

PHENOTYPICAL VARIABILITY IN THE *STREPTOMYCES NOURSEI* NYSTATIN-PRODUCING STRAIN WHEN GROWN ON MEDIA WITH VARIOUS CARBON SOURCES

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INTRODUCTION

The antibiotic manufacturing industry uses on a large scale, as producing microorganisms, species of actinomycetes. Among these, the genus *Streptomyces* includes the most significant representatives.

Actinomycetes exhibit a high variability and this is why the specialists in the laboratories continuously seek to maintain the useful characters of the antibiotic producers.

Therefore, in order to maintain the biosynthetic capacity, a maintenance selection must be carried out periodically. *Streptomyces noursei*, the producer of the antifungal antibiotic nystatin may exhibit a phenotypical variability induced by the presence of different sources of carbon hydrates in the specific growth and development medium.

THE AIM OF INVESTIGATION

The authors aimed at monitoring the phenotypical variability of a *Streptomyces noursei* strain from the collection of S.C. Antibiotice S.A. Iași, the only nystatin-producing company in the country which ensures the export both in Europe and in Canada.

MATERIAL AND METHOD

For the investigations, a *Streptomyces noursei* strain from the collection of Antibiotice S.A. Iasi was used. The culture was maintained by selection operations on specific agar medium in two versions.

For the first version, glucose monohydrate was introduced in the medium composition as a sugar source, while for the second, the corn starch.

The medium was distributed to Petri dishes and test tubes (slants). A *Streptomyces noursei* spore suspension was prepared and successive dilutions were carried out, from 10⁻¹ to 10⁻⁵. By laboratory selection the two versions of agar medium were inoculated with the spore dilutions and then incubated at 28°C for 8 days. The reaped cultures were grown on inclined agar medium at 28°C for 14 days.

The growth and development period of the colonies obtained by selection and of the slants, as well as the incubation conditions were the same for the two versions.

RESULTS AND DISCUSSIONS

The research examinations performed had the following results:

At the end of the growth and development period, the number of the *Streptomyces noursei* colonies obtained differed according to the dilution used in selection and a phenotypical variability was noted.

The colonies obtained by selection, reaped and inoculated in inclined agar medium exhibited the same characteristics obtained when selected, and the phenotypical variability in the version with corn starch.

For the interpretation of the results, the selections obtained from dilutions 10⁻² and 10⁻³ were used.

The characteristics of the *Streptomyces noursei* colonies grown on media with different carbon sources are indicated in the Table I and Photos 1 – 4 (for the version with glucose monohydrate) and Photos 5 – 8 (for the version with corn starch).

Table I – The characteristics of the *Streptomyces noursei* colonies grown on media with different carbon sources

Dilution	Version I (glucose monohydrate)	Version II (corn starch)
10 ⁻²	Typical, grayish white, sporulated colonies with dark brown reverse, 90% viability Sporulated slants, aerial grayish white mycelium with dark brown reverse	Atypical, non-sporulated colonies with non-pigmented reverse and phenotypical variability, 92% viability Non-sporulated slants, non-pigmented reverse
10 ⁻³	Typical, grayish white, sporulated colonies with dark brown reverse, 100% viability Sporulated slants, aerial grayish white mycelium with dark brown reverse	Atypical, non-sporulated colonies with non-pigmented reverse and phenotypical variability, 102% viability Non-sporulated slants, non-pigmented reverse

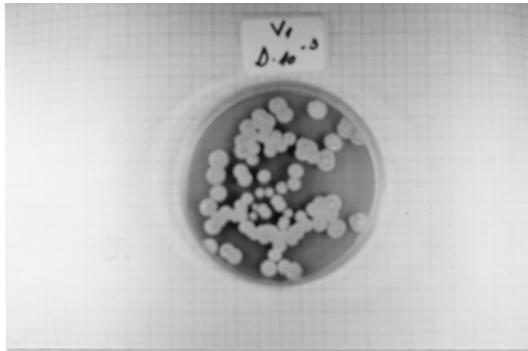


Photo 1 – Appearance of *Streptomyces noursei* colonies obtained by cultivation on agar medium with glucose monohydrate (colonies with sporulated mycelium)

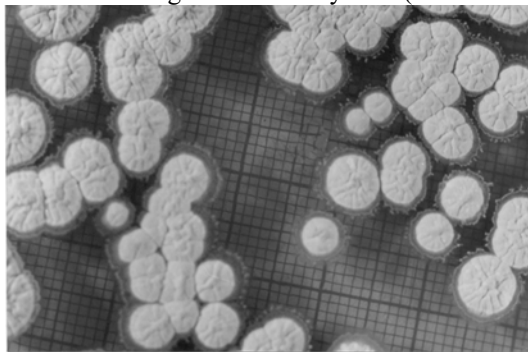


Photo 2 – Appearance of *Streptomyces noursei* colonies obtained by cultivation on agar medium with glucose monohydrate (detail)

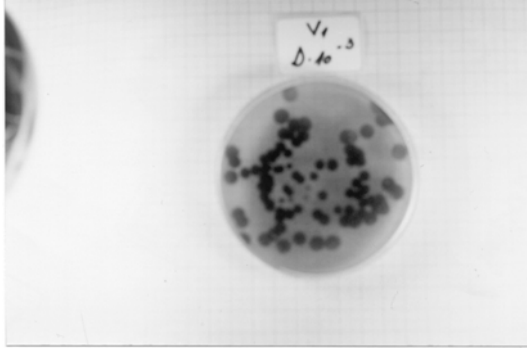


Photo 3 – Appearance of *Streptomyces noursei* colonies obtained by cultivation on agar medium with glucose monohydrate (colonies pigmented on the reverse)

