RESULTS AND DISCUSSION

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The pesticide chemicals, prothiofos 50 % E.C. and sulprofos 720 E.C. were applied on moloukhia, cowpea and tomatoes plants. Representative samples of moloukhia leaves, green pods and mature seeds of cowpea and tomato fruits were taken at different intervals and the residues of insecticides were determined. The persistence expressed in (ppm) and the percentage loss of prothiofos and sulprofos on and in three crops were calculated.

Thin layer chromatographic technique was used to separate the degradation products of both prothiofos and sulprofos in and on the edible parts of the three vegetable crops.

I. Persistence and fate of prothiofos

1. Residues on and in moloukhia leaves:

The amounts of prothiofos residues detected on and in moloukhia leaves at different intervals after application are tabulated in (Table 2) and demenstrated in Fig. (1). The percentage rates of loss of initial deposits of the tested chemical were calculated and presented in (Table 3).

The initial deposits on and in moloukhia leaves as

determined one hour after the application were 50.58 ppm. This value slighty decreased to 47.19 ppm indicating the rate of loss 6.70 % of the active ingredient 24 hours after application. On the 3, 6 and 9 days after treatment, the residues dropped and the amounts estimated were 26.04, 24.89 and 9.13 ppm the calculated rates of loss were 48.52, 50.79 and 81.95 % respectively. The residue amounts estimated 12 and 15 days after application gradually decreased to 3.09 and 1.61 ppm, respectively. The calculated rate of loss was 93.89 and 96.81% respectively.

The residue half life value of prothiofos as obtained from the persistence line (Fig. 2) was 115 hours.

Using the thin layer chromatographic technique, Fig. 3, the active ingredient of prothiofos pesticide was detected in the samples and persisted for 15 days on and in moloukhia leaves having R_f value of 0.83. No degradation compounds for prothiofos were detected on the chromatograms in moloukhia leaves during the experimental period (15 days).

2. Residues of prothiofos in the cowpea crop

a- Residues on and in the green pods

Data presented in table 2 and Fig. 1 showed that the

amount of residues of prothiofos detected on and in green cowpea pods were lower than those found in moloukhia leaves.

The initial deposits of prothiofos on and in green cowpea pods as determined one hour after treatment were 17.66 ppm. This value dropped to 9.46 ppm indicating the rate of loss of 46.43 % of the active ingredient 24 hours after application. Following this period, the residues decreased gradually and the amounts estimated were 4.28, 1.54, 0.32, 0.07 and 0.04 ppm when samples were investigated 3, 6, 9, 12 and 15 days after treatment respectively. The calculated rates of loss were 75.76, 91.27, 98.18, 99.60 and 99.77, respectively Table3.

The residue half life value of prothiofos as obtained from the persistence line fig. 2.was 34 hours.

Using thin layer chromatographic technique, Fig4 4 the activeingredient of prothiofos was detected in the samples and persisted for 9 days in the green cowpea pods, having R_f value of 0.83. No degradation compounds for prothiofos were detected on the chromatograms in the green cowpea pods during the experimental period (15 days).

b. Residues in the dry mature seeds

The samples were taken 30 days after appliying insecticie.

GC analysis revealed that the mature cowpea seeds contained 0.03 ppm. prothiofos. No degradation products were detected utilyzing the thin layer chromatographic technique.

3. Residues on and in Tomato fruits

Data obtained (Table 2 and Fig. 1) showed that the initial deposits of prothiofos on tomato fruits were lower than those found on and in either moloukhia leaves or green cowpea pods. The amounts of residues as determined one hour after application were 1.29 ppm. This value dropped to 0.32 ppm 24 hours after application showing the rate of loss 75.19 % (Table 2 and 3).

Successive samples taken at different intervals, i.e. 3. 6. 9. 12 and 15 days after application showed that prothiofos residues decreased to 0.21, 0.21, 0.20, 0.20 and 0.19 ppm; respectively. The calculated rate of loss during that period ranged between 83.72 and 85.27 %.

The residue half life value of prothiofos as obtained from the persistence line (Fig. 2) was 22 hours.

Following the thin layer chromatographic technique, (Fig. 5), the active ingredient of prothiofos was detected in the samples and persisted for 15 days in tomato fruits having

R_f value of 0.83. No degradation compounds for prothiofos were detected on the chromatograms in tomato fruits during the experimental period (15 days).

Table 2: Persistence of prothiofos on and in moloukhia leaves, green cowpea pods and tomato fruits after treatment at the rate of 1000 grams active ingredient per feddan.

Time after treatment (days)	Residues in ppm		
	Moloukhia leaves	Cowpea pods	Tomato fruits
Initial*	50.58	17.66	1.29
1	47.19	9.46	0.32
3	26.04	4.28	0.21
6	24.89	1.54	0.21
9	9.13	0.32	0.20
12	3.09	0.07	0.20
15	1.61	0.04	0.19

* Samples were taken one hour after application.

Figures were the average of three replicates.

Table 3: Percentage rates of loss of prothiofos on and in moloukhia leaves, green cowpea pods and tomato fruits.

Time after treatment (days)	Percentage loss		
	Moloukhia leaves	Cowpea pods	Tomato fruits
Initial*	0.00	0.00	0.00
1	6.70	46.43	75.19
3	48.52	75.76	83.72
6	50.79	91.27	83.72
9	81.95	98.18	84.49
12	93.89	99.60	84.49
15	96.81	99.77	85.27

* Samples were taken one hour after application.

