Wachstumsversuche mit Marasmius oreades (Bolt.ex Fr.) Fr., einem streuezersetzenden Basidiomyceten

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Publication Date:
1955

Permanent Link:
https://doi.org/10.3929/ethz-a-000089300 

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Wachstumsversuche mit
*Marasmius oreades (BOLT. ex Fr.) Fr.*, einem
streuezersetzenden Basidiomyceten

VON DER
EIDGENÖSSISCHEN TECHNISCHEN
HOCHSCHULE IN ZÜRICH
ZUR ERLANGUNG DER WÜRDE EINES
DOKTORS DER TECHNISCHEN WISSENSCHAFTEN
GENEHMIGTE
PROMOTIONSARBEIT

VORGELEGT VON
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Buchdruckerei Schönenerger A.G. / Winterthur 1955
II. Summary

Growth experiments have been carried out with a strain of the fungus *Marasmius oreades* (*BOLT. ex FR.*) *FR.*, a litter-decomposing Basidiomycete. The growth factor requirements and the utilization of various nitrogen sources have been studied. Furthermore, some preliminary experiments have been performed on the influence of pH, mineral salts, litter extracts as growth stimulants, and of some carbohydrates as carbon and energy sources.

Suspensions of hyphae prepared by mechanical rupturing of mycelial mats were used for inoculating the cultures.

The progress of the growth was followed quantitatively in stationary cultures by determining the mycelium dry weight at appropriate time intervals.

The basal medium contained per liter: glucose 20.0 g., diammonium tartrate 5.0 g., KH$_2$PO$_4$ 1.0 g., MgSO$_4$ • 7H$_2$O 0.50 g., CaCl$_2$ • 6H$_2$O 0.11 g., FeCl$_3$ • 6H$_2$O 4.2 mg., MnCl$_2$ • 4H$_2$O 9.9 mg., and ZnSO$_4$ • 7H$_2$O 4.4 mg. Thiamine was added as a growth factor in most experiments (0.5 mg/l). In the tests on the utilization of nitrogen sources the diammonium tartrate was replaced by various nitrogenous compounds at a nitrogen level of 0.28 g/l. (20 mM N).

1. Growth factor requirements

Thiamine proved to be an essential growth factor. For optimal growth 10 µg/l. were sufficient.

Other water-soluble vitamins, e.g. biotin, inositol, pantothenate, pyridoxine, and pteroyl glutamate, had neither alone nor in combination with thiamine a definite growth promoting effect.

Hypoxanthine, adenine, adenosine and adenosine-3'-phosphate were found to be highly growth stimulating in the presence of thiamine. Guanine was ineffective.

2. Utilization of various nitrogen sources

Nitrate nitrogen was not utilized by the fungus, while ammonium ion and urea were found to be good nitrogen sources.

A few amino acids, e.g. L-alanine, L-aspartate, L-glutamate, L-arginine, and glycine, were equally effective or slightly better than ammonium ion. In contrast, many other amino acids, (e.g. L-tryptophane, DL-phenyl-
alanine, L-cysteine, DL-proline, DL-norvaline, etc.) were scarcely utilizable; in a few instances some reason could be given for their nutritional inadequacy.

Some purine and pyrimidine compounds, i.e. xanthine, hypoxanthine, adenine, guanine, uracil, thymine, and cytosine, were not or only slowly utilized.

3. Infl uence of pH and some other factors

Good growth took place within the pH limits of 3.5 and 6.5, while growth was almost completely inhibited below 3.2.

Calcium salts had a considerable influence on the growth.

Small additions of litter extracts to the medium displayed a strongly stimulating effect.

Dextrins and maltose surpassed glucose as a carbon and energy source. Fructose was equally effective, while glycogen, starch, cellobiose, etc. were less active than glucose.