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Influence of Some Pesticides on the Availability of Nutrients to Brinjal *(Solanum melongena)*

P. SINGARAM[1] and T. S. MANICKAM[2]

The study revealed that when pesticides viz., aldicarp, carbofuran, di-syston and phorate, applied through the soil to control the insect pests of brinjal crop, the availability of nitrogen (nitrate and ammonium nitrogen) increased to some extent and then decreased; no drastic increase or decrease in the case of available phosphorus and sulphur. The results showed that when the pesticides were applied at recommended doses through the soil, the availability of soil nutrients to brinjal were not affected very much.

For controlling insect pests of crops application of insecticides is necessary. Some insecticides are applied through soil in the form of granuales and many chemical and biological changes may take place since these pesticides are not toxic to the insect pests but also to other soil microbes, especially those involved in the various mineralisation processes, affecting availability of nutrients. This study was carried out to find out the influence of some soil applied pesticides on the availability of major plant nutrients.

MATERIAL AND METHODS

Brinjal cultivar SM 68 was raised in five plots with a spacing of 75 × 60 cm at Tamil Nadu Agricultural University farm in Coimbatore. Calculated quantities of the pesticides viz., aldicarp, carbofuran, disystom and phorate at the rate of 1.0 kg a.i./ha were applied to each plot 24 days after transplantation, about 7.5 cm away from the seedlings. The fifth plot was kept as control (without the addition of any pesticides).

Soil samples from each plot were collected at random, mixed thoroughly and from this representative samples were drawn for analyses. The sampling was done before application of pesticides, third, seventh, fifteenth, thirtieth and sixtieth day after the application and the soil aamples were analysed for (nitrate and ammonical nitrogen, available phosphorus and sulphur by standard methods (Black *et. al.*, 1965).

RESULTS AND DISCUSSION

The data on ammoniacal and nitrate nitrogen, available phosphorus and sulphur and are presented in Table I.

1 and 2 Tamil Nadu Agricultural University, Coimbatore-3.

TABLE I Available Nutrients (ppm) as influenced by soil application of pesticides to brinjal.

Pesticides	Periods							Mean
	P_1	P_2	P_3	P_4	P_5	P_6	P_7	
Amoniacal nitrogen								
Aldicarp	102	136	88	97	82	86	36	89
Carbofuran	100	99	34	99	114	51	26	74
Di-syston	86	82	103	86	78	66	28	75
Phorate	85	77	84	78	69	63	37	70
Control	73	73	82	88	66	64	28	69
Mean	89	93	78	89	91	66	31	—
				F		S.E.		C.D.
	1.	Pesticides		N.S.		—		—
	2.	Periods		8.75**		10.26		17.56
Nitrate nitrogen								
Aldicarp	80	148	74	142	93	97	67	100
Carbofuran	108	111	76	103	142	93	67	100
Di-syston	91	93	101	96	95	87	67	90
Phorate	83	92	105	143	94	106	61	97
Control	84	87	111	90	80	107	79	91
Mean	89	106	93	114	101	98	68	
				F		S.E.		C.D.
	1.	Pesticides		N.S.		—		—
	2.	Periods		2.9*		12.01		20.54
Available phosphorus								
Aldicarp	2.1	5.1	2.3	9.1	9.3	9.6	2.6	5.7
Carbofuran	2.1	2.3	5.4	4.9	11.7	9.1	0.5	5.1
Di-syston	7.0	3.6	3.3	5.9	9.9	9.4	0.5	5.6
Phorate	1.5	4.4	8.0	8.4	7.9	9.4	0.5	5.7
Control	2.3	5.0	2.8	9.1	6.9	5.6	4.0	5.5
Mean	3.0	4.0	5.4	7.4	9.1	9.3	1.6	
				F		S.E.		C.D.
	1.	Pesticides		N.S.		—		—
	2.	Periods		13.2**		1.17		2.0
Available sulphur								
Aldicarp	430	2129	778	1009	1475	921	657	1055
Carbofuran	270	679	248	539	421	266	556	425
Di-syston	90	668	179	345	575	195	556	392
Phorate	192	425	878	306	755	1304	746	958
Control	260	377	741	421	141	877	644	494
Mean	245	855	565	524	673	714	631	
				F		S.E.		C.D.
	1.	Pesticides		N.S.		—		—
	2.	Periods		N.S.		—		—

P_1 : Before application of pesticides
P_2 : Immediately after application
P_3 : After 3 days
P_4 : After 7 days
P_5 : After 15 days
P_6 : After 30 days
P_7 : After 60 days.

a) Ammoniacal nitrogen :

Maximum content (136 ppm) of ammoniacal nitrogen was observed with the pesticide aldicarp in the second period and minimum (26 ppm) was recorded with the pesticide carbofuran in the seventh period. Comparing the mean values for the pesticides, the maximum and minimum contents were of 89 and 69 ppm for aldicarp and control respectively. The maximum and minimum contents were observed as 93 and 31 ppm for the periods 2 and 7 reapectively.

b) Nitrate nitrogen :

Maximum and minimum contents of nitrate nitrogen (148 and 61 ppm) were noted in aldicarp treated plots in the second period and phorate plot in the seventh period respectively. When the mean values for pesticides were compared, the maximum and minimum contents were observed for aldicarp and di-system (100 and 90 ppm) respectively. While comparing the mean values for the periods, the maximum and minimum availability (114 and 68 ppm) were observed in the periods 4 and 7 respectively.

The results revealed that contrary to the belief that application of pesticides through soil might cause some deleterious effect on the availability of nutrients, the contents of poth ammoniacal and nitrate nitrogen were not affected. This is in contrast to findings of some earlier workers (Flectcher and Bollen, 1954), the results proved that there was no adverse effect on nitrogen mineralising microorganisms, as stated by Salhravat (1974). The general reduction in the contents of nitrate and ammoniacal nitrogen may not be due to the influence of soil applied pesticides, but due to the plant uptake. Even immediately after the application of pesticides (after 3 days), there was no substantial reduction in the contents of nitrato and ammoniacal nitrogen which clearly showed that the pesticides at the recommended level did not affect the beneficial nitrogen mineralising micro organisms. All the pesticides fixed behaved similarly in these respects.

c) Available Phosphorus :

The maximum and minimum contents of available phosphorus (11.7 and 0.5 ppm) were observed with the pesticides carbofuran in the periods 5 and 7 respectively. Comparing the mean values for pesticides, the maximum and minimum contents (5.7 and 5.1 ppm) were for aldicarp and carbofuran respectively. While comparing the mean values for period, the maximum and minimum availability were observed for the periods 6 (9.3 ppm) and 7 (1.6 ppm) respectively.

As in the case of the trends observed with regard to the contents of ammonical and nitrate nitrogen, the soil application of pesticides did not affect the availability of phosphorus. The decrease observed thus was due to the uptake by the growing crop.

d) Available Sulpur :

The maximum and minimum contents of available sulphur (2129 and 90 ppm) were observed with the pesticides aldicarp in the period 2 and with disyston in the period 1 respectively. Comparing the mean values for the pesticides, the maximum and minimum availability were observed (1055 and 392 ppm) for aldicarp and disyston respectively. Regarding the periods, the maximum and minimum contents (855 and 245 ppm) were observed in the periods 2 and 1.

Unlike in the case of available nitrogen and phosphorus, some inconsistancy in sulphur content was observed due to application of pesticides. This effect could not explained.

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