FIRST YEAR APPLICATION EFFECTS OF COPPER FERTILIZERS ON GRAIN YIELD AND QUALITY OF WHEAT

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BACKGROUND

• Copper (Cu) deficiency is often associated with coarse-textured soils.
• Wheat is probably the most sensitive cereal to Cu deficiency, though some cultivars of wheat are less affected by the Cu deficiency than others.
• The deficiency of Cu is not wide spread in Saskatchewan, but it can cause a serious reduction in grain yield and quality of wheat when it occurs.
• Yield responses of cereals to Cu fertilization have been investigated in western Canada, but information is lacking on the effects of different Cu sources, formulations, methods and times of application in correcting Cu deficiency on wheat.

OBJECTIVE

• To determine the relative effectiveness of various sources, formulations, methods, times and rates of Cu on yield, grain quality and disease of wheat.

MATERIALS AND METHODS

• Locations: Porcupine Plain
• Soil: Dark Gray
• Mean Precipitation: 450 mm
• Growing Season: May to August
• Crop (Cultivar): Hard Red Spring Wheat (AC Barrie)
• Cu Sources:
  • Cu Fert 1 Cu Chelate Granular
  • Cu Fert 2 Cu Sulphate Granular
  • Cu Fert 3 Cu Oxysulphate I Granular
  • Cu Fert 4 Cu Oxysulphate II Granular
  • Cu Fert 5 Cu Chelate-EDTA Liquid
  • Cu Fert 6 Cu Sequestered I Liquid
  • Cu Fert 7 Cu Sulphate/Chelate Granular (Dissolvable)
  • Cu Fert 8 Cu Sequestered II Liquid
• Times and Methods Cu Application:
  – Incorporated (Prior to Seeding)
  – Seed-placed (at Seeding)
  – Foliar (4-Leaf and Flag-Leaf)

• Rates of Cu: Various
• Other Fertilizers: Blanket Application of N, P, K and S Fertilizers
• Data Recorded: Grain Yield, Protein Content and Total Cu in Grain

SUMMARY AND CONCLUSION

• Grain yield of wheat increased substantially with foliar application of Cu at the flag-leaf growth stage with copper (Cu Fert 5, 6 and 7) fertilizers.
• In these treatments, quality of grain also improved compared to the Cu-deficient wheat.
• None of the Cu fertilizers, when incorporated into soil or placed in seedrow or foliar applied at 4-leaf stage, were effective in correcting Cu deficiency on wheat. In conclusion, the preliminary results suggest that in the first year of application Cu deficiency in wheat can be corrected and grain yields improved by foliar application of some Cu fertilizers at flag-leaf growth stage.

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Grain yield of wheat with different sources, rates, times and methods of Cu application (0.5 mg Cu/kg in 0-15 cm soil).

<table>
<thead>
<tr>
<th>Method of application</th>
<th>Cu Fert 1</th>
<th>Cu Fert 2</th>
<th>Cu Fert 3</th>
<th>Cu Fert 4</th>
</tr>
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<tbody>
<tr>
<td>Incorporated (0.5)</td>
<td>1567</td>
<td>1689</td>
<td>1523</td>
<td>1467</td>
</tr>
<tr>
<td>Incorporated (2.0)</td>
<td>1821</td>
<td>1591</td>
<td>1655</td>
<td>1453</td>
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<tr>
<td>Seedrow (0.25)</td>
<td>865</td>
<td>1347</td>
<td>1271</td>
<td>1886</td>
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<tr>
<td>Seedrow (1.0)</td>
<td>1588</td>
<td>1831</td>
<td>1441</td>
<td>1348</td>
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<tr>
<td>Foliar-4 leaf (0.25)</td>
<td>1844</td>
<td>1849</td>
<td>1572</td>
<td>1522</td>
</tr>
<tr>
<td>Foliar-Flag leaf (0.25)</td>
<td>2709</td>
<td>2571</td>
<td>2555</td>
<td>1343</td>
</tr>
<tr>
<td>Control (without Cu)</td>
<td>1566</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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