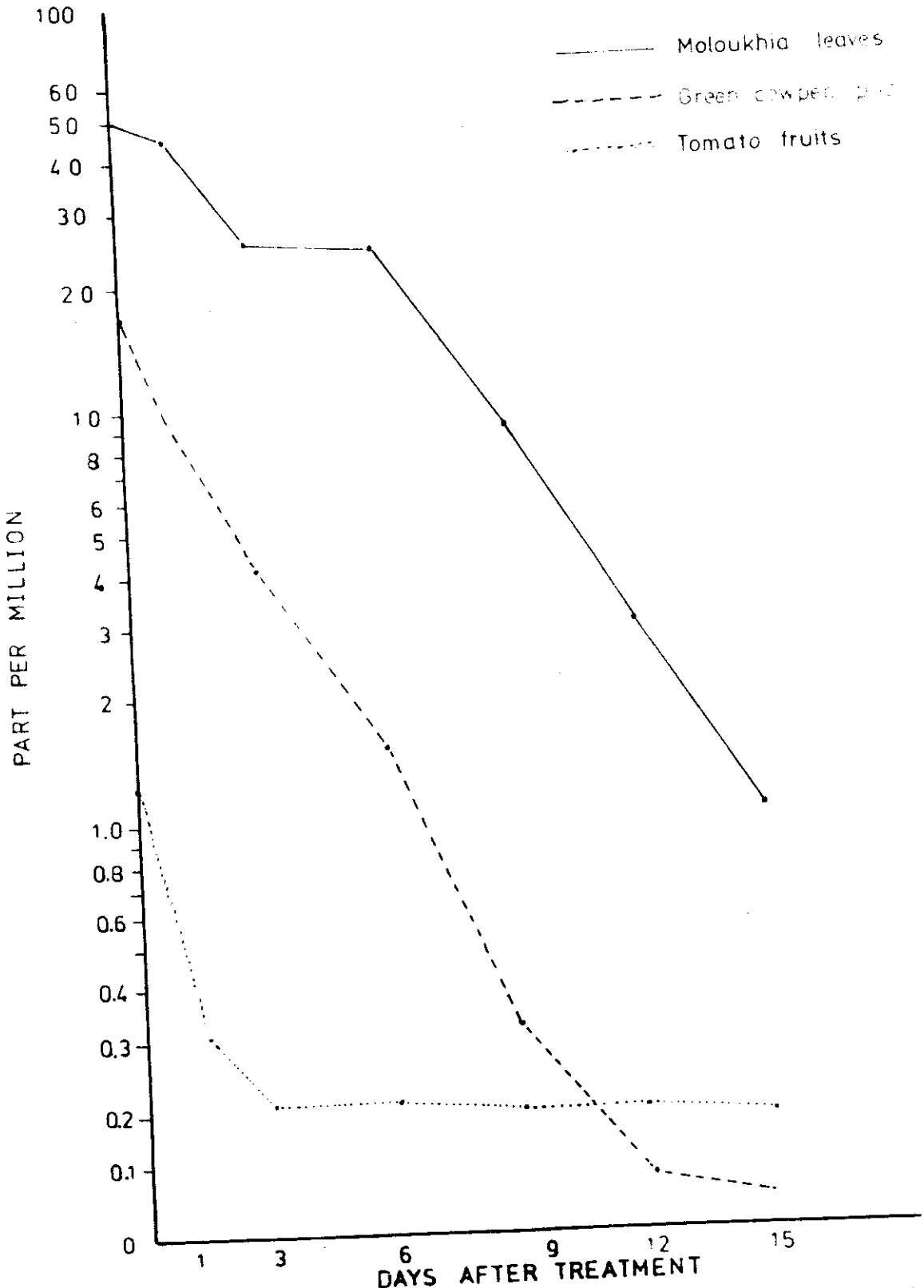

Fig.(1) Residues of prothiofos on and in moloukhia leaves, green cowpea pods and tomato fruits.

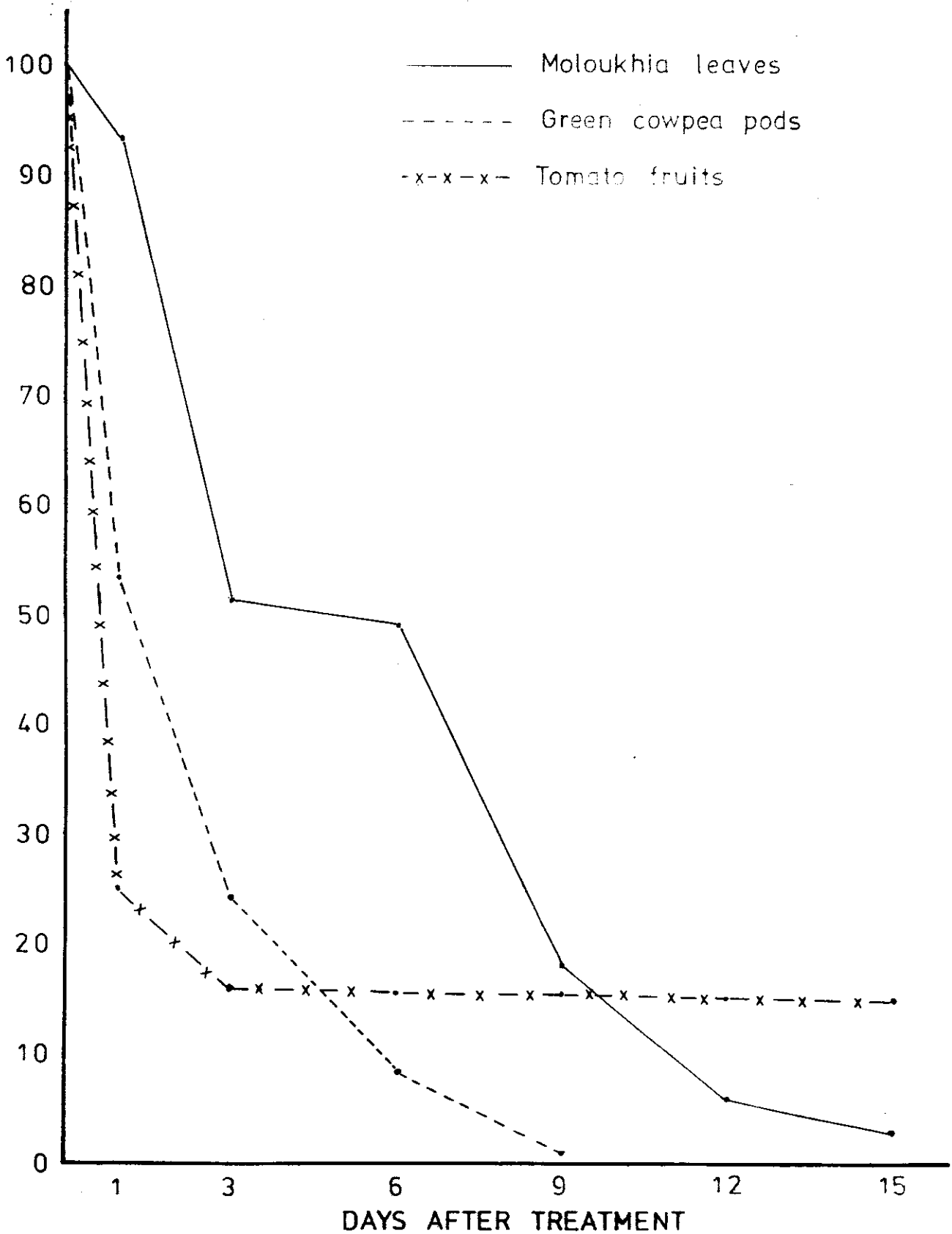

Fig.(2) Percentage persistence of prothiofos on and in moloukhia leaves, green cowpea pods and tomato fruits.

