rice. However, seedling height is a better criterion than leaf sheath, because of convenience of its measurement and relatively lower C.V. values. Currently, the above method is being used to screen reduced height mutants induced in *White Luchai*-112 at our laboratory and also at a number of other sources of *dwarfism*.

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BIOCHEMICAL CHANGES IN MUSAMBI FRUITS INOCULATED WITH SPECIES OF AFLATOXIN PRODUCING ASPERGILLI

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ASPERGILLUS flavus group of fungi cause deterioration in the nutritive quality of the food materials by producing aflatoxins and by changing some of the chemical constituents of the associated food materials[1,2]. In this investigation some biochemical changes have been reported in musambi (sweet orange) fruits during aflatoxin production by *A. flavus* Link ex Fries and *A. parasiticus* Speare.

Fruits of musambi (*Citrus sinensis* L. Osbeck) were surface-sterilized and inoculated separately with two known aflatoxin producers *i.e.*, *A. flavus* (BG-19) and *A. parasiticus* (NRRL-3240). Each set was done in triplicate and these were subsequently incubated for 7 days at a fixed R. H. of 96%. Total sugars and reducing sugars of the fruit tissues were estimated by standard methods[3,4]. The amount of non-reducing sugars was calculated by substracting the value of reducing sugars from total sugars. Total phenols, ascorbic acid and protein contents were recorded by usual methods[5,7].

It is evident from table-1 that *A. flavus* and *A. parasiticus* cause considerable changes in the sugar, protein, ascorbic acid and phenol contents of the fruits during infestation. Maximum depletion in sugar content was revealed by *A. parasiticus* whereas maximum

TABLE 1

Biochemical changes in musambi fruits due to infestation with A. flavus and A. parasiticus

Biochemical changes	% amount					
	Control fruits		Infested fruits		't' test value	
	0 Day	7 Days	*A. flavus*	*A. parasiticus*	*A. flavus*	*A. parasiticus*
Total sugars	6.13 ± 0.05	5.89 ± 0.08	2.85 ± 0.07	1.66 ±0.03	48.06[a]	84.04[a]
Reducing sugars	2.87 ± 0.02	2.65 ± 0.04	1.77 ± 0.04	1.38 ±0.02	24.89[a]	45.37[a]
Non-reducing sugars	3.26 ± 0.06	3.24 ± 0.04	1.08 ± 0.04	0.28 ±0.04	57.73[a]	79.11[a]
Ascorbic acid	0.132 ± 0.003	0.099 ± 0.005	0.090 ± 0.003	0.095 ± 0.003	2.44	1.33
Proteins	0.615 ± 0.004	0.580 ± 0.003	0.532 ± 0.003	0.544 ±0.003	16.37[a]	17.36[a]
Total phenols	0.193 ± 0.003	0.208 ± 0.003	0.231 ± 0.004	0.240 ±0.003	6.84[b]	9.78[b]

[a] $P < 0.01$; [b] $P < 0.05$.

loss in ascorbic acid and protein contents was exhibited by *A. flavus* in musambi fruits. However, the sole increase was observed in the phenol contents by both the fungal species, the maximum being by *A. flavus*. When analysed statistically the changes in musambi fruits by these fungi were found highly significant except in the case of ascorbic acid.

A. flavus (BG-19) and *A. parasiticus* (NRRL-3240) produced 0.686 and 0.879 ppm of aflatoxin B_1 on this fruit after 7 days of incubation[8]. It is clear from the above results that these two fungi cause considerable changes in the nutritive quality of the musambi fruits besides producing aflatoxins during their metabolism.

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GYNOECIAL ONTOGENY IN *CANSCORA SESSILIFLORA* ROEM

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The gynoecium of *Canscora sessiliflora* (Gentianaceae) is bicarpellary, syncarpous ovary with parietal placentation. Interestingly, the early ontogeny of the carpels shows apocarpous mode of origin. The two carpels, however, fuse by their margins and form syncarpous gynoecium only at a later stage of development, the sequence of which are given here.

Initially the two carpel primordia of a flower arise both independently and simultaneously on the terminal part of the floral axis. To begin with, each carpel primordium is knob shaped and is composed of undifferentiated ground tissue enclosed by a layer of protoderm. The two carpel primordia which are closely juxtaposed grow synchronously (figure B). With little more growth each primordium becomes flattened on the adaxial face and rounded abaxially (figures B, C). A group of submarginal initials begin to appear strongly on either corner as seen in the cross section (figures B, C). These submarginal initials which stain densely than the other vacuolated ground tissues are covered by a layer of marginal initials (protoderm initials). The marginal initials mostly divide anticlinally while the submarginal initials divide in periclinal planes. The derivatives of the marginal initials grow out to form placental lobes and also there is rapid cell division in the submarginal initials leading to the formation of a mass of cells which later on branch. Each branch ultimately bears many ovule primordia (figures D, E). Even before this development, the abaxial side registers a faster rate of growth resulting in the involute curvature of the laminal primordium. Hence, the placental meristematic activity is initiated only after the incurving of the carpel margins has been completed.

The further growth of the placental region makes it broader and its surface is now thrown into folds (figure D). Many ovule primordia now appear on this marginal placental tissues. At this stage the two carpels get tightly juxtaposed and come in contact with each other by their abaxial side of the incurving margins. The fusion of the two juxtaposed margins takes place first and later on it is followed by the fusion of two adjacent placentae to form composite placentae. Since the two opposing composite placentae do not fuse at any point, the gynoecium remains unilocular with parietal placentation (figure E).

The origin of syncarpous gynoecium in *C. sessiliflora* by the fusion of two carpels is similar to the development of carpels in *Enicostemma*[1]. Generally in angiosperms, the margins of the carpel wall may curve inwardly to occlude ovules either *in* conduplicate fashion[2] or in involute manner[3]. In *C. sessiliflora*, the post genital fusion of two independent carpels by rapid abaxial over growth leading to the incurving of the margins and the involvement of marginal meristem in the development of the placentae in the individual carpel adduce further support to the classical concept[3].

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