Influence of humates on the growth of microorganisms

Authors: O. F. Vyatchina¹, E. A. Karavaeva¹, M. Yu. Tolstoy², M. V. Atanova³, S. A. Kovalenko¹

Affiliations: ¹Irkutsk State University, Irkutsk, Lenin Street, 3, Russia
²Irkutsk National Research Technical University, Irkutsk, Lermontov Street 83, Russia
³Baikal Museum of the ISC, Listvyanka, Akademicheskaya Street, 1A, Russia
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Research Objective: study of the effect of the preparation of humate "Powhumus" on the growth of *B. thuringiensis* ssp. *kurstaki*.

The objects of the study were *B. thuringiensis* ssp. *kurstaki* (from the collection of O.F. Vyatchina, Department of Microbiology, ISU).
Results

Studies have shown that in the LB medium without the addition of humate, the number of cells of the studied *B. thuringiensis* strain increased by almost an order of magnitude during 24 hours of cultivation - from $(2.75 \pm 0.45) \cdot 10^7$ to $(3.35 \pm 0.45) \cdot 10^8$ CFU / ml. When 0.01% humate was added to the nutrient medium, the number of *B. thuringiensis* cells was almost three times higher than in the control ($(9.05 \pm 0.55) \cdot 10^8$ and $(3.35 \pm 0.45) \cdot 10^8$ CFU / ml, respectively). Humate at a concentration of 0.0001; 0.001 and 0.1% had no significant effect on the growth of the *B. thuringiensis* strain. The suppression of culture growth was noted during cultivation in a medium with 1% humate. At the same time, the number of cells was more than two times lower than in the control (table 1).

Table 1 – The effect of the "Powhumus" humate preparation on the growth of *B. thuringiensis* ssp. *kurstaki*

<table>
<thead>
<tr>
<th>Humate concentration, %</th>
<th>Number of cells, CFU / ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0001</td>
<td>$(5.0\pm0.79)\cdot10^8$</td>
</tr>
<tr>
<td>0.001</td>
<td>$(5.50\pm1.27)\cdot10^8$</td>
</tr>
<tr>
<td>0.01</td>
<td>$(9.05\pm0.55)\cdot10^8$</td>
</tr>
<tr>
<td>0.1</td>
<td>$(3.10\pm0.69)\cdot10^8$</td>
</tr>
<tr>
<td>1</td>
<td>$(1.40\pm0.11)\cdot10^8$</td>
</tr>
<tr>
<td>control</td>
<td>$(3.35\pm0.45)\cdot10^8$</td>
</tr>
</tbody>
</table>
Conclusions
Thus, humate concentrations have been revealed that stimulate the growth of the entomopathogenic bacterium *B. thuringiensis* ssp. *kurstaki* (0.01%), as well as the humate content, at which it had no visible effect on the growth of the strain (0.0001; 0.001 and 0.1%). The concentration limit was established, above which the growth inhibition of *B. thuringiensis* (1%) was observed. The revealed ranges of effective concentrations of humates must be taken into account when using these substances in the biotechnology of plant protection against Lepidoptera pests.

References

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Authors: O. F. Vyatchina¹, E. A. Karavaeva¹, M. Yu. Tolstoy², M. V. Atanova³, S. A. Kovalenko¹

Affiliations: ¹Irkutsk State University, Irkutsk, Lenin Street, 3, Russia
²Irkutsk National Research Technical University, Irkutsk, Lermontov Street 83, Russia
³Baikal Museum of the ISC, Listvyanka, Akademicheskaya Street, 1A, Russia

Contact details: stomd@mail.ru olgairk3@rambler.ru