YIELD TARGETING AND SOIL TESTING CROP RESPONSE
CONCEPT IN PEARL MILLET-WHEAT CROPPING SEQUENCE

A.B. Gosavi, G.N. Shirpurkar and D.T. Patil
Agricultural (Wheat) Research Station,
Niphad - 422 303, District Nashik, India

ABSTRACT

A field experiment was conducted during 2003-04 to assess the validity of yield targeting equations with soil testing for fertility in relation to soil and plant health in Pearl millet-Wheat cropping sequence. The application of fertilizers as per soil test value to pearl millet and wheat resulted in higher pearl millet and wheat yield compared to other treatments.

Crop intensification and fertilizer management in relation to soil health are important agronomic techniques to maintain the soil fertility by deriving the fertilizer dose as per soil test value and yield targeting equations. Fertilizer use based on targeted yield approach taken into account the crop needs and nutrients present in the soil. It also help to eliminate the guesswork and use fertilizer according to need of the crop. Hence, the present investigation was carried out to elicit the information as on above aspects in Pearl millet-Wheat cropping sequence.

The experiment was conducted during 2003-04 at Agricultural Research Station, Niphad, Dist. Nashik, Maharashtra on medium to black soil, slightly alkaline (pH 8.7), with EC 0.20 dSm⁻¹, O.C. 0.51% and CaCO₃ 9.5%.

The experiment was laid down in randomized block design with seven treatment combinations and four replications in kharif and rabi as:

**Kharif**
- T₁ - Control
- T₂ - Basal Recommended Dose (60:30:00)
- T₃ - As per soil test
- T₄ - Target 25 q ha⁻¹ (T₁)
- T₅ - Target 30 q ha⁻¹ (T₂)
- T₆ - T₁ + 5 mt. FYM ha⁻¹ + Bio Fertilizers
- T₇ - T₂ + 5mt. FYM ha⁻¹ + Bio Fertilizers

**Rabi**
- T₁ - Control
- T₂ - Basal Recommended Dose (120:60:40)
- T₃ - As per soil test
- T₄ - Target 30 q ha⁻¹ (T₁)
- T₅ - Target 40 q ha⁻¹ (T₂)
- T₆ - Target 30 q ha⁻¹ (T₁)
- T₇ - Target 40 q ha⁻¹ (T₂)

FYM @ 5 mt was applied before sowing of Pearl millet (cv. RHRBH-8609) in the kharif season and was sown during second fortnight of June with spacing 45 cm by drilling the treated seeds with biofertilizers Azotobacter and Phosphorous Solubilizing Bacteria. Wheat (cv. NIAW 301) was sown in first fortnight of October at 22.5 cm spacing by drilling.

The fertilizer applications based on the fertility gradient concept following fertilizer prescription equations were obtained (Dev et al., 1978).

Pearl millet
- FN = 3.31T - 0.38SN
- FP₂O₅ = 3.38T - 4.10SP
- FK₂O = 1.65T - 0.65SK

Wheat
- FN = 7.54T - 0.745SN
- FP₂O₅ = 1.90T - 2.88SP
- FK₂O = 2.49T - 0.22SK

Where
- FN, FP₂O₅, FK₂O - Fertilizers N, P₂O₅, K₂O in kg per ha
- T - Targeted yield in q per ha
SN, SP, and SK - Soil available N, P and K in kg per ha

Pearl millet

The difference in the yield of the pearl millet due to different fertilizer treatments were significant (Table 1). Application of fertilizers as per soil test value produced significantly higher grain yield of pearl millet (28.29 q/ha) and also recorded more monitory returns rupees per rupee invested (4.18) than rest of the treatments. Application of fertilizers with the target of 30 q per ha recorded higher monitory returns (Rs. 4.59 per rupee) invested for fertilizers.

Wheat

The difference in the grain yield of Wheat (rabi) followed after pearl millet (kharif) due to different treatments were significant (Table 2). Application of fertilizers as per soil test values produced significantly higher grain yield (22.41 q/ha) of wheat than the control and application of fertilizer without bio-fertilizer with target of 30 q per ha. This might be due to more number of ear head per sq. m, more number of grains per ear head and higher test weight, as applied fertilizer dose was higher as compared to the rest of the treatments. However, application of fertilizers with the target of 30 q per ha recorded higher monitory returns (Rs. 4.59 per rupee) invested for fertilizers.

