TABLE I

<table>
<thead>
<tr>
<th>Source</th>
<th>Glutamine synthase*</th>
<th>Glutamate dehydrogenase NADH NADPH NADH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (amine)</td>
<td>42·5</td>
<td>119·0 148·7 Trace</td>
</tr>
<tr>
<td>grown cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrate grown cells</td>
<td>33·8</td>
<td>96·7 38·2 23·6</td>
</tr>
<tr>
<td>Ammonia grown cells</td>
<td>15·4</td>
<td>78·4 10·3 14·5</td>
</tr>
</tbody>
</table>

* Expressed in mg of glutamic acid γ-monohydroxamate formed/min/mg protein.
** Expressed in n moles of NADH/NADPH oxidised min/mg protein.

nitrogenase synthesis. A comparison of glutamate dehydrogenase and glutamate synthase activities in Klebsiella, Azotobacter and Clostridium indicated that glutamate synthase played a prominent role in glutamate formation rather than the enzyme, glutamate dehydrogenase. It appears from the results that in Azospirillum brasilense the chief ammonia assimilating enzymes are glutamine synthetase and glutamate synthase. We have recently demonstrated in the case of Azotobacter chroococcum the predominance of glutamine synthetase and glutamate synthase as the ammonia assimilating enzymes.

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INHIBITION OF PURPLE SEEDCOAT COLOUR IN GROUNDNUT

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Purple seedcoat colour, P, is dominant (rose and red) in groundnut (Arachis hypogea, L.) Hammons, in a review, reported that the purple seedcoat was incompletely dominant to rose and flesh colours and showed monogenic control. Although the red colour gene, R, is not required for the purple phenotype, it modified the expression of P gene. This communication describes other loci for purple coat colour which were observed in the cross between two Spanish varieties, Chico and Trombay Groundnut (TG)-17.

TG-17, having flesh coloured seedcoat, was crossed as female parent to Chico with light rose colour. F₁ hybrids and F₂ progenies were grown during 1979 and 1980. Two of the F₂ families were grown in the F₂ generation to confirm phenotypic and genotypic segregations. The data obtained were statistically analysed and the chi-square values are given in Table I. Seedcoat colour was studied after sun-drying the pods.

The seedcoat following hybridization had flesh colour as in the maternal parent, TG-17. Similarly the F₁ kernels also resembled TG-17, indicating dominance of flesh colour over light rose. However, in F₂ and F₃ generations, wide variations in seedcoat colours, viz., light rose, rose, light flesh, flesh, pink, dark pink and purple were observed. With a view to emphasizing the inheritance of purple colour, plants were classified into those carrying non-purple and purple seedcoat colours. The segregation data are presented in Table I.

In the F₂ there were 87 plants with non-purple seedcoat colour and 7 with purple colour which gave a good fit to 15 : 1 phenotypic ratio suggesting duplicate recessive genes governing the purple colour. In the F₃ there were 12 heterozygous progenies showing 789 plants with non-purple and 22 plants with purple seedcoat exhibiting again a good fit to the dihybrid ratio. In addition, 13 progenies segregated into 332 and 99 plants without and with purple colour, respectively indicating monohybrid segregation which was expected. The remaining 19 plant progenies were homozygous for non-purple colour. All the four purple progenies also bred true. The genotypic segregation in F₃ for purple colour showed an excellent fit to the expected ratio 7:1:7 (x² = 3.607, P = 0.50).

These results demonstrated that the purple seedcoat colour was governed by duplicate recessive genes and both were necessary for its expression.
The recessive expression of a dominant character is generally due to interaction of inhibitors resulting from mutation of I to i, which was therefore, responsible for the expression of P in the segregating population. Unlike the earlier reports this study demonstrated that there were duplicate P factors. Accordingly the new gene symbols for purple coat colour in groundnut would be ip₁ and ip₂. The parental genotypes were IP₁,IP₁,IP₂,IP₂ and IP₁,IP₁,IP₂ which after hybridization segregated for the recombinant having purple seed-coat.

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INFLUENCE OF VARIOUS NITROGENOUS SOURCES ON THE PRODUCTION OF VOLATILE INHIBITORS BY PENICILLIA IN VITRO

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Recently volatile metabolites of fungi have been known for their impact in various spheres of microbial ecology. One such sphere is of soil fungistasis. Many species of fungi including the Penicillia produce substantial amounts of volatile inhibitors causing fungistasis in soil. An active role of 5 selected species of Penicillium, viz., P. janthinellum, P. canescens, P. expansum, P. granulosum and P. delfaeus in the phenomenon of soil fungistasis through the production of volatile inhibitors has been recently established. Further, the present study was undertaken to investigate the effects of various nitrogen sources on the production of volatile inhibitors by these fungi. Sodium nitrate, the nitrogen source in Czapek's medium, was replaced by an equivalent amount of nitrogen in the form of ammonium nitrate, ammonium citrate, potassium nitrate and urea. Alternaria tenuis and Curvularia lunata were used as test organisms.

The effect of volatiles produced by Penicillia with different nitrogen sources on the growth of test fungi was studied using modified Eumation agar technique. The species of Penicillium were grown for 5 days at 28°C in Czapek's medium containing different nitrogen sources. The test fungi were inoculated in another set of petriplates at the centre of its previously gelled medium. Now, these two plates, i.e., the one consisting of the antagonist at the bottom and the other consisting of the freshly inoculated test fungus on its top, in an inverted position, were snugly tied and sealed rim to rim with the help of cellophane and all the sets further incubated for 5 days at 28°C. Similarly controls were run without adding any nitrogen source to the medium. The diameter of each fungus colony exposed to the volatiles produced by different species of Penicillium was recorded and the per cent inhibition of test fungi in terms of radial growth in each case was calculated in comparison to control.

A perusal of data (Table I) reveals that the addition of nitrogen in the medium enhanced the growth of Penicillia resulting in a higher yield of volatiles. Among the nitrogen sources, sodium nitrate was found to be the most suitable for the growth of Penicillia. The other sources in the order of their effectiveness were: potassium nitrate > ammonium nitrate > urea > ammonium citrate. Both the test fungi, i.e., A. tenuis and C. lunata were found to be sensitive to the volatiles produced by Penicillia. The sensitivity of C. lunata was higher than A. tenuis. Among the species of Penicillium P. expansum was found to be the best producer of volatile inhibitors and the

<table>
<thead>
<tr>
<th>Cross</th>
<th>Generation (year)</th>
<th>Number of plant progenies</th>
<th>Number of plants</th>
<th>Phenotypic ratio</th>
<th>x² value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG-17 × Chico</td>
<td>F₁ (1979)</td>
<td>2</td>
<td>44, 4</td>
<td>15 : 1</td>
<td>0.355</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>F₁ (1980)</td>
<td>2</td>
<td>43, 3</td>
<td>15 : 1</td>
<td>0.005</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>F₂ (1980)</td>
<td>19</td>
<td>623</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>389, 22</td>
<td>15 : 1</td>
<td>0.564</td>
<td>25.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>332, 99</td>
<td>3 : 1</td>
<td>0.947</td>
<td>25.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>125</td>
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