EFFECTS OF UREA ON THE GERMINATION AND EARLY GROWTH OF KALE, BARLEY, AND WHEAT

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INTRODUCTION

Various workers in England have reported that urea applied for barley, kale and potatoes decreased plant numbers and damaged early growth more than corresponding dressings of ammonium sulphate, particularly when little rain fell immediately after sowing. In the present work, kale was grown in pots in the glasshouse, and barley and wheat in bottomless boxes in the open, using soils with widely different properties at various moisture contents, to try and define conditions severely damaging to germination and early growth.

PART I. POT EXPERIMENT

EXPERIMENTAL

Kale was grown in pots in the glasshouse, in two clay soils and in two sandy soils (one of each containing much and little organic matter), maintained at 40, 50, or 60 per cent of water-holding capacity. Urea supplying 0, 100, 200, or 300 lb of N/acre was applied. All combinations of soils, water-holding capacities and rates of urea were used and treatments were duplicated to give two blocks of 48 pots each.

Materials

Soils. Table 1 gives the values for pH, free calcium carbonate, organic-C and total-N contents, water-holding (WHC) and base-exchange (BEC) capacities of soils 1-4 used for this experiment (these soils were also used for
<table>
<thead>
<tr>
<th>Description and location</th>
<th>Field treatment</th>
<th>pH in water</th>
<th>CaCO$_3$</th>
<th>Organic N</th>
<th>Total N</th>
<th>Water-holding capacity</th>
<th>Base-exchange capacity m.eq./100 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clay loam</td>
<td>Bone's Close, Rothamsted</td>
<td>7.8</td>
<td>&lt; 1</td>
<td>1.08</td>
<td>0.120</td>
<td>51</td>
<td>18.4</td>
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<tr>
<td>2. Clay loam</td>
<td>Great Field IV, Rothamsted</td>
<td>5.8</td>
<td>0</td>
<td>2.67</td>
<td>0.258</td>
<td>61</td>
<td>19.2</td>
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<tr>
<td>3. Sandy loam</td>
<td>Lansome Piece, Woburn</td>
<td>6.2</td>
<td>0</td>
<td>1.02</td>
<td>0.086</td>
<td>36</td>
<td>8.5</td>
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<tr>
<td>4a Sandy loam</td>
<td>Butt Furlong, Woburn</td>
<td>6.2</td>
<td>0</td>
<td>3.44</td>
<td>0.386</td>
<td>55</td>
<td>23.0</td>
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<tr>
<td>4b. Sandy loam</td>
<td></td>
<td>6.1</td>
<td>0</td>
<td>1.72</td>
<td>0.214</td>
<td>49</td>
<td>15.4</td>
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<tr>
<td>5. Calcareous flinty-loam over Chalk</td>
<td>Barton Hill, Beds.</td>
<td>8.1</td>
<td>27</td>
<td>1.94</td>
<td>0.202</td>
<td>49</td>
<td>15.2</td>
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<td>6. Chalky loam over Chalk</td>
<td>Pegsdon, Beds.</td>
<td>8.3</td>
<td>81</td>
<td>1.54</td>
<td>0.204</td>
<td>59</td>
<td>12.2</td>
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<td>7. Calcareous loam over Cornbrash</td>
<td>Arable farming</td>
<td>7.2</td>
<td>1</td>
<td>3.73</td>
<td>0.399</td>
<td>71</td>
<td>25.2</td>
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<td>8. Calcareous stony-loam over Cornbrash</td>
<td>Arable farming for many years</td>
<td>7.8</td>
<td>3</td>
<td>2.70</td>
<td>0.325</td>
<td>61</td>
<td>21.9</td>
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