Critical soil test values for desired yield targets of 400, 450 and 500 q ha\(^{-1}\) were computed from the fertilizer prescription equations of potato in Ultic Hapludalf of Nilgiris. The critical soil test values for all the three major nutrients were low under IPNS treatments (NPK plus FYM, NPK plus Azospirillum) as compared to NPK alone, which in turn resulted in reduction of NPK fertilizer application for the same levels of yield targets.

Soil test based fertilization for desired yield targets helps in maintaining soil fertility and favours balanced nutrition of crops. The fertilizer prescription equations of a particular crop are used to fix the critical soil test values for the soils on which they are developed. These values are the levels below which a crop will definitely respond to the application of different nutrients and above which the crop response either diminishes at a faster rate or it is negligible (Randhawa and Velayutham, 1982), hence the application of fertilizer is not required. Therefore in the present study an attempt was made using fertilizer prescription equations of potato in Ultic Hapludalf of Nilgiris to fix the critical soil test values. The soil of the experimental site at State Horticultural farm, Nanjanad, Nilgiris district was sandy clay loam with acidic pH (4.30), non-saline (E.C 0.08 dSm\(^{-1}\)), medium in KMnO\(_4\) –N (352 kg ha\(^{-1}\)), high in Bray-P (425 kg ha\(^{-1}\)) and NH\(_4\)OAc-K (550 kg ha\(^{-1}\)).

By employing Inductive cum targeted yield model of Ramamoorthy et al. (1967) fertilizer prescription equations were formulated in the present study where, the critical soil test level for a particular nutrient refers to the soil test value at which there is no fertilizer recommendation for a desired yield level.

Using the above equations nomograms were formulated and making use of these nomograms the critical soil test values for available N, P and K for varying yield targets under different nutrient management practices were worked out. The critical soil test values for potato are furnished in Table 1.

\[\text{NPK alone}\]
\[\begin{align*}
F_N &= 0.71 T - 0.24 SN \\
F_{P_2O_5} &= 1.40 T - 0.55 SP \\
F_{K_2O} &= 0.72 T - 0.25 SK
\end{align*}\]

\[\text{NPK with FYM}\]
\[\begin{align*}
F_N &= 0.71 T - 0.24 SN - 0.41 ON \\
F_{P_2O_5} &= 1.40 T - 0.55 SP - 0.95 OP \\
F_{K_2O} &= 0.72 T - 0.25 SK - 0.39 OK
\end{align*}\]

\[\text{NPK with Azospirillum}\]
\[\begin{align*}
F_N &= 0.71 T - 0.24 SN - 0.42 ON \\
F_{P_2O_5} &= 1.40 T - 0.55 SP \\
F_{K_2O} &= 0.72 T - 0.25 SK
\end{align*}\]

where, \(F_N\), \(F_{P_2O_5}\), and \(F_{K_2O}\) are fertilizer N, \(P_2O_5\) and \(K_2O\) in kg ha\(^{-1}\); \(T\) is the yield target in q ha\(^{-1}\); \(SN\), \(SP\) and \(SK\), respectively are alkaline KMnO\(_4\) –N, Bray-P and NH\(_4\)OAc-K in kg ha\(^{-1}\) and \(ON\), \(OP\) and \(OK\) are the quantities of N, P and K supplied through FYM or through Azospirillum as the case may be.
Table 1. Critical levels of soil test values for potato as influenced by yield targeting and integrated plant nutrition System

<table>
<thead>
<tr>
<th>Treatments</th>
<th>400 q ha⁻¹</th>
<th>450 q ha⁻¹</th>
<th>500 q ha⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>P</td>
<td>K</td>
</tr>
<tr>
<td>NPK alone</td>
<td>1183</td>
<td>1018</td>
<td>1152</td>
</tr>
<tr>
<td>NPK + FYM</td>
<td>1020</td>
<td>967</td>
<td>1012</td>
</tr>
<tr>
<td>NPK + Azospirillum</td>
<td>1150</td>
<td>1018</td>
<td>1152</td>
</tr>
</tbody>
</table>

The critical soil test values for all the three major nutrients were low under IPNS treatments (NPK plus FYM, NPK plus Azospirillum) as compared to NPK alone, which in turn resulted in reduction of NPK fertilizer application. Similar trend of results were also recorded in Inceptisols for onion (Santhi et al., 2003). Therefore for judicious and efficient use of fertilizers in potato at Nilgiris, critical nutrient values should be taken into consideration and a maintenance dose of fertilizers is recommended above these critical soil test values.

REFERENCES