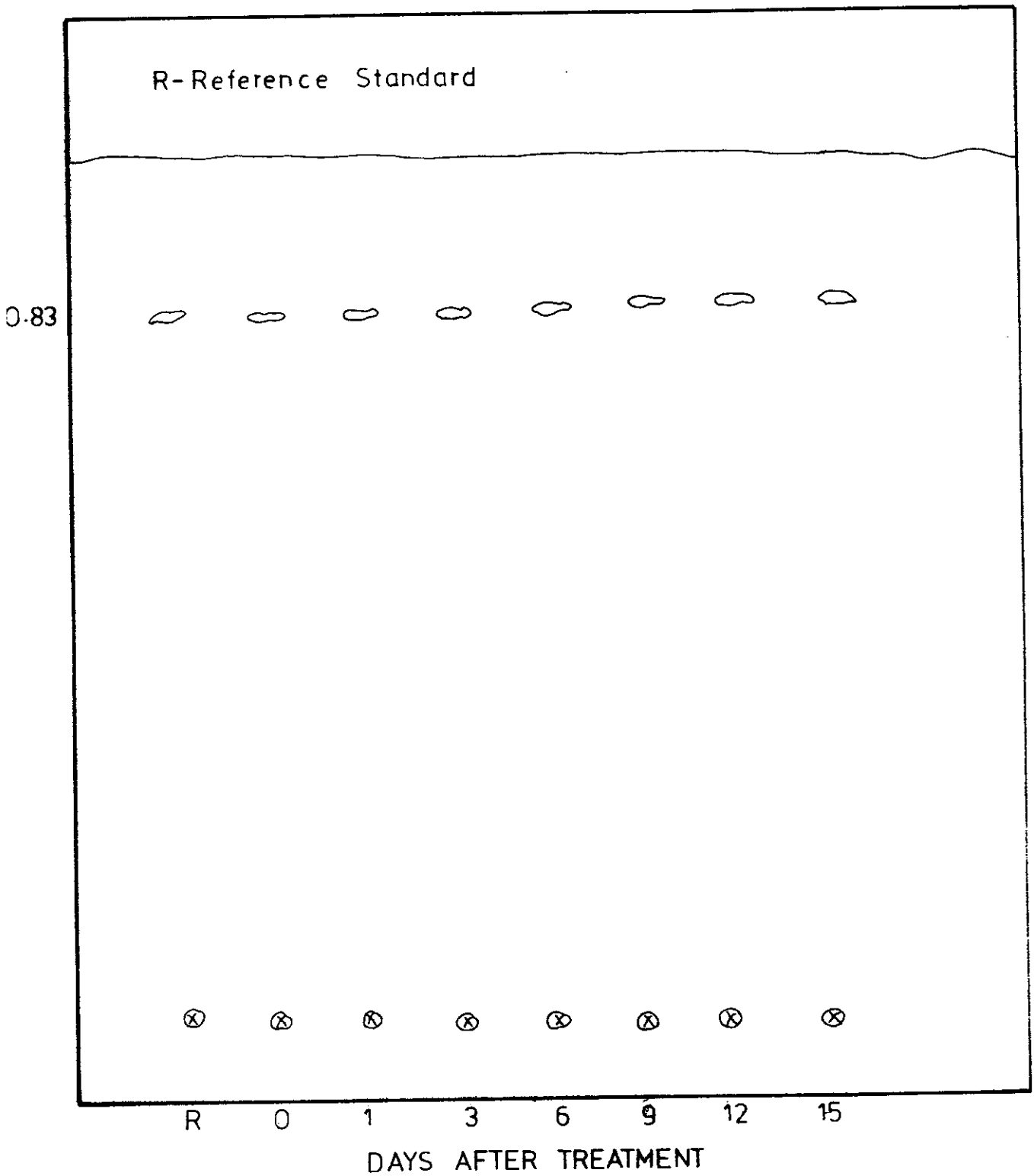

Fig.(3) Developed Chromatograms on Silica Gel Thin Layer Plates for Prothiofos on and in Moloukhia Leaves.

