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Influence of some Pesticides on the Availability of Nutrients to Bhendi (*Abelmoschus esculentus*)

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With the application of pesticides at recommended doses to soil for the control of Bhendi pests, the availability of nitrogen and sulphur increased while the availability of phosphorus decreased. The results also indicated the absence of harmful effects at recommended doses of the soil applied pesticides.

In the present day agricultural use of pesticides for the control of crop pests has become a must. Many pesticides are applied to the soil directly. By virtue of their poisonous nature, they might affect the beneficial microbial population also resulting in their reduced activity. This might bring about changes in the availability of plant nutrients present in the soil. Hence, an investigation was carried to findout the effect of pesticides when applied through soil on the availability of plant nutrients by raising bhendi (*Abelmoschus esculentus*).

MATERIALS AND METHODS

Pusa sawani bhendi was sown in five plots with a spacing of 60 x 20 cm in the Tamil Nadu Agricultural University Farm, Coimbatore and the calculated quantities of pesticides viz. aldicarp, carbofuran, disyston and phorate at the rate of one kilogram of active ingredient/ha were applied to each plot around the seedlings after 15 days of sowing by keeping a distance of 3 inches from the seedlings. The other plot was left as control. Representative soil samples from each plot were collected before application of pesticides, immediately after application of pesticides, third, seventh, fifteenth, thirtieth and sixtieth day after the application and were analysed for available nitrogen, phosphorus and sulphur.

RESULTS AND DISCUSSION

a) Nitrogen Ammoniacal form: Maximum and minimum availability of ammoniacal nitrogen were observed (155 and 31 ppm) with carbofuran in period one and with phorate in period five respectively. While comparing the mean values for pesticides, the maximum and minimum availability were observed (82 and 68 ppm) for carbofuran and phorate respectively. Regarding period, maximum and minimum availability were observed (94 and 67 ppm) in the periods one and seven respectively.

Nitrate form: Maximum and minimum availability of nitrate nitrogen were observed (156 and 67 ppm) with

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phorate in the period five and disyston in the period seven respectively. While comparing the mean values for pesticides, maximum and minimum availability were observed (106 and 98 ppm) for phorate and carbofuran respectively. While comparing the means of periods, maximum and minimum availability (123 and 83 ppm) were in the periods five and seven respectively. (Table I) The data were not-significant with pesticides and periods for both the forms of nitrogen.

TABLE I. Available nutrients on moisture free basis (ppm)

Periods	P_1	P_2	P_3	P_4	P_5	P_6	P_7
Pesticides:							
Available Nitrogen-Ammonical							
Aldicarp	72	69	76	82	78	72	89
Carbofuran	155	65	79	91	76	69	43
Di-Syston	88	133	69	80	68	65	35
Phorate	77	69	68	118	31	86	33
Control	78	87	75	81	91	68	36
Available Nitrogen-Nitrate:							
Aldicarp	85	99	86	104	140	138	78
Carbofuran	139	83	93	89	90	112	86
Di-Syston	94	135	106	118	89	101	67
Phorate	91	86	100	104	156	131	78
Control	89	105	89	98	142	110	108
Available Phosphorus:							
Aldicarp	4.6	6.4	3.3	13.3	10.3	8.7	1.5
Carbofuran	3.4	3.0	4.6	9.8	8.4	7.1	1.2
Di-Syston	2.0	6.4	2.5	9.7	6.4	10.5	0.5
Phorate	2.0	1.8	2.8	9.5	9.2	6.7	0.5
Control	3.1	3.0	3.0	8.5	9.5	8.1	8.6
Available Sulphur:							
Aldicarp	141	629	704	299	855	1519	558
Carbofuran	90	246	794	577	474	817	2027
Di-Syston	193	143	1036	527	806	908	514
Phorate	180	90	819	577	703	903	506
Control	130	91	423	550	434	484	633

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 bays

Contrary to the thinking prevailing that the soil application of pesticides might reduce the availability of plant nutrients, there was increase in the availability of both ammoniacal and nitrate nitrogen with application of pesticides under field conditions with crop Bhendi. This showed that there was no inhibitory effect of pesticides on the mineralisation of nitrogen. This agreed with the findings of Shin-Chsiang Lin *et al*. (1972), Kobayashi and Katsura (1968) and Taha *et al*. (1972).

Almost all the pesticides used had the same effect. The availability was reduced only in the last period which clearly indicated that the reduction in availability might not be due to pesticide application but due to crop utilisation of the available nutrients.

b. **Phosphorus** : Maximum and minimum availability of phosphorus were observed (13.3 and 0.5 ppm) with aldicarp in the period four and disyston in the period seven respectively. While comparting the mean values, maximum and minimum availabilities were observed (6.9 and 6.7 ppm) for aldicarp and disyston respectively. Regarding the periods, maximum and minimum availability were observed (10.1 and 2.4 ppm) for the periods four and seven respectively. (Table I) The data were significant with pesticides and periods.

The availability of phosphorus decreased to some extent while comparing the mean values of pesticides with that of the control. This might be due to the reason that the crop itself might have utilized a considerable amount of P of all the pesticides more availability was observed with the pesticide aldicarp.

c. **Sulphur** : Maximum and minimum availability of sulphur were observed (159 and 90) with aldicarp in the period six and with phorate in the period two. While comparing mean values for pesticides, maximum and minimum availability were observed (717 and 385 ppm) in carbofuran and control respectively. Regarding periods, maximum and minimum availability were observed (926 and 146 ppm) in the period six and one respectively (Tabie I) The data were significant with periods and non-significant with pesticides.

TABLE II. Analysis of variance for ammoniacal and nitrate Nitrogen

Source	F	SE	
Pesticides	NS		
Periods	NS		

Analysis of Variance for phosphorus

Source	F	SE	CD
Pesticides	3.41*	0.69	1.18
Periods	31.23**	0.82	1.41

Means

Pesticides :	C_1	C_2	C_3	C_4	C_5
	6.9	5.1	4.7	5.3	6.2

Periods :	P_1	P_2	P_3	P_4	P_5	P_6	P_7
	3.0	3.7	3.2	10.1	8.8	8.2	2.7

Source	F	SE	CD
Pesticides	NS		
Periods	4.39**	199.9	342.1

Means

Pesticides :	C_1	C_2	C_3	C_4	C_5
	672	717	589	539	385

Periods :	P_1	P_2	P_3	P_4	P_5	P_6	P_7
	146	239	755	496	654	926	847

Increase in availability of sulphur was observed with the crop bhendi, while comparing the mean values of pesticides with that of control. This indicated that pesticides application had not decreased the availability of sulphur. On the other hand there has been increased availability in general, higher availability of sulphur has observed on thirtieth day after application of pesticides which might be due to increased mineralisation of sulphur with the advancement of time.

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