Several studies have established the validity of targeted yield concept for different crops under variable soil types and agro-climatic conditions (Sekhon et al., 1976; Dhillon et al., 1978 and Tamboli et al., 1991).

### Table 1. Effect of different treatments on grain yield (q/ha) of Pearl millet

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Fertilizer dose</th>
<th>Available nutrient status</th>
<th>Yield</th>
<th>Rs./Re.* invested on fertilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N P2O5 K2O</td>
<td>N P2O5 K2O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>0 0 0</td>
<td>175 7.18 328</td>
<td>17.28</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>60 30 0</td>
<td>195 9.5 339</td>
<td>24.71</td>
<td>3.67</td>
</tr>
<tr>
<td>T3</td>
<td>75 37.5 0</td>
<td>216 9.8 359</td>
<td>28.29</td>
<td>4.18</td>
</tr>
<tr>
<td>T4</td>
<td>0 54 0</td>
<td>225 7.2 306</td>
<td>20.07</td>
<td>1.12</td>
</tr>
<tr>
<td>T5</td>
<td>19.5 58.6 0</td>
<td>210 10.4 350</td>
<td>20.39</td>
<td>1.27</td>
</tr>
<tr>
<td>T6</td>
<td>0 34.4 21.25</td>
<td>197 12.1 329</td>
<td>18.62</td>
<td>0.66</td>
</tr>
<tr>
<td>T7</td>
<td>34.6 50.08 30.82</td>
<td>329 18.62 329</td>
<td>24.08</td>
<td>2.29</td>
</tr>
<tr>
<td>CD at 5%</td>
<td></td>
<td></td>
<td></td>
<td>3.18</td>
</tr>
</tbody>
</table>

* - Rs./Re. - Rupees per Rupee.

### Table 2. Effect of different treatments on grain yield (q/ha) and ancillary data of wheat

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Fertilizer dose</th>
<th>Available nutrient status</th>
<th>Yield No. of Ear of</th>
<th>1000 Grain ear head sq m weight on</th>
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<tbody>
<tr>
<td></td>
<td>N P2O5 K2O</td>
<td>N P2O5 K2O</td>
<td>after harvest of</td>
<td>(g/ha) grain/ heads/ gm weight</td>
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<tr>
<td>T1</td>
<td>0 0 0</td>
<td>210 4.4 246</td>
<td>8.69 33 238</td>
<td>35.6 0.00</td>
</tr>
<tr>
<td>T2</td>
<td>120 60 40</td>
<td>254 6.4 280</td>
<td>19.54 46 286</td>
<td>34.1 3.00</td>
</tr>
<tr>
<td>T3</td>
<td>150 75 20</td>
<td>235 7.9 302</td>
<td>22.41 44 287</td>
<td>36.7 3.21</td>
</tr>
<tr>
<td>T4</td>
<td>36 19.3 25.9</td>
<td>257 13.1 224</td>
<td>14.35 40 266</td>
<td>35.8 4.59</td>
</tr>
<tr>
<td>T5</td>
<td>118.8 62.8 40.6</td>
<td>247 4.6 268</td>
<td>18.91 45 265</td>
<td>32.2 3.04</td>
</tr>
<tr>
<td>T6</td>
<td>105.6 36.0 5.8</td>
<td>163 7.3 313</td>
<td>19.55 43 267</td>
<td>36.4 4.55</td>
</tr>
<tr>
<td>T7</td>
<td>127.7 41.3 43.1</td>
<td>235 11.9 257</td>
<td>20.67 44 269</td>
<td>33.8 3.87</td>
</tr>
<tr>
<td>CD at 5%</td>
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<td>3.59</td>
</tr>
</tbody>
</table>

* - Rs./Re. - Rupees per Rupee.
In this approach, it is also possible to (Randhawa and Velayutham, 1982) make fertilizer recommendations to the farmers considering their financial conditions. However, the overall wheat yield was low due to shortage of irrigation.

REFERENCES