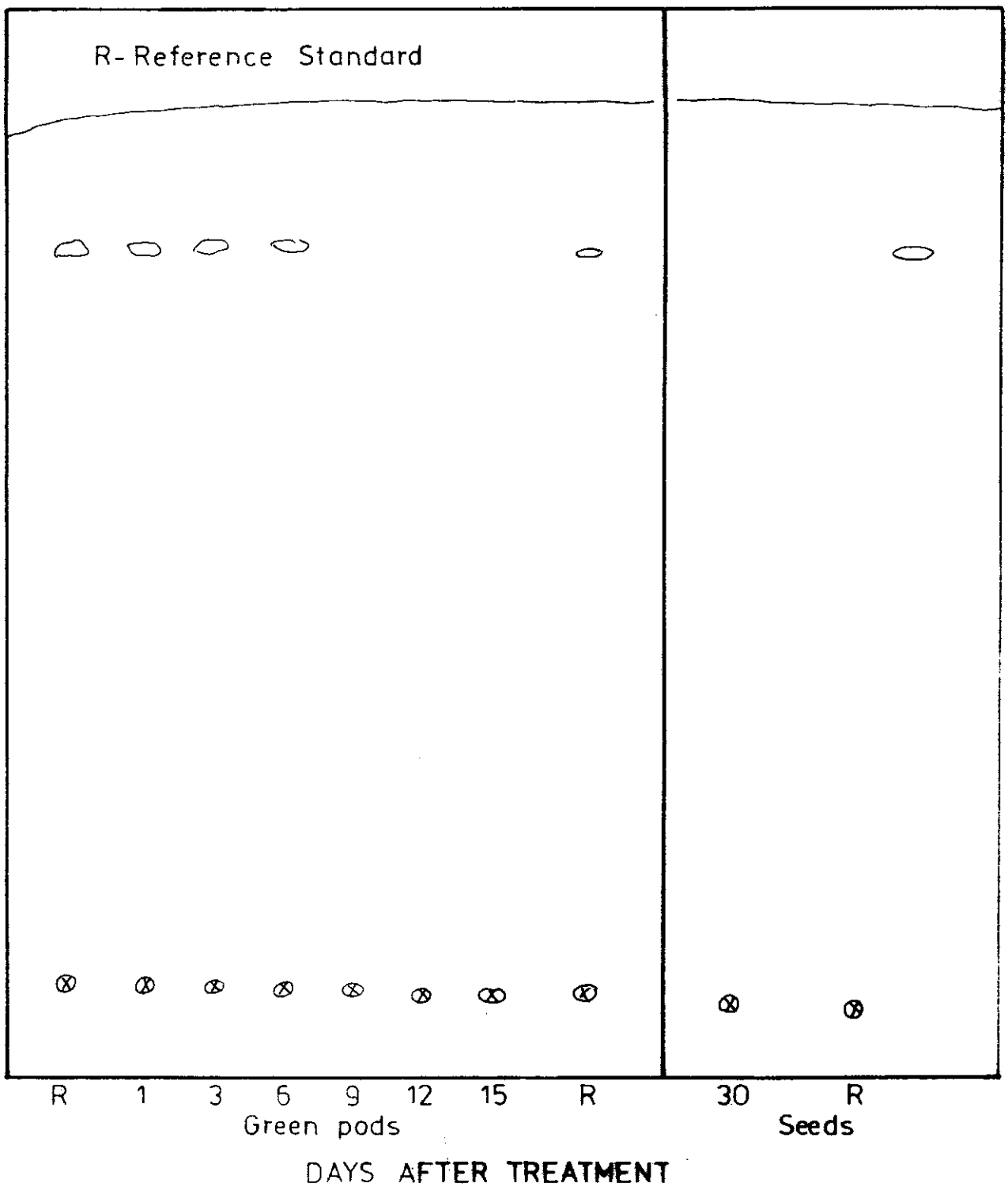

Fig.(4) Developed Chromatograms on Silica Gel Thin Layer Plates for Prothiofos on and in Green cowpea pods and Dry Seeds.

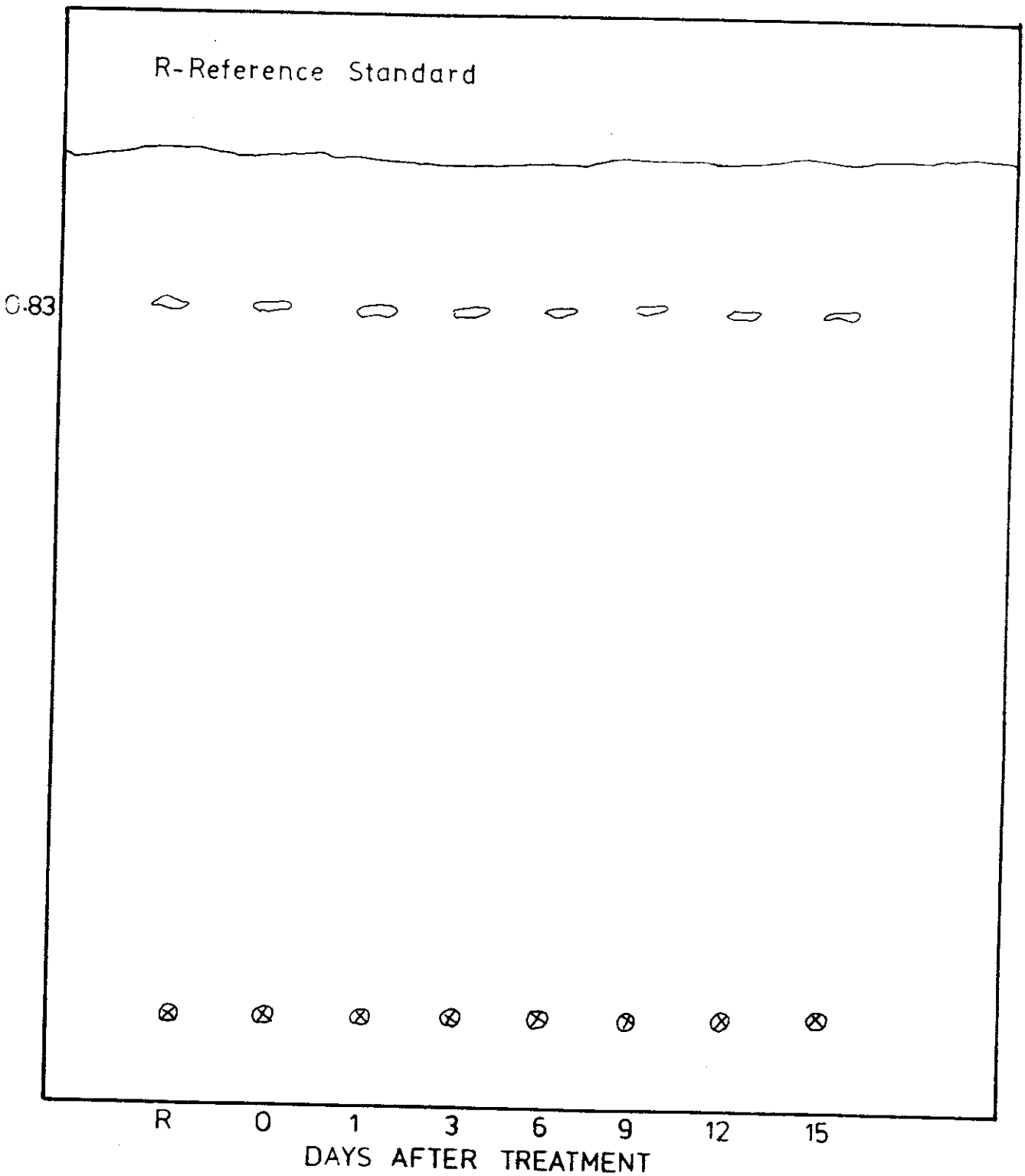

Fig.(5) Developed Chromatograms on Silica Gel Thin Layer Pates for Prothiofos on and in Tomato Fruits.

