Short Note

Effects of integrated nutrient management on maize (Zea mays L.): An economic analysis

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Abstract
The field experiment was carried out at Department of Soil Science, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, India during kharif season of 2015-16. The experiment was laid out in 3 x 3 factorial randomized block design with 9 treatments in three replications. It indicates that application of NPK, Zinc, FYM and Azotobacter increased the total cost of cultivation of yellow mustard markedly. The maximum total cost of cultivation ($39290.92 ha$) and the maximum net return ($56259.08 ha$) was computed in T 8 (N:P:K:Zn 120:60:60:20 kg ha$^{-1}$ + FYM 10 t ha$^{-1}$: Azotobacter 200 gm/10kg seed). While the maximum net return ($56259.08 ha$) was invested (2.85) was recorded in T 6 (N:P:K:Zn 120:60:60:20 kg ha$^{-1}$ + FYM 0 t ha$^{-1}$: Azotobacter 0 gm/10kg seed). There should be a chance of better yield and net income, suggested all operations will be performing timely for this crop, because time is a very important factor and play great role for greater yield and its quality, before time or after time any operations in the field of agriculture production and quality will goes down.

Keywords: NPK, zinc, FYM and azotobacter, economic analysis

Introduction
Maize is globally a top-ranking cereal not only in productivity but also as human food, animal feed and as a source of large number of industrial products. The potential for enhanced use of maize for specialty purposes based on existing uses and new products to meet the needs a future generation provides the researchers with unique challenges. Maize is also known as ‘Queen of cereals’ and kind of fodder maize has been usually considered as poor man’s crops and occupying the place in the rich communities due to its multifarious uses as industrial food and feed crops. It is known as an indicator plant for evaluation of Zn deficiency of a soil. (Suke et al., 2011) [8]. Maize is one of the important cereal crops in the world agricultural economy both as food grains for human and fodder and feed for cattle and poultry. Maize grain contains about 72% starch, 10% protein, 4.8% oil, 5.8% fibre, 3.0% sugar and 1.7% ash (Choudhary, 1993). Along with this, it is rich in vitamin A, vitamin E, nicotinic acid, riboflavin and contains fairly high phosphorus than rice and sorghum. Its fodder and hay contain 7-10% protein, 15-36% fibre, 2.09 to 2.62% ether extract, 0.42-0.70% Calcium, 0.28-0.29% phosphorus, 0.45% Magnesium, 1.34% Potassium and 56% carbohydrate, therefore, it has very nutritive fodder and hay. Besides food grain, fodder and feed, it has prime importance in textile, starch and dye industries. (Rai 2006). In India 55 percent of the grain produce concurrently is used for food purposes, about 14 percent for livestock 310 Agricultural Situation in India feed. 18 percent for poultry feed, 12 percent for starch and 1 percent for seed. By the end of this century the expected demand will be around 46 percent for food, 14 percent for livestock feed, 19 percent for poultry feed, 19 percent for starch industry and 15 percent for seed.

Materials and Methods
The experiment was conducted during kharif season of 2015-16 at Crop research farm Department of Soil Science Allahabad School of Agriculture SHIATS-DU Allahabad. The experimental site is located in the sub – tropical region with 25° 27’ N latitude 81° 51’ E longitudes and 98 meter the sea level altitudes. The experiment was laid out in a 3$^2$ RBD factorial design with three levels of NPK, Zinc and FYM, Azotobacter with nine treatments, each consisting of three replicates.
The total number of plots was 27. Maize (Zea mays L.) Var. Kirtiman Saurabh* were sown in kharif season plots of size 2 x 2 m with row spacing 50 cm and plant to plant distance 20 cm. The Soil of experimental area falls in order of Inceptisols and is alluvial in nature, both the mechanical and chemical analysis of soil was done before starting of the experiment to as certain the initial fertility status. The soil samples were randomly collected from 0-15cm depths prior to tillage operations. The treatment consisted of nine combination of T0 (N:P:K:Zn 0:0:0:0 kg ha−1 + FYM 0 t ha−1: Azotobacter 0 gm/10kg seed), T1 (N:P:K:Zn 0:0:0:0 kg ha−1 + FYM 0 t ha−1: Azotobacter 0 gm/10kg seed), T2 (N:P:K:Zn 0:0:0:0 kg ha−1 + FYM 10 t ha−1: Azotobacter 200 gm/10kg seed), T3 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 0 t ha−1: Azotobacter 0 gm/10kg seed), T4 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 0 t ha−1: Azotobacter 0 gm/10kg seed), T5 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 0 t ha−1: Azotobacter 0 gm/10kg seed), T6 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 5 t ha−1: Azotobacter 100 gm/10kg seed), T7 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 5 t ha−1: Azotobacter 200 gm/10kg seed), T8 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 10 t ha−1: Azotobacter 200 gm/10kg seed). The source of NPK, Zinc and FYM, Azotobacter as Urea, SSP, MOP, Zinc Sulphate respectively.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Grain yield (q/ha)</th>
<th>Straw yield (q/ha)</th>
<th>Gross return ($)</th>
<th>Cost of cultivation ($)</th>
<th>Net return ($)</th>
<th>C: B ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>25.66</td>
<td>38.5</td>
<td>47474</td>
<td>25300.00</td>
<td>22174.00</td>
<td>1.87</td>
</tr>
<tr>
<td>T1</td>
<td>28.43</td>
<td>40.7</td>
<td>52012</td>
<td>30337.50</td>
<td>21674.50</td>
<td>1.71</td>
</tr>
<tr>
<td>T2</td>
<td>31.25</td>
<td>42.78</td>
<td>56584</td>
<td>33575.00</td>
<td>21209.00</td>
<td>1.59</td>
</tr>
<tr>
<td>T3</td>
<td>35.22</td>
<td>45.7</td>
<td>63018</td>
<td>27257.96</td>
<td>35760.04</td>
<td>2.31</td>
</tr>
<tr>
<td>T4</td>
<td>40.94</td>
<td>55.65</td>
<td>74011</td>
<td>32295.46</td>
<td>41715.54</td>
<td>2.29</td>
</tr>
<tr>
<td>T5</td>
<td>43.36</td>
<td>58.69</td>
<td>78311</td>
<td>37332.96</td>
<td>40978.04</td>
<td>2.09</td>
</tr>
<tr>
<td>T6</td>
<td>45.87</td>
<td>64.26</td>
<td>83496</td>
<td>29215.92</td>
<td>54280.08</td>
<td>2.85</td>
</tr>
<tr>
<td>T7</td>
<td>49.00</td>
<td>70.25</td>
<td>89675</td>
<td>23201.58</td>
<td>55421.58</td>
<td>2.61</td>
</tr>
<tr>
<td>T8</td>
<td>51.00</td>
<td>80.5</td>
<td>95550</td>
<td>29215.92</td>
<td>54280.08</td>
<td>2.43</td>
</tr>
</tbody>
</table>

**Results and Discussion**

Cost of cultivation was worked out on per hectare basis. Economics of different treatment combinations was worked out by taking into account the cost of cultivation and sale value of produce. The gross income and return invested were worked out as follows for each treatment combination:

- Gross income (ha−1) = Cost of mustard seed (ha−1) + Cost of stover (ha−1).
- Net return (ha−1) = Gross income (ha−1) − Total cost of cultivation (ha−1).
- Net return_ha−1invested= Net return (ha−1)/ Total cost of cultivation (ha−1).

The maximum net return (39290.92 ha−1) was computed in T8 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 10 t ha−1: Azotobacter 200 gm/10kg seed). The maximum net return invested (2.85) was recorded in T8 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 10 t ha−1: Azotobacter 0 gm/10kg seed).

**Conclusion**

It is concluded that the total cost of cultivation (39290.92 ha−1) and the maximum net return (56259.08 ha−1) was computed in T8 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 10 t ha−1: Azotobacter 200 gm/10kg seed). While the maximum net return invested (2.85) was recorded in T8 (N:P:K:Zn 120:60:60:20 kg ha−1 + FYM 0 t ha−1: Azotobacter 0 gm/10kg seed).

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**References**


