

indices (Table II). There was no reduction of bacterial nodulation at the inoculum level of 10 larvae.

TABLE II

The effect of 0, 10, 100, 1,000 larvae of *Meloidogyne javanica* on soybean bacterial nodulation

Treatment	Nodule index*	Root-knot index†
Control	3.7	0
<i>M. javanica</i> 10 larvae	3.2	1.4
" 100 "	0.3	3.0
" 1,000 "	0.2	3.4

*, † Same as in Table I.

The results indicate that *M. javanica*, *M. incognita* and *M. hapla* could cause reduction of bacterial nodulation in soybean. Previously, reduction of bacterial nodulation by *M. incognita acrita* Chitwood, 1949, on soybean, *M. javanica* on cowpea, *Trichodorus christiei* Allen, 1957, and *Criconemoides curvatum* Raski, 1952, on hairy vetch have been reported.³⁻⁵ Further, the inoculum level of *M. javanica* as low as 100 larvae caused reduction of the nodulation. The reduction of nodulation might be due to root-knot larvae interfering directly with the establishment of nitrogen-fixing bacteria as indicated by the lesser production of root hairs in the infected plants, thereby destroying the root-hair infection by *Rhizobium* spp. Reduced numbers of nodules might also be due to overall reduction of root system, as indicated by Taha and Raski,⁶ on white clover by *M. javanica* and *Heterodera trifolii* Goffart, 1932. It is also possible that nematodes render the infected plant roots physiologically incompatible to the bacteria. This area requires further research.

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OBSERVATIONS ON THE GLYCO-ALKALOID CONTENT OF DIPLOID AND TETRAPLOID *SOLANUM* *KHASIANUM* CLARKE

Solanum khasianum has attracted the attention of modern pharmacologists because of its high solasodine content.

Solasodine is a nitrogen analogue of diosgenin which is a precursor for various steroid hormones and hence can replace the latter, resources of which are limited.

Saini *et al.*¹ studied the growth of *S. khasianum* under cultivation and found that its glyco-alkaloid content varied from 1.9% to 7.6% of dry weight, depending on the maturity of fruits, pale yellow fruits having the maximum amount.

Tetraploidy was successfully induced in *S. khasianum* by colchicine (E. K. Janaki Ammal and B. Bhatt—in press): The glyco-alkaloid content of six diploids and four tetraploids as percentages of dry weight is shown in Table I. The moisture content of the fruits at the time of analysis was about 78%.

TABLE I

Estimation of glyco-alkaloid in diploid and tetraploid *S. khasianum*

Plant No.	Av. weight of fruits gm.	Glyco-alkaloid % of dry weight
Diploids		
IX 3	4.3	4.3
IX 7	4.5	4.8
IX 2	5.0	4.2
IX 5	7.0	3.3
IX-4	8.7	2.8
Tetraploids		
V-3	2.8	7.4
V 6	3.2	2.6
XII 6	3.2	1.4
11-6	3.6	7.6

The glyco-alkaloid content of the control diploids ranged from 2.8% to 4.8% showing that variability existed in the controls. This variability was also noticed in the tetraploids. An interesting feature brought out from these studies is that the larger fruits in the control had less glyco-alkaloid than the small ones. However, two out of four tetraploids analysed showed 7.4% and 7.6% glyco-alkaloid content which is higher than the maximum 4.8% found in the diploids. The difference in size of the diploid (upper) and tetraploid (lower) is shown in Fig. 1.

Saini^{2,3} is of the opinion that the glyco-alkaloid of *S. khasianum* is concentrated in a

mucilage layer around the seeds, and hence directly correlated with the number of seeds in each fruit. Thus poor seed-setting would be expected to result in proportionately reduced

