sucrose and auxin. The role of carbohydrates in the process of root formation in cuttings has been discussed by Kraus and Kraybil[6]. These show that carbohydrates are important for root growth and hence the study of amylase activity was chosen as a parameter. Riboflavin and niacin simulate gibberellic acid in increasing amylase activity. The results also indicate that amylase of the root is more susceptible to heat than that of the shoot since the vitamins could not reverse the inhibition in the root during later stages of seedling growth, *i.e.*, 10th and 12th days. This can be corroborated by the fact that some enzymes (like catalase) differ in their concentration in different parts. Catalase of the spores of *Bacillus terminalis* was heat resistant and that of the vegetative cells was heat susceptible as shown by Lawrence and Halvorson[7]. Earlier work on this subject was done with crude extracts only possessing catalytic activity according to Pringsheim[8].

Use of ^{14}C isotope for the transport of sugars and sucrose–auxin balance as influenced by vitamins is being investigated.

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1. Langridge, J., *Ann. Rev. Plant Physiol.*, 1963, **14**, 441.
2. Levitt, J., *Soc. Exp. Biol. Symp.*, 1969, **23**, 395.
3. Bernfield, P., *Methods in Enzymology*, Eds. Colowick, S. P. and Kaplan, N. O., Academic Press, New York, 1955, **1**.
4. Bhattacharya, N. C., Usha Parmer, Malik, C. P. and Bhattacharya, S., *Zeitshrift. Pflanzen Physiol.*, 1977, **85**, 377.
5. Nanda, K. K. and Jain, M. K., *Jour. Exp. Bot.*, 1972, **23**, 980.
6. Kraus, E. J. and Kraybil, H. R., *Oregon. Agric. Coll. Expt. Sta. Bull.*, 1918, p. 149.
7. Lawrence, N. L. and Halvorson, H., *J. Bacteriol.*, 1954, **68**, 334.
8. Pringsheim, H., *Z. Physiol. Chem.*, 1912, **78**, 266.

PHYLLODY DISEASE OF SOME CUCURBITACEOUS CROPS IN INDIA

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During surveys of different cucurbit growing areas of Bangalore district, some plants of bottle gourd (*Lagenaria siceraria* (Molina) Standl.), ridge gourd

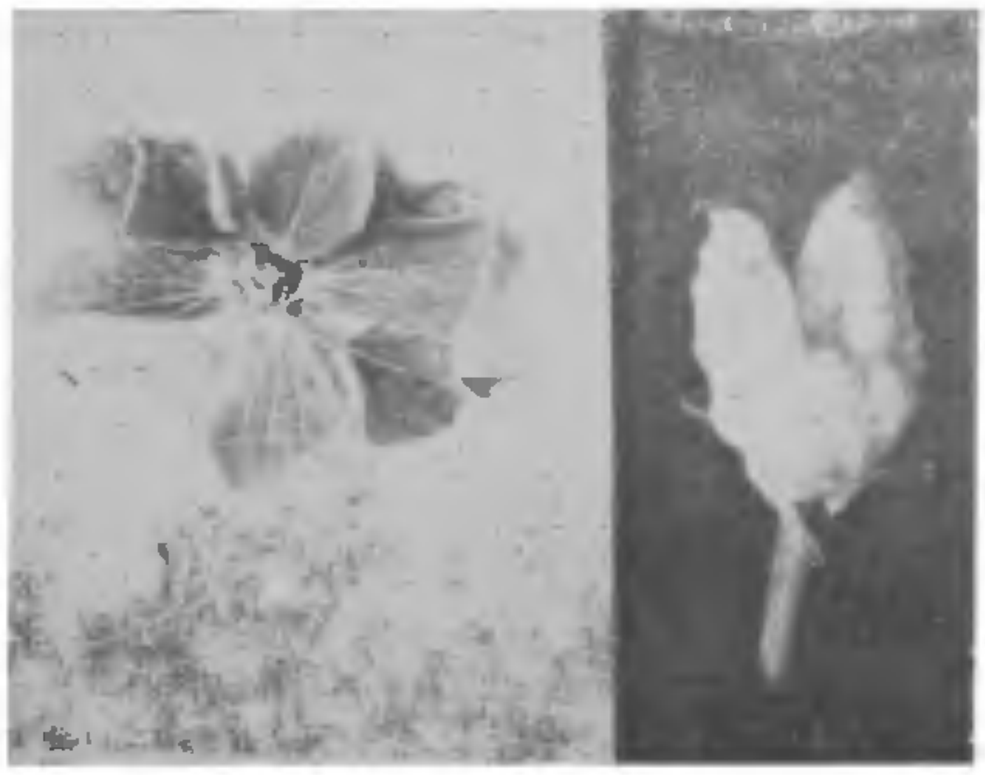

Fig. 1. Phyllody disease on bottle gourd.
Right:—healthy flower, *Left*:—infected flower.

[*Luffa acutangula* (L.) Roxb.], cucumber (*Cucumis sativus* L.), snake gourd (*Trichosanthes anguina* L.) and bitter gourd (*Momordica charantia* L.) were exhibiting typical phyllody symptoms and about 4 to 7% of the plants were affected. The infected plants had short internodes with reduced chlorotic leaves. The floral parts like corolla, androecium and gynoecium were transformed into green leaf-like structures (Fig. 1). Further, some infected flowers bore clusters of phylloid flowers from their centre and the infected plants were evident by their pale green colour. The results of experiments conducted to identify the causal agent involved are reported here.