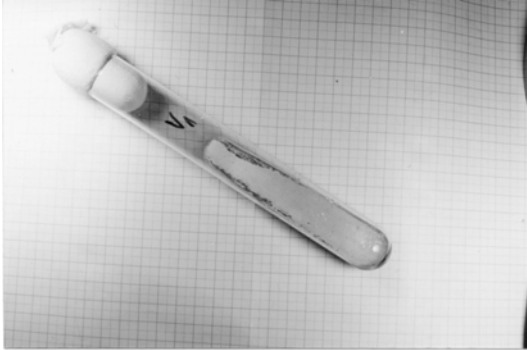


Photo 4 a – Appearance of *Streptomyces noursei* slants grown on agar medium with glucose monohydrate - sporulated mycelium

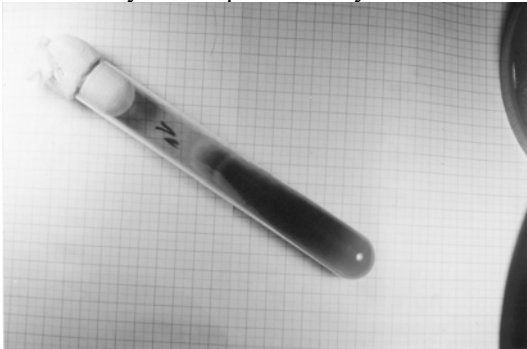


Photo 4 b – Appearance of *Streptomyces noursei* slants grown on agar medium with glucose monohydrate - pigmented on the reverse

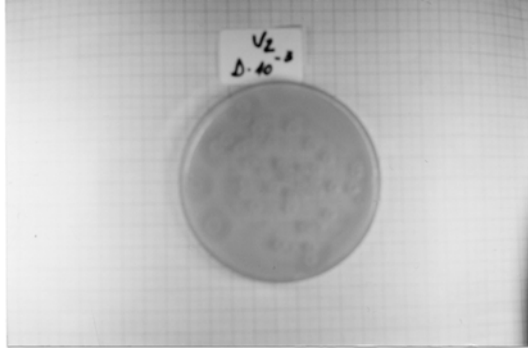


Photo 5 – Appearance of *Streptomyces noursei* colonies obtained by cultivation on agar medium with corn starch (colonies with non-sporulated mycelium)

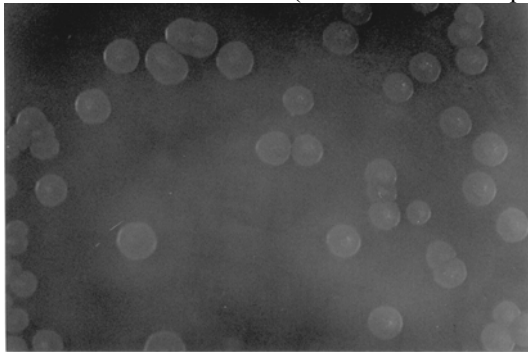


Photo 6 – Appearance of *Streptomyces noursei* colonies obtained by cultivation on agar medium with corn starch (detail)

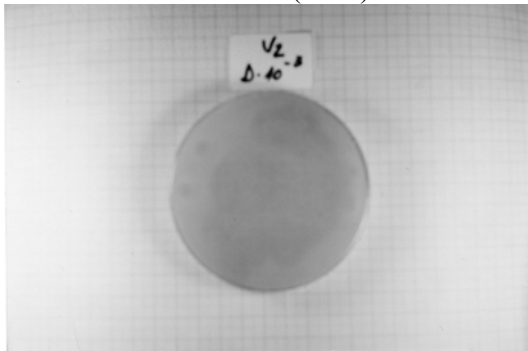


Photo 7 – Appearance of *Streptomyces noursei* colonies obtained by cultivation on agar medium with corn starch (non-pigmented on the reverse)

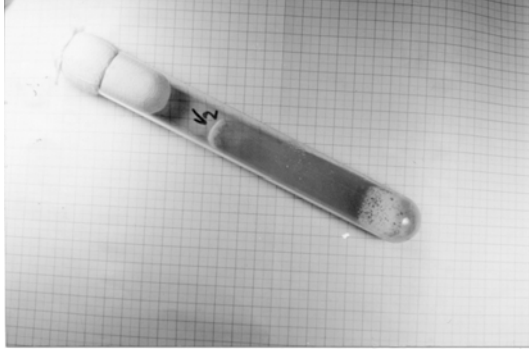


Photo 8 a – Appearance of *Streptomyces noursei* slants grown on agar medium with corn starch - non-sporulated mycelium



Photo 8 b – Appearance of *Streptomyces noursei* slants grown on agar medium with corn starch non - pigmented on the reverse

CONCLUSIONS

The use of carbon hydrates sources easily metabolizable, such as glucose monohydrate, in the growth and development medium of the microorganism *Streptomyces noursei* results in a good growth, a characteristic mycelium sporulation as well as in the production of a dark brown pigment diffusible in the medium.

When the corn starch is used as a carbon source, colonial growth is noted without the manifestation of the characteristics specific to the microorganism such as sporulation and pigmentation.

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