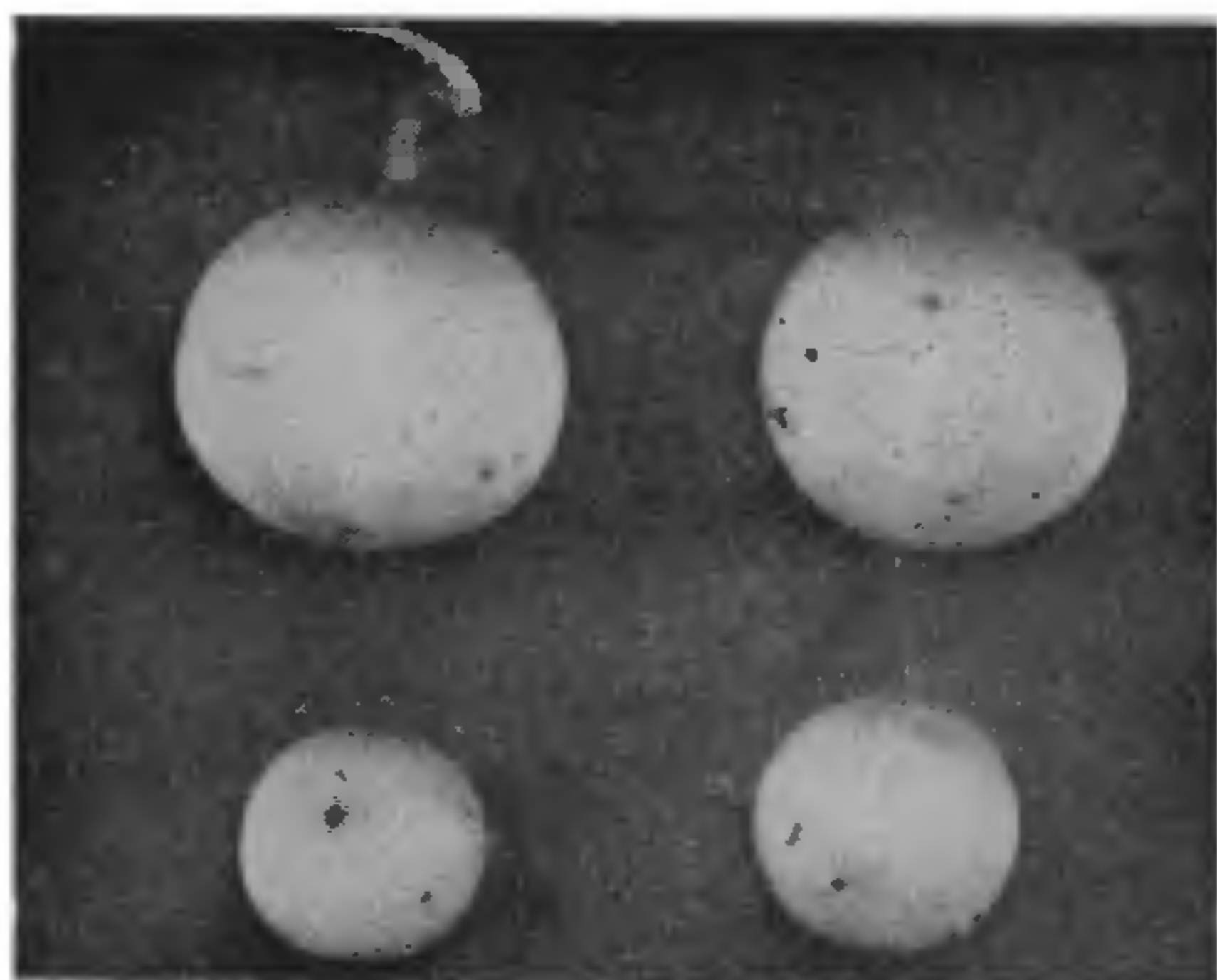


FIG 1. Difference in size of the fruit. Top: Diploid; Bottom: Tetraploid.

alkaloid content. Our experience is exactly the opposite. Although diploid fruits had 200-300 seeds, their glyco-alkaloid content was found to be less than that in some tetraploids which contained only 2-5 seeds.

These preliminary findings indicate that sterility and smaller fruits which are considered a disadvantage in induced tetraploidy might prove to be of advantage in the case of *Solanum khasianum*,

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REVIEWS AND NOTICES OF BOOKS

An Introduction to Metabolic Pathways. By S. Dagley and Donald E. Nicholson. (Blackwell Scientific Publications, 5, Alfred Street, Oxford, OX 1, 4 HB, England), 1970. Pp. 343. Size 20 cm. × 29 cm. Price 75 sh.

Dr. Nicholson's Metabolic Pathways Chart is well known and is extensively used in biological laboratories throughout the world. To meet the growing demand for the charts and for information on concerned literature, the authors have decided to present in book form separate charts of pathways in which enzymes are named and references are cited.

The first two sections of the book are concerned with the ideas and methods involved in the determination of metabolic pathways, and the ways in which they are controlled—ultimately on the genetic level. Then, in about 150 pages of charts are given some of the more important pathways of metabolism. These pathways are arranged in vertical sequence with relevant enzymes, co-factors and references inserted between each reaction. A great amount of thought has been given to the presentation and design of the pathways cited in the book. References are given in about 70 pages at the end. An author index and a sub-

ject index of great utility to the users are also included.

The publication will find ready welcome by researchers and students working in this growing field of biological science. A. S. G.

An Introduction to Ion Exchange. By Russell Paterson. (Published by Heyden & Son Ltd., Spectrum House, Alderton Crescent, London NW 4), Pp. 109. Price £ 2.10.0; \$ 6.00; DM 22.50.

The development of synthetic ion exchange resins some three decades ago laid the foundations for a new industry and a new unit operation which have grown remarkably since then. New and improved ion exchangers continue to be developed. This rapid growth in both theory and applications necessitates an up-to-date introductory text for those familiar with basic principles of physical chemistry and who wish to know something in this field. This book fulfils this purpose. It provides a comprehensive and sound introduction to all aspects of the ion exchange process, including a description of all currently available types of ion exchange materials. A. S. G.