Tamil Nadu Agrl. University,
Coimbatore-3,
July 5, 1975.

S. PANNEERSELVAM.
C. L. SUBRAMANIAN.
T. K. KANDASWAMY.
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Aspergillus lanosus—A New Mold Producing Citric Acid

Microbial production of citric acid has engaged the attention of several investigators owing to its apparent commercial potentialities. A project was undertaken for improving the yield of citric acid by screening of aspergilli from different substrates, by strain selection, and by induced mutation. Out of 70 *Aspergillus* species isolated and screened only 7 were found to possess the capacity to ferment commercial sugar into citric acid. This note reports the ability of *A. lanosus* Kam. et Bharg.[1] to bring about such a fermentation.

Microbial organic acid production was achieved by paper culture technique[2]. The production of citric acid was confirmed colorimetrically.[3] The stock culture of the fungus was maintained on Czapek's Agar slant from where it was inoculated into seed medium (Sugar 14%, NH_4NO_3 0·25%, $MgSO_4.7\ H_2O$ 0·025%, KH_2PO_4 0·10%, soluble starch 0·10%, pH finally adjusted to 2·5 with N.HCl) ; 48 hours after incubation in seed medium, 5 ml of the medium containing the fungus was inoculated into production medium (Sugar 10%, NH_4NO_3 0·18%, $MgSO_4.7\ H_2O$ 0 018%, KH_2PO_4 0·076%, pH finally adjusted to 2·5 with N.HCl). The cultures were incubated at 30° C for 7 days at 280 rpm.

After incubation the medium was filtered and the filtrate assayed for citric acid. The mycelium was washed and dried to determine the dry weight. The production of citric acid was estimated on the basis of sugar consumed by the mold. The concentrations of both the sugar and the acid in the culture medium were determined colorimetrically[3'1], the latter by the method of Marier and Boulet[4].

The mycelial dry weight was 3·8994 g/100 ml of the medium. The amount of sugar consumed in the production medium was 5·50 g/100 ml while the citric acid yield was only 11·3 mg/ml of the medium. The rate of conversion of sugar into acid by *Aspergillus lanosus* is lower than that by several strains of *A. niger*. Attempts to increase the yield of citric acid by changing the factors governing its productivity are in progress.

Department of Botany,
University of Gorakhpur,
Gorakhpur (India),
June 3, 1975.

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Fungi Associated with Sunflower Seeds

Two hundred seeds of each of the five commercially recommonded varieties of sunflower, *viz.*, EC. 68413, EC. 68414, EC. 68415, EC. 69874 and Sunrise were subjected to isolation procedure to know the association of various fungi. Both external and internal seedborne infections were detected by plating unsterilized and surface sterilized seeds on Blotter and Potato Dextrose Agar medium separately.

Twenty-two different fungal isolates were obtained as endo and actophytic association with the seed. These isolates were identified as *Aspergillus flavus* Link ex Fries, *Aspergillus tamarii* Kita, *Aspergillus niger* Van Tieghem, *Chaetomium globosum* Kunze ex Fr., *Neurospora* sp., *Curvularia lunata* (Wakker) Boedijn var. *aeria* (Batista, Lime and Vasconcelos) M. B. Ellis, *Macrophomina phaseolina* (Tassi), Goeid, *Phoma exigpa* Desm., *Aspergillus variecolor* var. *astellatus* Fennell and Raper, *Fusarium aquiseti* (Corda) Sacc., *Rhizopus microsporus* Van Tieghem, *Aspergillus sydowii* (Bainier and Sartory) Thom and Church, *Cladosporium* sp., *Alternaria* state of *Pleospora infectoria* Fuckel, *Aspergillus amstelodami* Thom and Church, *Verticillium* sp., *Drechslera hawaiiensis* M.B. Ellis, *Penicillium funiculosum*, *Fusarium moniliforme* Sheld and *Nigrospora sphaerica* (Sacc.) Mason. *Two isolates did not sporulate and hence their identity could not be ascertained.

Out of these various fungal isolates *Aspergillus niger*, *Rhizopus microsporus*, *Aspergillus flavus*, *Macrophomina phaseolina* and *Aspergillus tamarii* were found to be most frequently associated with the seeds. Pathogenicity tests revealed 26 to 30% loss in germination by these fungi.

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Sunflower Research Scheme, J. G. RAUT.
Punjabrao Krishi Vidyapeeth,
Akola (M.S.), India, *April* 6, 1975.

A Preliminary Note on the Free amino Acids in *Centella asiatica* Linn.

Centella asiatica Linn. Urban Syn., *Hydrocotyle asiatica* Linn. (Umbelliferae) is a prostrate perennial, mildly aromatic herb found throughout India. This plant is widely used in Indian systems of medicine[1,2]. The present study is aimed at the detection and distribution of the free amino acids present in the different regions of the plant. The presence of five amino acids in this plant has been reported earlier.[3]

The plants for investigation were collected around Tiruchy town and separated into leaves, petioles, stolons and roots. A known quantity of each part was stabilized in 80% ethyl alcohol and the amino acid fraction extracted and identified by two-dimensional descending paper chromatography[4].

Twenty free amino acids were identified in all the four different regions of the plant. They are : cysteine cystine, aspartic acid, glutamic acid, serine, glycine, threonine, alanine, arginine, lysine, histidine, tyrosine, amino-butyric acid, valine, methionine, proline isoleucine, leucine, phenylalanine and tryptophan.

A colorimetric comparison of the quantity of the amino acids present in the different regions of the plant was made on the basis of the intensity on ninhydrin colour spot. It was found that the distribution of free amino acids in the leaves, petioles and stolons was about the same. In these regions glutamic acid, serine and alanine were found in larger quantities than the other amino acids. In the root, the various amino acids were found in greater quantities than in the other parts ; and in particular, aspartic acid, glutamic acid, serine, threonine, alanine, lysine, histidine and amino-butyric acid were in abundance.

Department of Botany, V. K. GEORGE.
St. Joseph's College, J. L. GNANARETHINAM.
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REVIEWS AND NOTICES OF BOOKS

World Meteorological Organization. Technical Note No. 131. **Climate under Glass.** By Dr. J. Seemann. 1974. Pp. 40. Price not given.

Dr. J. Seemann has rendered a great service to agricultural scientists interested in raising tropical or sub-tropical crops in temperate or frigid zones under the suitably controlled environment of a glass-house. He has presented in this brochure a critical digest of several experiments in glass-houses already carried out under European conditions by workers in this area.

Stressing that solar radiation is a major factor the author emphasises that in northern latitudes, the diffuse sky radiation can at times compete with the contribution from direct solar radiation. The glass or other plastic material enclosing the glass-house cuts off the ultra-violet and allows only a part of the solar energy to be transmitted into the interior of the glass-house. The blanketing effect of the glass or plastic covering as well as the energy balance at the soil surface within the glass-house irradiated by solar radiations that reach that surface are greatly responsible for making the " climate under the glass " so much warmer than outside.

The author developes the subject under two main headings, *viz.*, Chapter 1: " Elements and factors of climate in the greenhouse " and Chapter 2: " Control of climate in the greenhouse ". In Chapter 1, the author discusses the several environmental factors like: (i) Radiation and heat balance, (ii) Heat transformation, (iii) Temperature conditions including air, soil and plant temperatures, (iv) Air humidity, (v) Evaporation and consumption of water and (vi) the Carbon-di-oxide factor. Chapter 2 covers topics like the basis of climatic control, regulation of temperature, shading, ventilation and water atomising installations and short period spraying.

The author has presented a clear picture of the large number of factors controlling the climate within the glass-house which is rendered congenial to the growth