II. Persistence and fate of sulprofos

1. Residues on and in moloukhia leaves

Data presented in table 4 and Fig. 6 demonstrate the amounts of sulprofos residues detected on and in moloukhia leaves at different intervals after application. Also the percentage rates of loss of initial deposits of the tested chemical are given in tabbe 5.

The initial deposits on and in moloukhia leaves as determined one hour after application was 42.54 ppm (Table 4). This value dropped to 27·28 ppm indicating the rate of loss of 35.87 % of the active ingredient 24 hours after application. Residues continued to drop by elapse of time the following amounts were estimated; 5.34, 0.51 and 0.03 ppm indicating the rates of loss of 87.45, 98.80 and 99.92 % 3, 6 and 9 days after treatment respectively (Tables 4 and 5 and Figs. 6 and 7).

The residue half life of sulprofos value as obtained from the persistence line (Fig. 7) was 38.4 hours.

Developed silica gel chromatograms, (Fig.8), indicated the following:

The parent compounds(R_f 0.66) was detected in all samples

taken during 6 days after treatment. Two degradation products having R_f value of 0.16 and 0.23 extracted from moloukhia leaves were detected. The first one was detected in the samples taken within the first nine days and the other was detected only up to 6 days after application but not later.

2. Residues in the cowpea crop:

a. Residues in the green pods:

Data presented in (Table 4 fig. 6) showed that the residues detected of sulprofos on and in green cowpea pods were lower than these found in moloukhia leaves.

The initial deposits of sulprofos extracted from green cowpea pods as determined one hour after treatment were 5.01 ppm (Table 4 and Fig. 6). This value drpped to 1.21 ppm indicating the rate of loss of 75.84 % of the active ingredient 24 hours after application. Following this period the residues declined and the amounts estimated were 0.33 and 0.05 ppm in samples collected 3 and 6 days after treatment respectively. The calculated rates of loss were 93.41 and 99.00 % respectively (Table 5).

The residue half life value of sulprofos as obtained from the persistence line (Fig. 7) was 26.4 hours.

Developed silica gel chromatograms, (Fig. 9) showed the following:

The parent compound (R_f 0.66) was detected only in the first 3 days from treatment. Two degradation products having R_f values of 0.16 and 0.23 on and in the green cowpea pods were detected. The first one was detected within the first 6 days from treatment. The other was detected within 3 days from application. In subsequent samples it was not detected.

b. Residues in the dry mature seeds:

The samples were taken 30 days after the pesticidal application. GC analysis revealed that the mature cowpea seeds contained 0.001 ppm.

Silica gel chromatograms were developed for the mature cowpea seeds. The active ingredient and any of its degradation products were not detected.

3. Residues on and in tomato fruits:

The data obtained (Table 4 and Fig. 6) showed that the initial deposits of sulprofos on tomato fruits were lower than those found on and in either moloukhia leaves or green cowpea pods. The amounts of residues as determined one hour after a

application were 0.79 ppm. This value dropped to 0.10 ppm 24 hours after application showing the rate of loss of 87.34 % (Table 4 and 5).

Successive samples taken at different intervals, i.e. 3 and 6 days after application showed that sulprofos residues were approximately constant recording 0.10 and 0.08 ppm, respectively. The calculated rates of loss were 87.34 and 89.87 % respectively (Tables 4 and 5 and Figs. 6 and 7).

The residue half life value of sulprofos as obtained from the persistence line (Fig. 7) was 12 hours.

Developed silica gel chromatograms, (Fig.10), showed that the parent compound (R_f 0.66) was detected only up to 3 days after treatment. Two degradation products having R_f value of 0.16 and 0.23 on and in the tomato fruits were also detected.

The first one was detected in samples taken during 6 days after treatment. The other one was only detected in the initial samples which were taken one hour after application.

Table 4: Persistence of sulprofos on and in moloukhia leaves, green cowpea pods and tomato fruits after treatment at the rate of 720 grams active ingredient per feddan.

Time after treatment (days)	Residues in ppm		
	Moloukhia leaves	Cowpea pods	Tomato fruits
Initial*	42.54	5.01	0.79
1	27.28	1.21	0.10
3	5.34	0.33	0.10
6	0.51	0.05	0.08
9	0.03	UND	UND
12	UND	UND	UND
15	UND	UND	UND

* Samples taken one hour after application.

UND Undetectable.

Table 5: Percentage rates of loss of sulprofos residues on and in moloukhia leaves, green cowpea pods and tomato fruits.

Time after treatment (days)	Percentage		
	Moloukhia leaves	Cowpea pods	Tomato fruits
Initial*	0.00	0.00	0.00
1	35.87	75.84	87.34
3	87.45	93.41	87.34
6	98.80	99.00	89.87
9	99.92		
12			
15			

* Samples taken one hour after application.

