SOIL FERTILITY STATUS AND FERTILISER PRESCRIPTION THROUGH TARGETED YIELD APPROACH FOR FARM SOILS OF TAMILNADU AGRICULTURAL UNIVERSITY, COIMBATORE

R. SANTHII, G. SELVAKUMAR, P. MURUGESA BOOPATHI and RANI PERUMAL
Department of Soil Science and Agricultural Chemistry
Tamil Nadu Agricultural University
Coimbatore-641 003.

ABSTRACT

Soil fertility status of Tamil Nadu Agricultural University (TNAU) farm, Coimbatore was evaluated. Almost all the blocks recorded low available N status. Available P status was high in Paddy Breeding Station, medium to high in wetlands field, No.62-77 and New Area of Eastern Block and Cotton Breeding Station, low to medium in Millet Breeding Station and New Area low in field No.36 and 37 of Eastern Block. With regard to available K almost all the blocks recorded high status. Based on the targeted yield approach (STCR), fertiliser recommendations are given for various crops grown in different blocks of Tamil Nadu Agricultural University Farm, Coimbatore.

KEY WORDS: Fertility Status, TNAU Farm, STCR fertiliser recommendation

The capability of a soil for sustaining production depends on fertility of that soil. A comprehensive knowledge on soil fertility status is quite imperative for efficient use of any production input. Balanced fertilisation is a must for realising higher efficiency and economy in fertiliser use. The concept of yield targeting (Ramamoorthy et al., 1967), provides ample scope for the practice of balanced fertilisation and guides in the maintenance of the soil fertility status which is a key factor for sustained crop productivity. Hence the study was undertaken to evaluate the fertility status of soils of TNAU Farm, Coimbatore and to provide soil test based fertiliser recommendation for specific yield targets (STCR) in an effort to improve the fertiliser use efficiency.

MATERIALS AND METHODS

Representative surface soil samples (0-15 cm) were collected fieldwise from different blocks of TNAU farm, Coimbatore (Wetlands, Eastern Block and New Area, Millets Breeding Station and New Area Cotton Breeding Station and Paddy Breeding Station). The samples were processed and analysed for KMnO4-N (Subbiah and Asija, 1956), Olsen-P (Olsen et al., 1954) and NH4OAc-K (Hanway and Heidal, 1952). Based on the fertility status of the soil, fertiliser prescription for average yields of various crops grown in different blocks of TNAU Farm, Coimbatore were given using the fertiliser prescription equation developed in the All India Co-ordinated Research Project on Soil Test Crop Response Correlation.

RESULTS AND DISCUSSION

A. Fertility Status

Eastern Block and New Area

The KMnO4 - N in the soil of different blocks ranged from 145-292 kg/ha. In general, the N status was found to be low (<280 kg/ha). In respect of Olsen-P, the range was 5.6 - 26.9 kg/ha. Almost all the soils in field No.36 and 37 recorded values lesser than 11.2 kg/ha while the status was found to be medium to high (>11.2 kg/ha) in New Area. In respect of NH4OAc-K, the range was 336 - 952 kg/ha thereby revealing the high available K status of the soils (Table 1).

Wetlands

All the 14 blocks in wetlands (Table 2) recorded low N (151 - 298 kg/ha); with regard to Olsen-P the status was medium to high (19.8 - 58.2 kg/ha). The available K status was found to be high in all the blocks (414-980 kg/ha).
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**Millet Breeding Station**

The available N,P and K status was found to be low (142-213 Kg/ha), low to medium (7.8-20.2Kg/ha) and medium to high (202 - 423Kg/ha) respectively (Table 3).
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**New Area**

All the fields in New Area (Table 3) were found to be low in available N status (153 - 220 Kg/ha)
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while the available K status was found to be low to medium (5.6 - 16.7kg/ha). With regard to available K, all the fields recorded high status (280 - 694kg/ha).

Cotton Breeding Station

The status of N, P and K were low (164 - 254kg/ha), medium to high (12.2 - 39.2kg/ha) and high (158 - 672kg/ha) respectively (Table 4).

Table 4. Cotton Breeding Station

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Paddy Breeding Station

All the eleven blocks recorded low N(160 - 683kg/ha) status (Table 5).

Table 5. Paddy Breeding Station

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<th>(\text{K}_2\cdot\text{O} )</th>
<th>N</th>
<th>(\text{P}_2\cdot\text{O}_5 )</th>
<th>(\text{K}_2\cdot\text{O} )</th>
</tr>
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<tbody>
<tr>
<td>36</td>
<td>185</td>
<td>6</td>
<td>469</td>
<td>92</td>
<td>64</td>
<td>0</td>
<td>142</td>
<td>75</td>
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<td>37</td>
<td>175</td>
<td>11</td>
<td>489</td>
<td>100</td>
<td>48</td>
<td>0</td>
<td>145</td>
<td>69</td>
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<tr>
<td>62 - 70</td>
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<td>13</td>
<td>510</td>
<td>88</td>
<td>42</td>
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<td>140</td>
<td>66</td>
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<tr>
<td>71 - 77</td>
<td>202</td>
<td>14</td>
<td>489</td>
<td>78</td>
<td>38</td>
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<td>135</td>
<td>65</td>
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<tr>
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<td>184</td>
<td>18</td>
<td>861</td>
<td>93</td>
<td>26</td>
<td>0</td>
<td>142</td>
<td>60</td>
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</tr>
</tbody>
</table>

A. Fertiliser recommendations:

Fertiliser recommendations based on targeted yield approach could be followed for various crops that are grown in different blocks. Blockwise fertiliser prescription were worked out for some important crops and furnished in (Tables-6-10).

