	62.33	83.00	70.11	67.33	63.66	83.00	71.33	71.33	65.66	82.66	73.21	68.33	65.66	82.33	72.10
56	69.66	66.00	82.33	72.66	72.33	68.66	83.00	74.66	74.66	70.33	82.33	75.77	75.33	71.66	83.00	76.66
Mean	47.23	41.29	82.62		54.66	48.28	82.74		58.49	52.74	82.53		57.52	51.23	82.71	

	Concentrations (C)	Intervals (I)	C vs I	C	I	C vs I	C	I	C vs I	C	I	C vs I
S.E.	0.15103	0.27575	0.47762	0.1869	0.3053	0.5288	0.1926	0.3145	0.5447	0.1990	0.3040	0.5265
C.D. ($P=1\%$)	0.4024	0.7347	1.2725	0.5029	0.8215	1.4228	0.5182	0.8462	1.4656	0.5380	0.8220	1.4236

*Average of three replicates. —, not tested.

from untreated seed plants were used as control. All the petri dishes were inoculated with 7 mm mycelial discs of a 3-day-old culture of *S. rolfsii* isolated from infected groundnut plants (cv TMV-2). Radial growth of the fungus was measured after 72 h of incubation.

Persistence of tolclofos methyl in sandy loam, red loam and black loam soils was studied over 12 weeks. Characteristics of the soils are given in table 1. Samples of each soil type were passed through a 4.68 mm sieve after pounding. The soils were sterilized in an autoclave at 20 psi for 30 min twice on alternate days. One kg of sterile soil of each soil type was mixed with fungicide (1 and 2 g/kg of soil). The treated soils were kept in plastic beakers and sterile water was added regularly except on the day prior to soil sampling. Control soils were maintained without the addition of the fungicide.

Persistence of the chemical to a depth of up to 5 cm in the soils was studied by bioassay of samples collected using a cork borer. Fungicide present in the soil was extracted by taking 5 g of air-dried soil with 5 ml of acetone in glass vials (100 × 25 mm). The vials were then thoroughly shaken and left for 10 min to allow the soil to settle. The supernatant was transferred to sterile glass vials (100 × 25 mm) and the acetone was evaporated. The residue was taken up in sterile distilled water as before, and the bioassay carried out. Each treatment, including the control, was replicated thrice.

The data (table 2) show that tolclofos methyl was taken up by groundnut following dry seed treatment and was redistributed among different parts of the plant. All the extracts, prepared from plants on days 1, 3 and 7 and every week thereafter after germination, inhibited growth of *S. rolfsii*. The whole plant extracts from plants raised from seeds treated with 0.1% and 0.2% fungicide limited fungal growth to a greater extent than the corresponding root and shoot extracts. Extracts from older plants age (raised from treated seeds) were less inhibitory to the fungus than extracts from younger plants. Extracts prepared from fungicide-treated soils completely inhibited growth of *S. rolfsii*.

The inhibition of *S. rolfsii* by shoot and leaf extracts shows that the fungicide moved upwards in the plant system. The higher inhibition in the case of treatment with 0.2% tolclofos methyl may be due to higher initial uptake, and translocation and persistence of the fungicide in plant system. The lower inhibition by extracts from older plants (raised from treated seeds) may be due to dilution of the fungicide or degradation of the fungicide to non-fungitoxic products.

The better persistence of the fungicide in the treated soils may be due to slow rate of degradation by abiotic factors and absence of biological degradation.

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1. Ohtsuki, S. and Fujinami, A., *Jpn. Pestic. Inf.*, 1982, **41**, 25.
2. Gullino, M. L., Lento, G. and Garibaldi, A., *Meded. Fac. Landbouwwet. Rijksuniv. Gent.*, 1984, **49**, 363.
3. Kesavan, R., *Fitopatol. Brasil.*, 1984, **9**, 627.
4. Naito, S., *Res. Bull. Hokkaido Nat. Agric. Exp. Stn.*, 1984, **139**, 145.
5. Nakamura, S. and Kato, T., *J. Pestic. Sci.*, 1984, **9**, 725.
6. Nene, Y. L. and Thapliyal, P. N., *Fungicides in Plant Disease Control*, Oxford & IBH Publishing Co., New Delhi, 1979, pp. 413.

A NOTE ON THE SPONTANEOUS OILY LARVAL MUTANT IN SILKWORM, *BOMBYX MORI* L

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DURING the course of our breeding studies in June 1988 some spontaneous oily mutant larvae were observed in a polyvoltine silkworm breed of *Bombyx mori* L. The larvae were highly oily and translucent when compared to normal creamy-white larvae (figure 1). The mutant larvae were separated and their performance was assessed and compared with that of the normal breed. After three generations the characters of the mutant strain were consistent; hence it is breeding true.

More than 25 different genes, located at different loci, are known to cause translucency of the skin. The integument of the silkworm larva is usually opaque, containing whitish crystals of urate[1]. But several mutants have become known which have