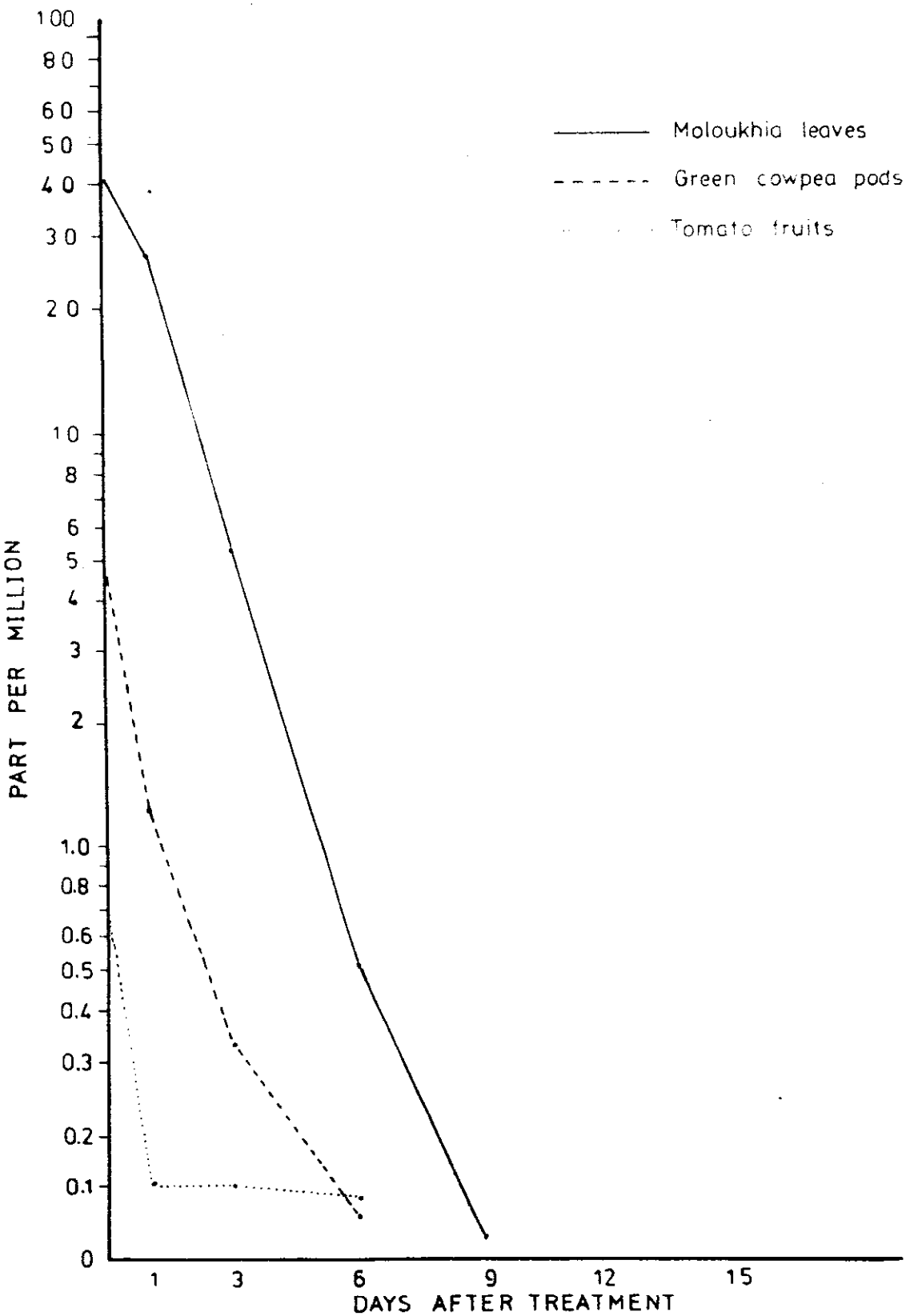

Fig.(6) Residues of sulprofos on and in moloukhia leaves, green cowpea pods and tomato fruits.

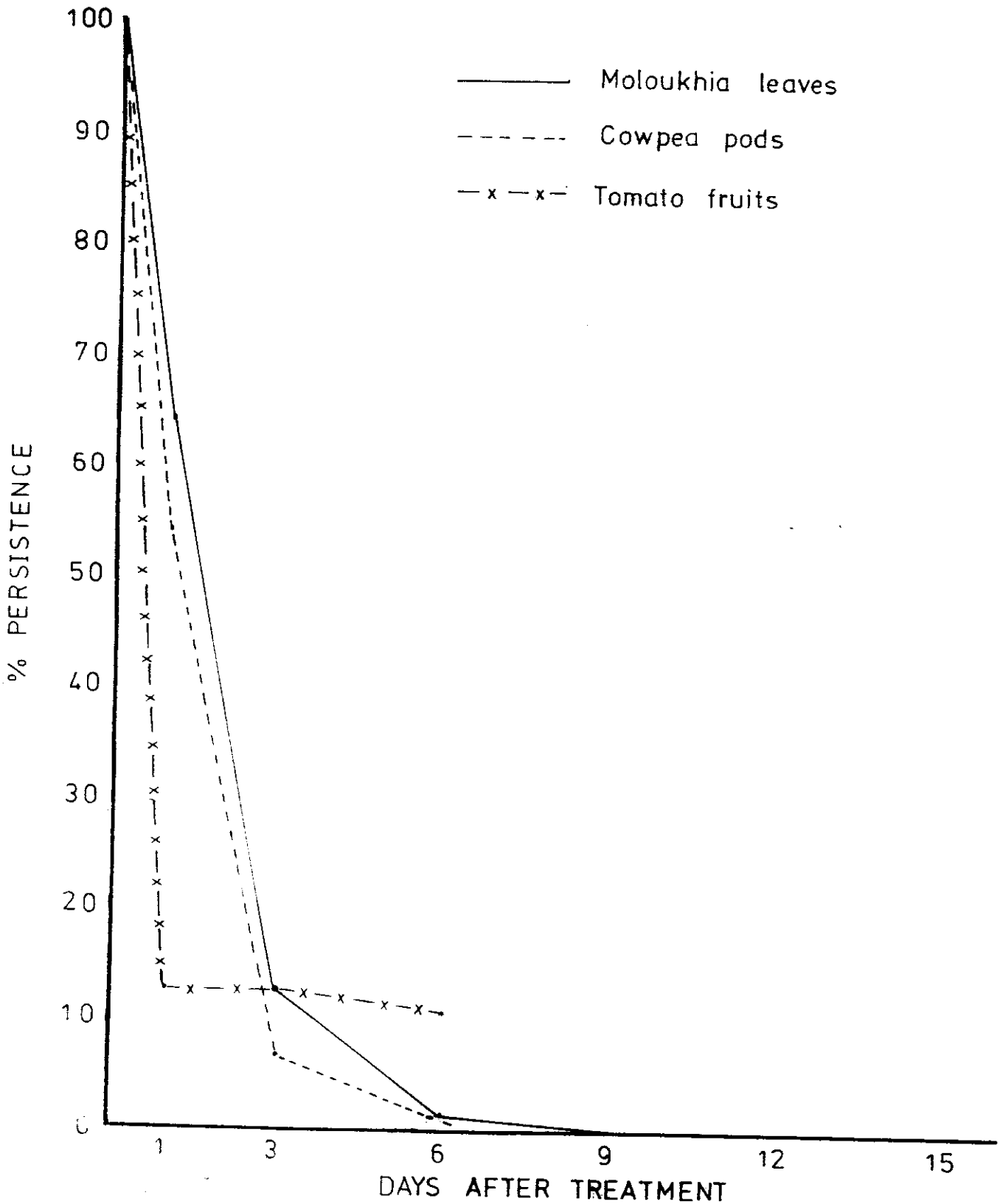

Fig.(7) Perecentage persistance of sulprofos residues on and in moloukhia leaves, cowpea fruits and tomato fruits.