For those blocks which are high in available nutrients status, there is reduction in the fertiliser doses to be applied (preferably for P and K). If the fertility status is poor, relatively higher doses are recommended (preferably N) to improve the fertility status and to sustain soil productivity. Similar recommendations could be given for individual fields also.

In the targeted yield approach, fertiliser doses are optimised based on the soil fertility status. Fertiliser saving in the soil of high fertility is achieved. Fertility maintenance is also possible since the recommended doses is a balanced dose, where balance means the balanced ratio of not only the fertiliser nutrients but that of fertiliser and soil available nutrients (Yelawathan, 1979). Thus, the fertiliser dose rationalised through targeted yield approach would take care of the soil fertility status also and no undue depletion of nutrients would

Table 9. Block: Millet Breeding Station

<table>
<thead>
<tr>
<th>Block</th>
<th>(\text{KMO}_4\cdot\text{N} )</th>
<th>Olsen-P</th>
<th>(\text{NH}_4\cdot\text{OAc-K} )</th>
<th>N</th>
<th>(\text{P}_2\cdot\text{O}_5 )</th>
<th>(\text{K}_2\cdot\text{O} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBS</td>
<td>169</td>
<td>10</td>
<td>287</td>
<td>105</td>
<td>57</td>
<td>13</td>
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<td>New Area</td>
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<tr>
<td>A</td>
<td>173</td>
<td>8</td>
<td>481</td>
<td>103</td>
<td>58</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>169</td>
<td>8</td>
<td>496</td>
<td>105</td>
<td>58</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>183</td>
<td>7</td>
<td>617</td>
<td>97</td>
<td>59</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>185</td>
<td>7</td>
<td>493</td>
<td>96</td>
<td>59</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 10: Block : Cotton Breeding Station

<table>
<thead>
<tr>
<th>Soil test values (kg ha⁻¹)</th>
<th>Fertiliser prescription Kg ha⁻¹</th>
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</thead>
<tbody>
<tr>
<td>Block</td>
<td>KMnO₄-N</td>
</tr>
<tr>
<td>A</td>
<td>189</td>
</tr>
<tr>
<td>B</td>
<td>196</td>
</tr>
<tr>
<td>C</td>
<td>196</td>
</tr>
<tr>
<td>D</td>
<td>198</td>
</tr>
<tr>
<td>R</td>
<td>160</td>
</tr>
<tr>
<td>2</td>
<td>180</td>
</tr>
<tr>
<td>3</td>
<td>192</td>
</tr>
<tr>
<td>4</td>
<td>198</td>
</tr>
<tr>
<td>5</td>
<td>190</td>
</tr>
<tr>
<td>6</td>
<td>178</td>
</tr>
</tbody>
</table>

occur on account of crop growth. Addition of organics viz., Farm Yard Manure/Green Manure/ Green leaf manure depending on their availability and biofertilisers will improve the fertility status besides reducing the inorganic fertilisers to be applied. The quantities of inorganic fertilisers that could be reduced due to the addition of organics and biofertilisers are furnished below.

i) If GM is applied at 6.25 t ha⁻¹, 15 kg ha⁻¹, 38,13 and 33 kg ha⁻¹ of N, P₂O₅ and K₂O could be reduced from the recommended dose of fertilisers for rice.

ii) If azospirillum is applied at 2 kg ha⁻¹, 15 kg ha⁻¹ of fertilisers N could be reduced from the recommended dose of N.

iii) If phosphobacteria is applied at 2 kg ha⁻¹, 10 kg ha⁻¹ of fertiliser P₂O₅ could be reduced from the recommended dose of P₂O₅.

iv) If FYM is applied at 12.5 t ha⁻¹, 40 kg ha⁻¹ of N, P₂O₅ and K₂O could be reduced from the recommended dose of fertilisers for short duration crops like cotton, sugarcane and tapioca, 65, 35 and 65 kg ha⁻¹ of N, P₂O₅ and K₂O could be reduced from the recommended dose of fertilisers.

The targeted yield approach (STCR) coupled with integrated plant nutrition system which regulates fertiliser use for increasing the fertiliser use efficiency and maintaining the fertility status could be followed for TNAU Farm soils.

REFERENCES


RAMAMOORTHY, B., NARASIMHAN, R.L. and DINESH, R.S. (1967). Fertilizer application for specific yield targets of Sonora 64 (Wheat). Indian Fmg. 17:
