Effect of liquid seaweed fertilizer on yield and quality of okra

(Abelmoschus esculentus L.)

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A field experiment was conducted in summer of 2006 to study the effect of liquid seaweed fertilizer (LSF) applied as a foliar spray (conc. 2.5%, 5.0%, 7.5% and 10.0%) on okra (Abelmoschus esculentus L.). Control plants were sprayed with water. Yield and nutrition quality of okra fruit got significantly increased (20.47%) at LSF spray (2.5%).

Keywords: Foliar spray, Hormones, Liquid seaweed fertilizer, Okra, Yield

Introduction

Application of seaweed extract as an organic biostimulant is fast becoming an accepted practice in horticulture1. Seaweed extracts are reported2-4 effective fertilizer in many crops including vegetables, trees, flowering plants and grain crops. Many physiological responses shown by crop plants are reported5-9 due to cytokinins. Main seaweed extract known to play useful role in agriculture are Maxicrop, Algifert, Geomar GA14, Kelpak66, Seaspray, Seasol, SM3, Seacrop 16, CyteX10, Cytokin11, Algistim12, Biozyme, Ujazyme, Agrimore13, Seamac and AlgineX14, and MAC8.

This study presents effect of liquid seaweed fertilizer (LSF) applied as a foliar spray (conc. 2.5%, 5.0%, 7.5% and 10.0%) on okra (Abelmoschus esculentus L.).

Materials and Methods

A field experiment was conducted during summer of 2006 at Panjabrao Deshmukh Krishi Vidyapeeth, Akola. LSF was derived from fresh Kappaphycus alvarezii and applied to foliage (conc. 2.5%, 5.0%, 7.5% and 10.0%). Control plants were sprayed with water mixed with surfactant only. Experiment was a completely randomized block design with four replications per treatment. Total number of plants grown was: gross plot (1.80 m x 3.0 m), 40; and net plot (0.90 m x 2.40 m), 16.

First foliar application of LSF was given just at initiation of flowering and remaining sprays at three weeks interval from application of first spray. Growth and yield data was recorded on the basis of net plot area. Analysis of nutritional contents of okra [carbohydrate, protein, dietary fibre, minerals (P, K, Na, Ca, and Mg) and vitamin C] was estimated by using standard procedure15.

Result and Discussion

Growth of plants, yield of grain as well as quality of product was greatly influenced by applications of LSF. Compared to control, plants sprayed with LSF (2.5%) showed a significant increase per net plot (Table 1) in fruit yield (20.47%), besides significant increase in length (31.77%) and diameter (18.26%) of fruit and number of fruits (37.47%) per net plot. LSF had influence on other growth parameter such as height, fresh weight, dry weight of plants and fruits, which is in conformity with earlier report16. Increase in the yield in A. esculentus and Lycopersicon lycopersicum17, wheat9, bean18, and black gram19 has been reported with foliar application of LSF. Compared to control, plants sprayed with LSF (2.5%) showed increase (Table 2) in nutritional quality of okra as: carbohydrate, 7.39; protein, 28.04; and dietary fibre, 35.55 %. An increase was also registered in mineral contents. Enhancement in vitamin C of Trigonella foenum-graecum20, increase in N of beans21, sugar of sugarbeet22 has been reported for plants treated with LSF.
Foliar application of LSF at lower concentration was most effective compared to control and other concentrations of LSF, which is in conformity with green gram and black gram and *Dolichos biflorus*. Aitken & Senn and Abetz reported that LSF at very high concentrations retard plant growth, may be due to very high salt index observed in seaweed extracts that may be affecting growth and yield. Promotive effects of LSF application might be because of increased root proliferation and establishment, thereby plants were able to mine more nutrients even from distant places and deeper soil horizons, in balanced proportion. Besides, LSF regulated plant bio-physiological activities, which collectively resulted in maintaining higher photosynthetic activities.

**Acknowledgements**

Authors are grateful to Director of Research, Punjabrao Deshmukh Krishi Vidyapeeth, Akola for agreeing to conduct the experiment. Thanks are also due to Dr Eswaran for providing LSF.

**References**


**Table 1—Effect of seaweed extract on growth and yield of okra**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Plant height cm</th>
<th>Fresh wt. of 5 fruits g</th>
<th>Dry wt. of 5 fruits g</th>
<th>Fresh wt. of plant g</th>
<th>Dry wt. of plant g</th>
<th>Length of fruit cm</th>
<th>Diam of fruit cm</th>
<th>No. of fruits/ net plot</th>
<th>Fruit yield / net plot kg</th>
<th>Fruit yield q/ha</th>
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<tbody>
<tr>
<td>Control</td>
<td>50.65</td>
<td>41.71</td>
<td>4.50</td>
<td>137.77</td>
<td>20.07</td>
<td>7.27</td>
<td>1.15</td>
<td>118.75</td>
<td>1.25</td>
<td>57.90</td>
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<td>2.50%</td>
<td>52.10</td>
<td>57.39</td>
<td>5.94</td>
<td>140.70</td>
<td>22.67</td>
<td>9.58</td>
<td>1.36</td>
<td>163.25</td>
<td>1.51</td>
<td>69.75</td>
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<td>5.00%</td>
<td>51.60</td>
<td>55.87</td>
<td>5.86</td>
<td>137.82</td>
<td>20.50</td>
<td>8.91</td>
<td>1.31</td>
<td>154.25</td>
<td>1.40</td>
<td>64.71</td>
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<td>7.50%</td>
<td>52.02</td>
<td>52.58</td>
<td>5.86</td>
<td>139.85</td>
<td>21.65</td>
<td>8.53</td>
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<td>5.16</td>
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<td>19.75</td>
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<tr>
<td>CD at 5%</td>
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<td>9.91</td>
<td>-</td>
<td>1.75</td>
<td>0.54</td>
<td>0.600</td>
<td>0.02</td>
<td>11.60</td>
<td>0.10</td>
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</table>

**Table 2—Effect of seaweed extract on nutritional quality of okra (per 100 g of edible portion)**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Carbohydrates, g</th>
<th>Proteins g</th>
<th>Dietary Fibre, g</th>
<th>P mg</th>
<th>K mg</th>
<th>Na mg</th>
<th>Ca mg</th>
<th>Mg mg</th>
<th>Vit C mg</th>
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<td>5.82</td>
<td>1.07</td>
<td>0.90</td>
<td>58.75</td>
<td>97.00</td>
<td>6.22</td>
<td>57.75</td>
<td>39.25</td>
<td>10.75</td>
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<td>2.50%</td>
<td>6.25</td>
<td>1.37</td>
<td>1.22</td>
<td>63.25</td>
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<td>1.25</td>
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<td>100.50</td>
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<td>7.50%</td>
<td>5.95</td>
<td>1.17</td>
<td>1.05</td>
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<td>59.75</td>
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<td>1.12</td>
<td>1.00</td>
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<td>6.80</td>
<td>59.50</td>
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<td>-</td>
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<td>1.50</td>
<td>0.37</td>
<td>2.34</td>
<td>1.95</td>
<td>0.98</td>
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