

STUDIES IN MULTIPLE CROPPING—A NOTE ON CORRELATION BETWEEN NITROGEN AND CARBON IN THE SOIL AND RICE YIELD

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Organic matter and nitrogen status in a soil are considered as indices of soil fertility. Both cultivation and cropping change the soil organic matter and nitrogen status of the soil.

Acharya and Rajagopalan (1956) studied the soils of "Long term manurial experiments" at Pusa (Bihar) and Coimbatore and reported no significant increase of nitrogen and carbon in plots which received green manure. Similarly Arora and Raheja (1966) studied the correlation between nitrogen and carbon in soil and wheat yield in the rotation experiment at I. A. R. I., New Delhi and found no significant correlation.

The present study is from the multiple cropping experiment in progress since 1967, at the Central Rice Research Institute, Cuttack. There are five cropping patterns and *kharif* rice has been included in all the cropping patterns whereas *rabi* rice has been included in four out of five cropping patterns. Recommended doses of manures and fertilizers were applied to each crop according to schedule given below.

Schedule of manuring for various crops

Crop	Farm yard manure in quintals per hectare	Nitrogen in kg per hectare as ammonium sulphate	Time of application
<i>Rabi</i> rice		110	$\frac{1}{2}$ at planting $\frac{1}{4}$ one month after J before flowering.
<i>Kharif</i> rice		100	-do-
Potato	200	100	$\frac{1}{2}$ at planting remaining 3 weeks after.
Maize	120	100	$\frac{1}{3}$ rd at planting $\frac{1}{3}$ rd 3 weeks after and $\frac{1}{3}$ rd 6 weeks after.
Groundnut	50	25	f at planting rest one month after.
Jute		60	Full dose one month after sowing.

Nitrogen and Carbon content of the soil and *rabi* rice yield as affected by different cropping patterns.

Cropping pattern	Rabi rice 1968			Rabi rice 1969		
	N%	C%	Yield in kg./hectare	N%	C%	Yield in kg./hectare
1. Potato-rice-rice	0.0545	0.4397	7205	0.0609	0.4904	5814
2. Maize-rice-rice	0.0529	0.3933	5387	0.0536	0.4875	2519
3. Groundnut-jute-rice	—	—	—	—	—	—
4. Rice-jute -rice	0.0507	0.3803	7172	0.0416	0.3878	5411
5. Rice-rice	0.0510	0.4208	6754	0.0401	0.3178	5471
(a) Correlation coefficient between yield and total N%	+0.2427 N. S.			+0.5150 N. S.		
(b) Correlation coefficient between yield and C%	+0.4347 N. S.			+0.0360 N. S.		

N. S. Not significant

Table 2

Nitrogen and Carbon content of the soil and kharif rice yield as affected by different cropping patterns.

Cropping pattern	Kharif rice 1968			Kharif rice 1969		
	N%	C%	Yield in kg/hectare	N%	C%	Yield in kg/hectare
1. Potato-rice	0.0535	0.4233	3065	0.0490	0.4107	5222
2. Maize-rice	0.0442	0.3525	2834	0.0420	0.3924	5152
3. Groundnut-jute-rice	0.0325	0.3150	3441	0.0513	0.4125	3122
4. Rice-rice	0.0457	0.3535	3972	0.0401	0.3272	2880
5. Urea-rice	0.0502	0.3638	3014	0.0403	0.3057	4803

(a) Correlation coefficient between yield and N% = +0.2752 N.S.

(b) Correlation coefficient between yield and C% = +0.1224 N.S.

+0.4078 N.S.

+0.2323 N.S.

N.S. Not significant

Soil samples were collected before starting the experiment as well as after each crop from the top 15 cm layer and nitrogen and organic carbon in the soil were determined by Kjeldahl's method and Walkley and Black's rapid titration method respectively.

Correlation between *rabi* rice yield and nitrogen and organic carbon content of the soil, and between *kharif* rice yield and nitrogen and organic carbon content of the soil for the years 1967-68 and 1968-69 were worked out and the data are presented in Tables 1 and 2.

Results and Conclusions

It is evident from Table 1 that the yield of *rabi* rice was not significantly correlated with the total soil nitrogen and organic carbon contents. During the second year also there was no significant correlation between nitrogen and yield of rice although the correlation coefficient was more than 0.5 and positive. The soil which had comparatively high percentage of nitrogen might be expected to release more nitrogen for plant growth and it might give comparatively high yield. Similar results were reported by Arora and Raheja (1966).

The data in Table 2 also show that the yield of *kharif* rice was not significantly correlated with the total nitrogen percentage and organic carbon percentage in the soil. However, nitrogen had a higher non-significant positive correlation than organic carbon during both the years. Hence, it appears that total nitrogen in soil has some degree of influence on plant growth and yield of rice.

References

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