FERTILIZATION VALUE OF TANK SILTS

II. Phosphorus and Reproductive Vigour of Oryza sativa L.

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Received April 17, 1952
(Communicated by Prof. T. S. Sadasivan, F.A.Sc.)

In an earlier communication (Venkata Ram and Pai, 1951) the presence of N and K in tank silts in catalyzing growth in the rice plant was reported. The present investigation was undertaken to determine the role of phosphorus in relation to ammoniacal and nitrate nitrogen, organic matter, iron and manganese in the silts in influencing the reproductive vigour of the rice plant and the results are discussed below.

MATERIALS AND METHODS

In addition to silt samples A and B used earlier by the authors, another sample C from Triplicane temple tank, Madras City, was also included in this investigation and the experimental procedure largely remained the same (loc. cit.) with the exception that tin cans of 9" × 6" × 6" size quoted with inert bitumen paint were used as containers for the silt soil admixture. At first 50 seeds were sown in each can, maintaining three replicates for each series, and later thinned out to 20 seedlings per can, the entire experiment being run in the open under field conditions. Chemical assays of the silt samples were carried out by following standard methods and the results are presented in Table I. The vigour of rice plants 90 days after sowing in soils containing 15 per cent. silt each of the three samples are presented in Plate III and Text-Fig. 1. The control plants were not photographed since they behaved similarly to those grown in silt sample C.

DISCUSSION OF RESULTS

Growth stimulated by silt application at either 10 or 15 per cent. of sample C was practically negligible when compared to the control (garden soil); the other two samples A and B markedly improved growth as is seen in Plate III. The chemical composition of the three silts manifested striking
### Table I

*Chemical composition of the silt and soil samples determined quantitatively*

<table>
<thead>
<tr>
<th>Presence of various constituents in the samples represented as milligram per cent.</th>
<th>Garden soil</th>
<th>Silt samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Total soluble salts</td>
<td></td>
<td>280</td>
</tr>
<tr>
<td>Chlorides</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td></td>
<td>112.8</td>
</tr>
<tr>
<td>Organic matter</td>
<td></td>
<td>0.64*</td>
</tr>
<tr>
<td>Ammonium Nitrogen</td>
<td></td>
<td>86.5</td>
</tr>
<tr>
<td>Nitrate Nitrogen</td>
<td></td>
<td>4.6</td>
</tr>
<tr>
<td>Potassium (K₂O)</td>
<td></td>
<td>228</td>
</tr>
<tr>
<td>Phosphorus (P₂O₅)</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Iron (Fe₂O₃)</td>
<td></td>
<td>760</td>
</tr>
<tr>
<td>Manganese</td>
<td></td>
<td>12.68</td>
</tr>
</tbody>
</table>

* Gram per cent.

Differences. Both samples A and B were found to contain more total nitrogen, potassium, phosphorus and organic matter than sample C. Sample C, however, indicated higher figures for total nitrogen, ammonium and nitrate nitrogen, phosphorus and organic matter than unmanured garden soil although presenting lower figures for K, Fe and Mn.

Further interest centred round the fact that sample C, although containing considerable quantities of N, P, Fe and Mn, yet had very low K. Indeed, the failure of sample C to catalyze growth of the rice plants to any appreciable extent could be attributed to lack of potassium only (being even lower than in garden soil) since this silt was almost as rich as sample A in
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Fig. 1 shows earliness of flowering of rice plants grown in silt samples A, B and C over those grown in unamended control.

ammoniacal nitrogen which is known to be essential to rice plants during initial growth (Dastur and Malkani, 1933). It should, therefore, be possible within reason, to make sample C a complete fertilizer by enriching it with optimum amounts of K, and only further work will show the practicable application of this hypothesis.

Regarding Fe and Mn contents of the silts, the lack of these elements rather than their abundance appears to have ameliorated growth of the plants because the substrate to which these were supplied was enriched of these elements. It is recognized that the action of Mn in the plant is linked with that of nitrogen, whereas that of Fe is linked with K (Russel, 1937). Thus
plentiful Fe and Mn in the garden soil and N and K in the silts might have made silt plus garden soil an ideal and well balanced nutritive substratum.

Samples A and B were complete fertilizers inasmuch as they not only stimulated vegetative growth but also catalyzed the reproductive vigour of the plants to a considerable extent. Earliness in flowering of the rice plants grown in either 10 or 15 per cent. silt amendment of samples A and B was marked, being 15 to 20 days ahead of that in the control, the earliness being three weeks in the case of sample A at 15 per cent. silt amendment (Text-Fig. 1). The third sample C did not contribute in any appreciable measure to early flowering. Undoubtedly, the presence of large amounts of phosphorus in the silt samples played a part in early flowering, this element being known to govern the reproductive phase of the plant life-cycle and also the uptake of nitrogen by the rice plant (Sircar and Sen, 1941). However, interest has been roused by recent reports (Hamence, 1945; Chaplin and Regan, 1945) that sludges, sewage and silts contain growth hormones and it may be that the silts employed in the present investigation also contained these hormones. Nonetheless, the striking earliness in flowering achieved by the application of these silts in conjunction with their rich contents of organic matter, N, K and P indicates further investigations in this field.

ACKNOWLEDGEMENTS

The authors are deeply indebted to Prof. T. S. Sadasivan and Dr. S. V. Anantakrishnan, F.A.Sc., for their kind help in making available facilities and for their interest in this work. We thank the Government of India for award of scholarships.

REFERENCES


Showing 90-day old paddy seedlings in silt sample: A, B and C. Note: Arrows indicate ear heads.