The cultures of phyllody disease of the five cucurbitaceous hosts were maintained on their respective hosts in the insect proof house. The transmission was achieved by sidewedge grafting to healthy plants of bottle gourd, ridge gourd, snake gourd, bitter gourd and cucumber. The phyllody symptoms were produced on the grafted plants within 25 to 40 days. Cross inoculations made on all the five host plants produced typical symptoms indicating that the phyllody disease on these cucurbitaceous hosts was produced by the same agent. Experiments on antibiotic treatment were conducted by treating four plants each of diseased cucumber and bottle gourd plants with oxy-tetracycline hydrochloride at 500 ppm as three foliar sprays at one week interval. Ten days after the last spray, spontaneous remission of symptoms were noticed on both the host plants. There was no reaction of penicillin at 500-750 ppm, when given as four foliar sprays at one week interval.

Melothria maderaspatana (L.) Cogn., which occurs as a climber on the hedge plants, was found affected with phyllody disease. Graft transmission tests on all the five cucurbitaceous hosts indicated that this weed host harbours the same disease agent as the other

economically important cucurbitaceous crops and the pathogen over winters on this perennial weed host.

In our studies, based on the symptoms and sensitivity to oxy-tetracycline hydrochloride, the phyllody on the five cucurbitaceous hosts may be assigned tentatively as due to mycoplasma-like organisms. From Tamil Nadu, Narayanaswamy *et al.*,[1] Nagarajan[2], Rajasekhara Mudaliar and Girija Lakshman[3] reported mere occurrence of phyllody disease only on *M. charantia*, *T. anguina* and *L. acutangula*. In the present studies in addition to this three hosts reported from Tamil Nadu, three more hosts like *C. melo*, *L. vulgaris* and *M. maderaspatana* are reported as hosts of phyllody disease. Earlier, Chou *et al.*[4] from Taiwan reported graft transmissible disease on bottle gourd, chayote, balsam-pear and ridge gourd, which were exhibiting witche's-broom symptoms, and produced many flowers, which blossomed earlier than the healthy plants and is different from the present report.

A perusal of the bibliography of plant virus and mycoplasmal diseases in India[5] revealed that there is no record of this disease on *C. sativus*, *L. vulgaris* and *M. maderaspatana*. The occurrence and relationship with the phyllody diseases on other cucurbitaceous hosts is reported in this communication.

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1. Nagayanasamy, P., Ramaiah, M and Kandaswamy, K., *Sci. and Cult.*, 1979, **45**, 123.
2. Nagarajan, M., *Madras Agric. J.*, 1961, **48**, 225.
3. Rajasekhara Mudaliar and Girija Lakshman, *Ibid.*, 1953, **40**, 382.
4. Chou, T. G., Yang, S. J. and Huang, P. Y., *Plant Dis. Reptr.*, 1976, **60**, 378.
5. Sastry, K. S., *Plant Virus and Mycoplasmal Diseases in India : A Bibliography*, Bharati Publications, Delhi, 1980, p. 292.

CHEMICAL ANALYSIS OF *URGINEA INDICA* (ROXB.) KUNTH. CYTOTYPES

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Introduction

Chemical analysis of intra-specific variations based on botanical characterization is an essential prerequisite for the breeding programme of the species. *Urginea indica* is an important medicinal plant in modern therapeutic medicine. As it is highly heteromorphic, its natural population exhibits a variety of phenotypes and cytotypes[11,12]. Cytotypes of *U. indica* under the present investigation include diploids and naturally occurring polyploids. So far no systematic chemical analysis of *U. indica* cytotypes has been carried out in order to ascertain any possible differences related to polyploidization itself.

Materials and Methods

Seven different morphologically unique cytotypes of *U. indica* were collected from Guhagar, Ratnagiri, Vengurla, Karwar, Ravanfond (Goa), Vengurla and Aurangabad, respectively. These cytotypes were studied karyomorphologically and the Nos. 1–4 (from Guhagar, Ratnagiri, Vengurla, and Karwar, respectively) were reported as diploid ($2n = 20$); Nos. 5–6 (from Ravanfond and Vengurla, respectively) as triploids ($3n = 30$), and No. 7 (from Aurangabad) was a tetraploid ($4n = 40$).

Uniformly matured bulbs of these cytotypes were washed and used for different estimations.

Carbohydrates (sugars) were estimated by the usual titration method of Sommogyi Nelson[9]. The mucilage and sizing-gum contents were determined by the methods given by Beri and Pharasi[1] and Seth[13], respectively. The proteins were estimated by the method given by Hawk *et al.*[4].

For the estimation of total glycosides the membranous outer scales were removed, the fleshy inner scales were sliced and used for extraction with ethyl acetate[15] and the solvent evaporated. The residue was dissolved in methanol and used for the spectrophotometric estimation of total glycosides[5].

Results and Discussion

Triploid (Nos. 5 and 6; from Ravanfond and Vengurla) and tetraploid (No. 7, from Aurangabad) cytotypes of *U. indica* are naturally occurring polyploids.

According to Stebbins[14] nearly all natural polyploids (perhaps all) are intermediates to the categories of strict alloploids and strict autoploids.

On biochemical examination of 7 cytotypes of *U. indica* it is quite evident that there exists a large variation in chemical contents in diploids and polyploids.

Cytotype No. 5 (triploid from Ravanfond) had a maximum concentration of one of the most important active principle, namely total glycosides (0·96%) besides proteins (5·98%) and sizing-gum (12·38%). Cytotype No. 6 (triploid from Vengurla) ranked second as far as the amounts of proteins (2·63%) and sizing-gum (11·75%) are concerned (Table 1).