These fertilizer guidelines are based on relationships established through research by the University of Idaho, The Amalgamated Sugar Company and the USDA Agricultural Research Service. Results and experience indicate that the guide rates suggested will produce above-average yields if other factors are not limiting production. Thus, the fertilizer guide assumes good management.

The suggested fertilizer rates will be accurate for your field provided: (1) the soil samples represent the area to be fertilized, and (2) the crop history information supplied is complete and accurate. An analysis is only as good as the sample collected (see CIS No. 162, Soil Sampling). Low yielding, cropped or scraped areas should be sampled separately and, if necessary, fertilized separately. These fertilizer guide rates and critical levels are subject to change as additional research information becomes available.

**Nitrogen (N)**

Controlling the amount of N available to the sugarbeet is critical in producing high beet tonnage with high sugar percentage. Nitrogen in excess of the crop's need can reduce sugar percentage and gross income per acre. The N soil test is the only way to accurately estimate N fertilizer needs. About 10 pounds of N per acre are required to produce 1 ton of sugarbeets. This N need is met by N released by mineralization of soil organic matter, by residual N carryover from previously fertilized crops and by addition of fertilizer N. Mineralizable N is assumed to be approximately 150 pounds N per acre.

**Nitrogen Soil Test** — Accurate soil sampling and analysis in a high value crop like sugarbeets is one of the best investments that can be made and is highly recommended. A soil test measures the residual N carryover from the previous crop and provides the necessary information for accurate fertilizer application.

Nitrate nitrogen (NO₃-N) is mobile in the soil. Soil samples, therefore, should be taken from the 0 to 12-inch and 12- to 24-inch soil depths or the effective root zone. These depths should be sampled and kept separate for analysis.

The N soil test values in Table 1 represent the sum of the extractable NO₃-N and ammonium nitrogen (NH₄-N) in the top 2 feet of soil by 1-foot increments or in the effective root zone. If the effective rooting depth is greater than 24 inches, a third sample should be collected, analyzed separately and the NO₃-N and NH₄-N added to the 0 to 12-inch and 12- to 24-inch values.

If the first foot is low in N (less than 5 ppm) but the sum of the first 2 feet is adequate, 20 to 40 pounds N per acre may be applied to provide N until root growth is sufficient to reach

<table>
<thead>
<tr>
<th>Soil test N¹</th>
<th>18</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>26</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>34</th>
<th>36</th>
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<tbody>
<tr>
<td>ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0 to 5</td>
<td>65</td>
<td>85</td>
<td>110</td>
<td>130</td>
<td>155</td>
<td>185</td>
<td>215</td>
<td>245</td>
<td>275</td>
<td>300</td>
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<td>55</td>
<td>80</td>
<td>100</td>
<td>125</td>
<td>155</td>
<td>180</td>
<td>210</td>
<td>240</td>
<td>270</td>
</tr>
<tr>
<td>11 to 15</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>100</td>
<td>125</td>
<td>150</td>
<td>180</td>
<td>210</td>
<td>240</td>
</tr>
<tr>
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<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td>210</td>
</tr>
<tr>
<td>21 to 25</td>
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<td>0</td>
<td>25</td>
<td>50</td>
<td>70</td>
<td>95</td>
<td>120</td>
<td>145</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>26 to 30</td>
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<td>0</td>
<td>25</td>
<td>45</td>
<td>65</td>
<td>90</td>
<td>115</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>31 to 35</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>35</td>
<td>50</td>
<td>65</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>36 to 40</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>50</td>
</tr>
</tbody>
</table>

¹Add the ppm soil test NO₃-N and NH₄-N in the 0 to 12-inch sample to that in the 12- to 24-inch sample or effective rooting depth sample to determine soil test N. If effective rooting depth is greater than 24 inches, a third sample should be collected, analyzed separately and the NO₃-N and NH₄-N added to the 0 to 12-inch and 12 to 24-inch values.

²Nitrogen rates suggested should produce these yields if stand, planting date, irrigation disease or other factors are not limiting production. Choose a realistic yield goal that is consistent with your past experience and climatic conditions, and fertilize accordingly.

³Add 15 pounds N for each ton of grain straw or non-legume residue placed under up to 50 pounds N per acre. Yields of grain straw or corn stover are normally 3 to 4 tons per acre.

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Presented at the University of Idaho Sugarbeet Schools, Burley and Caldwell, Idaho, January 17 and 18, 1985, respectively.
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Nitrogen (N)
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Phosphorus (P)
Sugarcane roots respond to P fertilizer if soil test levels are low. The soil test is based on extractable P present in the upper 12 inches of the soil. Table 2 shows the rates of P to apply for different soil test levels. Phosphorus should be plowed down or applied to rough-plowed ground and worked into the seedbed. High rates should not be placed with or immediately below the seed. Side dressing is recommended when late season applications are necessary.

Micronutrients
Zinc (Zn) — Deficiencies of Zn are not widespread in sugarcane. When the soil test for Zn is below 0.6 ppm in the upper 12 inches of the soil, or where land leveling has exposed white, limy subsoil, apply Zn fertilizer at a rate that supplies 10 pounds of Zn per acre or equivalent.

Other Micronutrients — "Shot" applications of micronutrient mixtures "for insurance" have not been necessary or economical; therefore, they are not recommended.

Sulfur (S)
Sulfur is generally not deficient in the major sugarcane-growing region of Idaho where the Snake River is the source of irrigation water. In areas known to be S deficient or where the soil test is less than 8 ppm in the 0 to 12-inch soil sample, apply 30 pounds S per acre.

General Comments
- Irrigation management and weed, insect and disease control significantly influence the efficiency and effectiveness of your fertilizer applications and your ultimate crop yield.
- Nitrogen fertilizers can be fall applied on loam, silt loam, and clayey soils. Winter leaching of N from the soil profile can be reduced to a minimum by applying N in the ammonium or urea forms when soil temperature is below 45°F. Greater efficiency may be obtained from preplant application in spring or by side dressing before July 1. Nitrogen applied after July 1 stimulates vegetative growth, lowers sugar percentage and extractability and contributes little to total sugar yield.
- On sandy soils where over-irrigation and leaching of nitrogen are likely, side dressing or applications of nitrogen through irrigation water before July 1 are suggested for at least half of the rate used.
- Fertilizer materials such as P, K and Zn can be fall applied as they are not readily leached over winter.
- Zinc-sensitive crops such as beans or corn following sugarcane should receive 10 pounds Zn per acre.
- Uniform plant populations (110 to 130 plants per 100 feet of row) after thinning have produced the highest root yields and sugar percentages.

If you have questions regarding the interpretation of this information, please contact your Extension Agricultural agent or sugar company fieldman.


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