UTILIZATION OF THE MIXTURES OF AMINO ACIDS
BY HELICOSTYLUM PIRIFORME BAINIER

by

MADHAVA DAS MEHROTRA

907, Kalyani Devi, Allahabad, India

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This is the third paper in the series on the nutrition of Helicostylum piriiforme. It deals with the utilization of different mixtures of amino acids and their effect on the growth of the above organism.

MATERIAL AND METHOD

A pure culture of Helicostylum piriiforme was used throughout this investigation. The composition of the medium was the same as given in the first paper of the series for nitrogen requirements. Three different mixtures of amino acids were used.

1. Phenylalanine, arginine, glutamic acid and histidine.
2. Leucine, histidine, glutamic acid and arginine.
3. Tryptophane, glycine, glutamic acid and histidine.

For each of the mixtures different amino acids were mixed in equivalent quantity so as to supply 186 mg of nitrogen per liter. The rest of the procedure was the same as given in a previous paper dealing with the utilization of amino acids by all the recognized members of Choanephorateae.

RESULTS

The results of the rate of growth of Helicostylum piriiforme on different mixtures of amino acids and their utilization are tabulated in Table I. From the results it is evident that Helicostylum piriiforme grew well on all the different mixtures of amino acids. The rate of growth and the final amount of mycelium produced on the first two mixtures were better than on the same amino acids when supplied singly. On the other hand, rate of growth and the final amount of mycelium on mixture No. 3 were not better than all the individual amino acids. From the table it is clear that all the amino acids were completely utilized within the incubation period from mixtures 1 and 2. On the other hand, none of the amino acids could be consumed by the fungus from mixture 3.
**TABLE I.**
*Showing the presence of amino acids, change in pH of the medium and the dry weights of fifth, tenth and fifteenth day in Helicostylum piriorme.*

<table>
<thead>
<tr>
<th>amino acids</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenylalanine</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Arginine</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Glutamic acid</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Histidine</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Drift in pH</td>
<td>6.5</td>
<td>7.8</td>
<td>8.0</td>
<td>6.5</td>
<td>7.6</td>
<td>8.4</td>
<td>6.6</td>
<td>7.2</td>
<td>7.9</td>
<td>6.6</td>
<td>7.2</td>
<td>7.9</td>
<td>6.6</td>
<td>7.2</td>
<td>7.9</td>
</tr>
<tr>
<td>Increase in dry wts.</td>
<td>29.6</td>
<td>50.2</td>
<td>59.8</td>
<td>35.0</td>
<td>55.4</td>
<td>67.8</td>
<td>20.0</td>
<td>35.8</td>
<td>44.0</td>
<td>20.0</td>
<td>35.8</td>
<td>44.0</td>
<td>20.0</td>
<td>35.8</td>
<td>44.0</td>
</tr>
</tbody>
</table>

+ = presence of Amino acids.
— = absence of Amino acids.

**DISCUSSION**

**LILLY & BARNETT (1951, p. 106)** have mentioned that a mixture of amino acids may or may not be better utilized than a single amino acid. In the present case also two mixtures, viz., 1 and 2 were better utilized than the individual amino acids while mixture No. 3 was not better utilized than all of its amino acids when supplied singly. Similar reports have been made by the author for other Mucorales. Good response of *Helicostylum piriorme* to the first two mixtures is possibly due to the improved assimilability of the mixtures by mutual supplementation. Further, it can be due to the capacity of the organism to synthesize the necessary enzymes in larger quantities to assimilate an amino acid satisfactorily. On the other hand, poor utilization of the amino acids from mixture 3 may be due to the presence of histidine and tryptophane. It has been found earlier that these two amino acids are of no value for the growth of this organism when they are supplied singly. In mixture these appear to have depressive effect on growth. **DAYAL (1958), CHANDRA (1961) and CHATURVEDI (1961)** have also reported better mycelial growth on some individual amino acids than on their mixtures. In the present case growth of the organism was better on mixture 3 than tryptophane and histidine but poorer than glycine and glutamic acid.