Vesicular arbuscular mycorrhizae in effluent treated wheat

UDHAYA JOSEPH and I.L. KOTHARI
Department of Bio Sciences, Sardar Patel University, Vallabh Vidyanagar 388 120

Key words: VAM, wheat, disturbed ecosystem

Large tracts of unusable land was created by industries through their effluent spread and industrial wastes. There are heavy metals, dyes, acidic or alkaline wastes present in these soils, are the main constraints in using such lands\(^1\). VAM helps the plants to grow and survive better under stress conditions. Quantitative and qualitative assessment of VAM fungi in soils affected by industrial effluents has been made (2).

Indian Petrochemicals Corporation Limited (IPCL) is an integrated Petrochemical complex near Baroda in Gujarat. The effluent generated by the IPCL has been used after treatment for the irrigation of fields of various crops of cereals, pulses and vegetables in the Ecofarm of IPCL. Wheat plants of cv. Sonalika from such fields were collected with their root system and rhizospheric soil at an intervals of 45, 90 and 100 days of sowing. Roots were stained\(^2\), washed and stored in 100\% KOH (w/v) at 121\(^\circ\) C for 15 min and stained with Chlorozal Black E. The VAM infection in terms of percentage infected segments and the percent length of each piece carrying infection was also recorded. Colonization was also measured as the proportion of root segment with vesicles, arbuscules or hyphae. VAM spores were extracted from rhizospheric soil by wet sieving and decanting method\(^6\). Estimation of VAM spores in soil was carried out by a modified method\(^5\). Spores collected between 75 \(\mu\)m and 750 \(\mu\)m sieves were identified following Schenck and Perez (6).

Sonalika plants grown in effluent treated fields showed well-developed arbuscules. Extra- and intra-matrical hyphae and extra-matrical spores were present from the early phase of the crop cycle. Arbuscular and vesicular infection and number of VAM spores showed variation with the growth of wheat plant (Table 1). Hyphal infection generally decreased with the plant growth and vesicular infection could be observed in wheat on 90\(^{th}\) day after sowing (Table 1). Total VAM infection first increased and then decreased. On 45\(^{th}\) day of sowing maximum number of VAM spores (120 /g of soil) in the rhizospheric soil had been observed which decreased later. However, intensity of VAM infection increased with the growth of plant (Table 1).

Examination of rhizospheric soil of effluent

Table 1. VAM in effluent irrigation treated wheat plots at IPCL Ecofarm*

<table>
<thead>
<tr>
<th>Days after sowing</th>
<th>% root segment with VA infection</th>
<th>% length of VA infected roots</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arbuscules</td>
<td>Hyphae</td>
</tr>
<tr>
<td>45</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>90</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
<td>6</td>
</tr>
</tbody>
</table>

* Mean of 4 bulked samples
treated plants revealed presence of fairly large population of extra-matrical spores. VAM spores isolated from the wheat rhizosphere were *Glomus aggregatum* Schenck and Smith and *Glomus microcarpum*.

It has been reported that mycorrhizal plants are effective colonizers of disturbed habitats (7). VAM are known to colonize wheat (8). Formation of vesicles and arbuscules in mycorrhizal inoculated plants was influenced by the stage of development of wheat plant. In the present investigation this has been found to be true.

One of the authors (UJ) is thankful to the UGC for providing financial assistance.

REFERENCES


Received for publication August 11, 2000