BRIEF PAPERS

RESPONSE OF IRIS TO SOIL REACTION

(WITH TWO FIGURES)

Recommendations in popular literature vary considerably as to the optimum soil reaction for the Bearded iris, *Iris germanica*, ranging from "acid" to "alkaline." Dykes¹ states that "The Bearded Irises all, without exception, want dry conditions and the only hope in damp situations is to make raised beds for them. They also need lime in the soil and this is, in most cases, best supplied in the form of old mortar rubble. The Apogons do not, as a rule, want lime, except possibly the Spurias and some, such as the Californians, will not grow in a soil that is highly charged with lime."

Since soils on which the iris is grown in Ohio vary widely in reaction, it seemed desirable to determine the optimum condition or range for them. A series of plots on a raised bed in the greenhouse, which had already been prepared for studying other species of flowers, was used for the purpose. These plots were 7 x 8 feet in size and were filled with Canfield silt loam, in June, 1929. The pH value of the soil was 5.0 at the time it was moved into the greenhouse. A one-inch layer of German peat (pH 3.5) was added in an endeavor to improve the humus content. Increments of aluminum sulphate or hydrated lime were added to the plots until a range of pH 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, and 8.0 was attained for the eight plots respectively. Readings of the pH value of each plot were made biweekly, either electrometrically or by means of the La Motte soil tester.

On September 1, 1930, irises were planted in these plots, using Alcazar and another German variety, the name of which was not determined. The rhizomes were approximately the same size at the time of planting, but the weights were not recorded. Three plants of each variety were set to the plot and they received identical care with the exception of occasional additions of aluminum sulphate or hydrated lime as was necessary to maintain the desired reaction of the soil.

For the first four months no appreciable differences were noted in the growth or color of the plants. Beginning January 1, 1931, a darker color and larger size of foliage were noted in the plants growing on plots 7 and 8 (pH 7.5 and 8.0 respectively). Plots 1 and 2 by this time showed a somewhat stunted appearance, with some tip burn. The succeeding plots were

increasingly better, particularly in the alkaline ones, as noted. Throughout the following eighteen months there was a gradual widening of the growth behavior between plots 1 and 8 until those in the former were practically worthless. Whether this injury to the plants at pH 4.5 and 5.0 was due to the high concentration of hydrogen ions or to toxicity due to soluble aluminum was not definitely determined, but probably the latter played an important rôle.

Figure 1 shows a typical sample of leaf from each plot. There is a fairly consistent gradient in size, color and amount of tip burn from plot 1 to plot 8.

Figure 2 shows a typical plant from each plot, photographed June 15, 1931.

At the time of removal from the bed, July 22, 1932, the Alcazar plants were weighed and the length of typical leaves measured. With one slight exception, plot 5, the weight is in an ascending order from plot 1 to 8, increasingly higher as acidity decreases; that is, from plot 1 to 8. The length of flower stems was measured on June 15, 1931, and, with other data, are shown in table I.
Fig. 2. Alcazar iris plants typical of those grown in soil reaction plots from pH 4.5 to 8.0.

From this work it appears that the German iris, Alcazar, thrives much better when the soil reaction is nearly neutral to alkaline than in acid soils. Since these plants were kept rather dry throughout to prevent injury, the matter of wet soil is eliminated. The conclusion may be drawn that iris...
TABLE I
Some Effects of Soil Reaction on Growth of Alcazar Iris Plants,
Sept. 1, 1930, to July 22, 1932

<table>
<thead>
<tr>
<th>Plot</th>
<th>Reaction</th>
<th>Average Weight of 3 Plants</th>
<th>Average Number of Shoots per Plant</th>
<th>Average Height of Foliage</th>
<th>Length of Flower Stems, June 15, 1931</th>
<th>Condition of Foliage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH* 4.49</td>
<td>gm. 276</td>
<td>4</td>
<td>inches 9</td>
<td>inches 3</td>
<td>Very pale, tip burn</td>
</tr>
<tr>
<td>2</td>
<td>4.86</td>
<td>316</td>
<td>4</td>
<td>11</td>
<td>5</td>
<td>Very pale, tip burn</td>
</tr>
<tr>
<td>3</td>
<td>5.46</td>
<td>385</td>
<td>6</td>
<td>13</td>
<td>8</td>
<td>Pale, tip burn</td>
</tr>
<tr>
<td>4</td>
<td>6.05</td>
<td>401</td>
<td>5</td>
<td>14</td>
<td>10</td>
<td>Pale, tip burn</td>
</tr>
<tr>
<td>5</td>
<td>6.48</td>
<td>393</td>
<td>5</td>
<td>15</td>
<td>10</td>
<td>Green</td>
</tr>
<tr>
<td>6</td>
<td>6.93</td>
<td>529</td>
<td>5</td>
<td>16</td>
<td>14</td>
<td>Dark green</td>
</tr>
<tr>
<td>7</td>
<td>7.56</td>
<td>561</td>
<td>4</td>
<td>18</td>
<td>16</td>
<td>Dark green</td>
</tr>
<tr>
<td>8</td>
<td>8.05</td>
<td>677</td>
<td>5</td>
<td>20</td>
<td>22</td>
<td>Very dark green</td>
</tr>
</tbody>
</table>

* The last reading before the iris plants were removed, recorded electrometrically with a quinhydrone electrode, June 21, 1932.

Plants growing on acid soils may be improved if the soil is treated with lime until the reaction is nearly neutral or above.—J. H. Gourley, Ohio Agricultural Experiment Station, Wooster, Ohio.

GROWTH OF TREE SEEDLINGS IN RELATION TO LIGHT INTENSITY AND CONCENTRATION OF NUTRIENT SOLUTION

(with one figure)

The importance of available mineral nutrients in the shade tolerance of trees has been emphasized by Lundegardh, who points out that the presence of abundant mineral nutrients in the soil favors chlorophyll and foliage formation and thus increases the assimilative capacity of plants under shade conditions. Sufficient experimental data relative to the effects of mineral nutrients on plants grown at low light intensities are lacking, however. The following experiments were carried out to determine the effects of concentration of mineral nutrients on tree seedlings grown at or near the minimum light intensity required for growth.

1 The author wishes to express his appreciation to Dr. R. B. Harvey of the University of Minnesota for his encouragement and suggestions during the course of the experimental work and for the material assistance and facilities offered by the Division of Plant Pathology and Botany of the Minnesota Agricultural Experiment Station.