Effects of Nitrogen in Cabbage Fertilization

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Cabbage grown in the Salt River Valley has shown marked responses to nitrogen fertilization. The nitrogen fertilizer applications increased the total number of marketable heads and, therefore, increased yields (see table below). There also resulted a striking effect on the uptake and accumulation in the cabbage of certain other fertilizer elements in the soil.

Perhaps the most interesting feature of the results is that applications of nitrogen not only increased the nitrogen content in the plant tissue, but also the phosphate and potash percentage.

Nitrogen Sources

A close evaluation of the data also reveals the relative values of the various sources and types of nitrogen in a fertilizer program for cabbage production. With differences so small as indicated between nitrogen sources, it is apparent that advantages often ascribed to certain nitrogen sources or types have probably been overemphasized. Whether the nitrogen is supplied in the nitrate, ammoniacal, or urea form appears to make no appreciable difference in the final yield or plant composition, if the same amount of nitrogen is applied.

Reasons Not Clear

The fact that striking increases in the percentage of all three major fertilizer elements occurred in plants receiving nitrogen alone as compared to plants from the check areas would indicate a somewhat different concept in the relationships between nitrogen, phosphate and potash than is normally realized or expressed. Just why this relationship exists among nitrogen, phosphorus and potash is not entirely clear. In this connection, however, a close examination and comparison of the root systems developed under a high nitrogen level to those from the unfertilized area is quite revealing. (Compare the two pictures.)

Nitrogen, Roots, and Tops

Many investigators have reported that increasing the nitrogen supply to certain types of plants causes a relative reduction of roots to tops. And, associated with this relative reduction in roots to tops the root systems usually become more fibrous. This increase in the number of fibrous roots indicates more effective and efficient absorption of water and fertilizer elements.

Root Efficiency

The effectiveness is suggested by a wider and more thorough invasion of a given volume of soil by the roots, thus increasing the accessibility of the naturally occurring and residual supply of these elements. The efficiency is related to the close association of the more actively absorbing fibrous roots to the soil particles containing these nutritional elements.

N, P, and K

The summation of these two effects, where nitrogen alone was supplied, resulted in increased absorption of phosphorus and potash, and improved yield and quality of the marketable product. These findings point out the need for a thorough understanding of fertilizer needs and the responses that may be expected from the applications of specific fertilizers. The regulatory function of phosphorus on nitrogen utilization is often mentioned in fertilizer element relationships and interpretations of plant responses to fertilizers. However, there has been shown herein the effects of nitrogen on phosphate and potash absorption and utilization. Certain fertilizer elements inherently present in the soil may be more effectively utilized by proper selection of the fertilizer to be applied.

Restricting root systems through limited levels of nitrogen may cause external plant appearances different from typical nitrogen deficiency symptoms. And, above all, it must be remembered that the portion of the plant which grows beneath the surface of the soil is more important than many growers generally realize.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>% N</th>
<th>% P</th>
<th>% K</th>
<th>Ave. Wt. Per Head</th>
<th>Yield Tons/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cal Nitrate</td>
<td>3.78</td>
<td>.246</td>
<td>2.40</td>
<td>3.62</td>
<td>7.71</td>
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<tr>
<td>Nu Green</td>
<td>3.94</td>
<td>.261</td>
<td>2.20</td>
<td>3.64</td>
<td>8.36</td>
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<tr>
<td>Amm Nitrate</td>
<td>3.80</td>
<td>.248</td>
<td>2.42</td>
<td>3.86</td>
<td>8.53</td>
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<tr>
<td>Amm Sulfate</td>
<td>3.79</td>
<td>.254</td>
<td>2.22</td>
<td>3.84</td>
<td>7.87</td>
</tr>
<tr>
<td>Urea</td>
<td>3.96</td>
<td>.254</td>
<td>2.21</td>
<td>3.84</td>
<td>7.87</td>
</tr>
<tr>
<td>Check</td>
<td>2.23</td>
<td>.215</td>
<td>1.90</td>
<td>2.90</td>
<td>1.91</td>
</tr>
</tbody>
</table>

Effects of Certain Nitrogen Sources on Cabbage Plant Composition and Yield
(The nitrogen fertilizers were applied at the rate of 60 lbs. of nitrogen per acre)

(Progressive Agriculture Page 12)