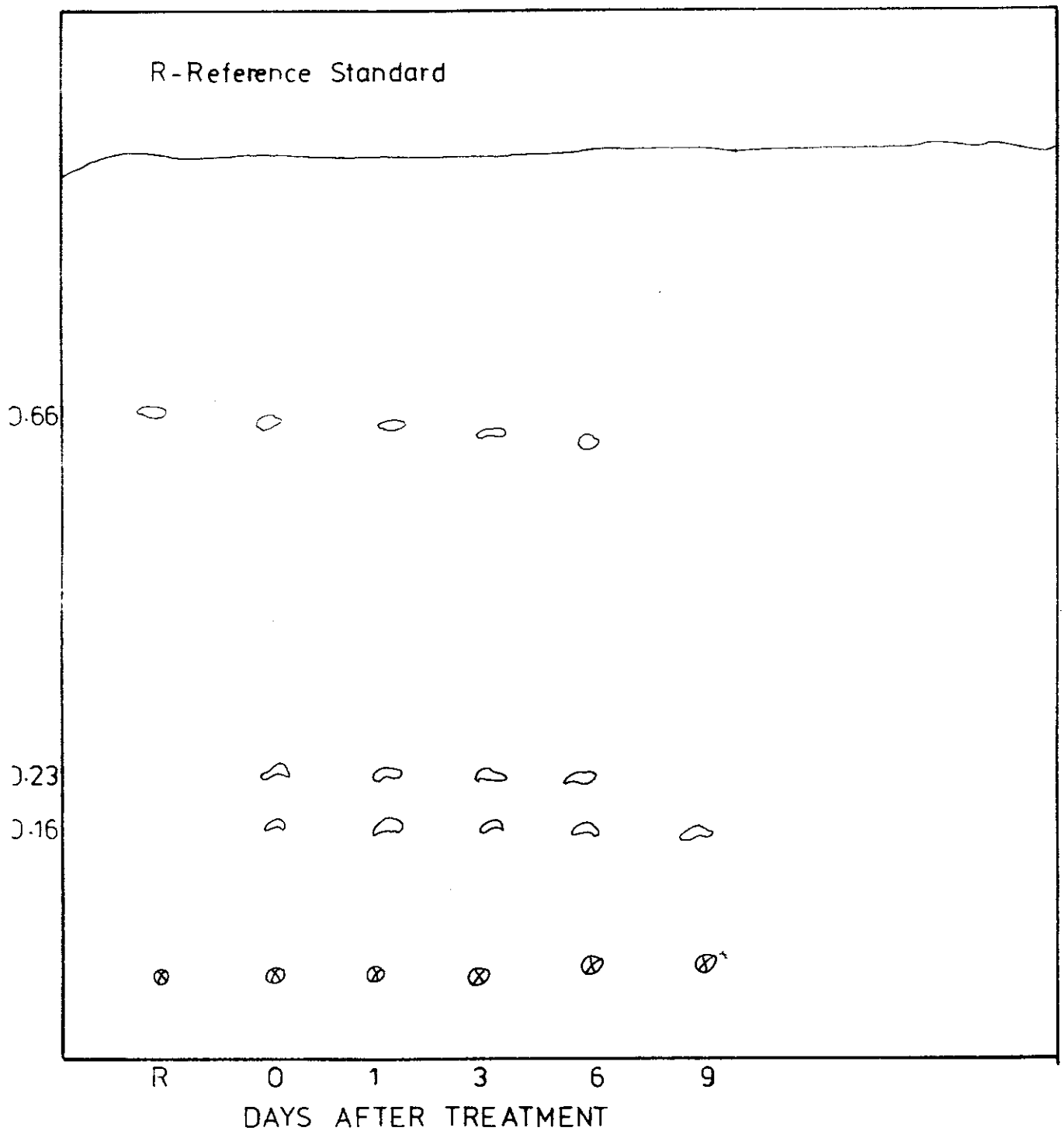

Fig.(8) Developed Chromatograms on Silica Gel Thin Layer Plates for Sulprofos on and in Moloukhia Leaves

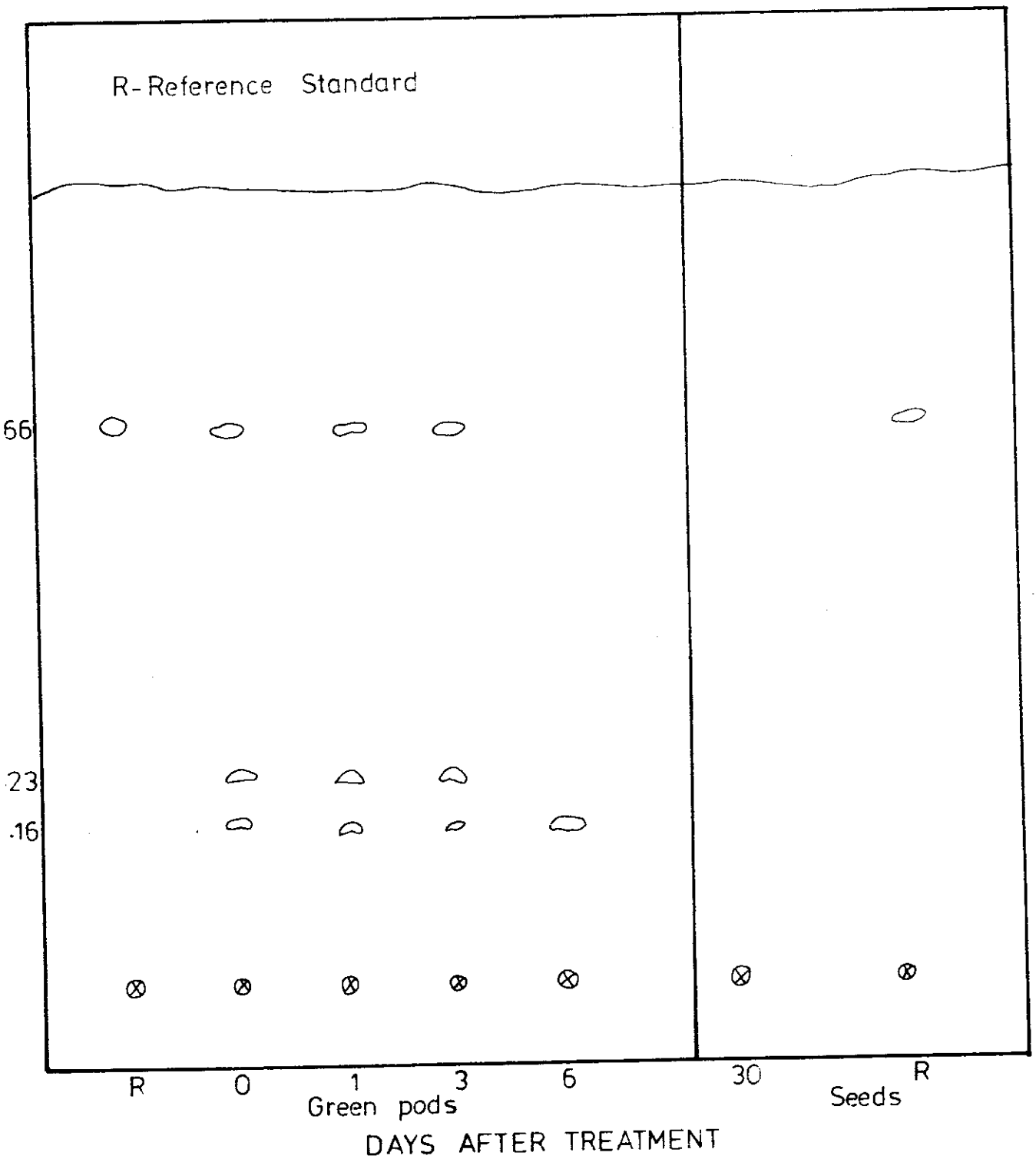

Fig.(9) Developed Chromatograms on Silica Gel Thin Layer Plates for Sulprofos on and in Green Cow pea pods and Dry Seeds.

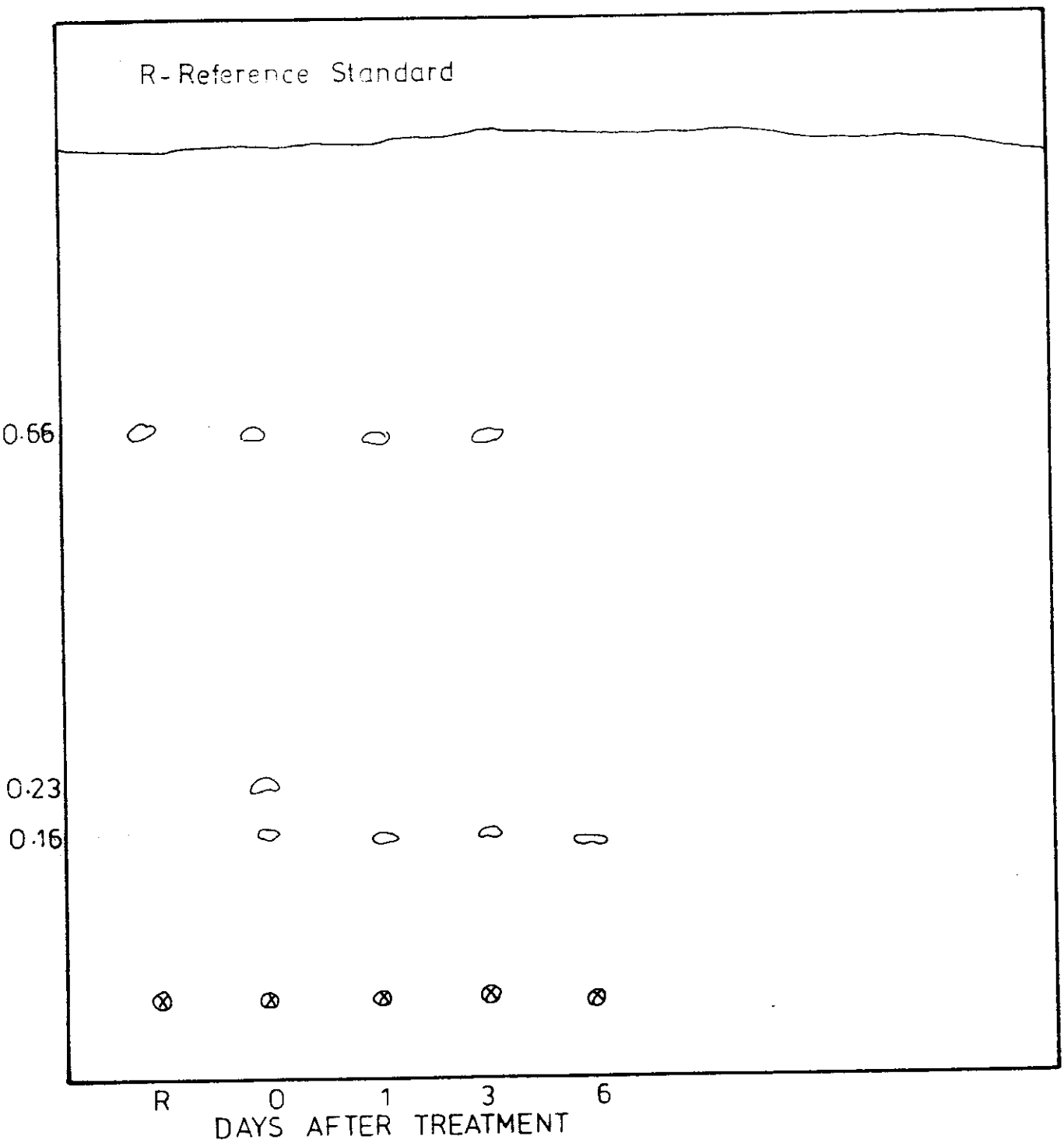

Fig.(10) Developed Chromatograms on Silica Gel Thin Layer Plates for Sulprofos on and in Tomato Fruits.