TABLE 3
Segregation of mutants in F_2 generation

Cross	F_1 plants		F_2 plants		X^2 (3:1)	P value
	No.	Phenotype	Normal	Mutant		
Orange long fruit × control51	51	Control	89	29	0·11	0·90–0·95
Dwarf × control	62	Control	85	25	0·30	0·50–0·70

type similar to control except bearing small pointed, pendent and thin-skinned fruits.

3. *Orange-long fruit* – obtained in 20 Kr treatment. Fruits normal except for orange colour, In the beginning the colour of unripened fruits was green which changed to pale yellow and finally orange on complete ripening. The mutated character was found to be controlled by a single recessive gene (table 3).

4. *Orange-round fruit*-isolated in 15 K_r treatment. The mutant was characterized with small, globular, orange coloured fruits at maturity. Fruits thick-skinned and possessed small, thick, straight to curved peduncles. Stamen pale yellow and bright yellow in bud and at anthesis respectively. Style straight to curved and projected over stamens.

5. *Purple fruit* – isolated in EMS (0·6%) treatment. Details on its morphology, cytogenetics and taxonomic significance have already been worked out[2].

During the present investigation on the effects of various mutagens employed individually as well as in combination, a limited number of viable mutations were scored out in chilli. In M_1 generation, four types of mutations concerning plant habit and fruit shape were recorded following gamma-ray, MES, EMS and HA treatments. DMS and HZ, however, did not induce any mutation. Among chemical mutagens, HA alone appeared promising. Gamma rays, as evident from observations, were found to be effective when used alone. But in combination with DMS, it did not yield any mutation. In tomato, current tomato and tomatillo, the combination of gamma-rays and DMS produced fewer mutations than either gamma-rays or DMS produced individually[4]. Irradiation with x-rays followed by treatment with EMS, however, gave an increased frequency in barley over individual treatments while the combination treatment in reverse order yielded reduced mutation frequency[5]. Whereas the combined treatment of gamma-rays and DES or MES induced intermediate mutation frequency in tomato[6]. The available data, hence, reveals that the effects of mutagenic treatments in which two different mutagens are combined, are variable and that the sequence in which they are combined also causes variations in their effects.

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A NEW SPECIES OF *MASSARINA* SACC.

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DURING a general survey of Ascomycetes from Jodhpur, Rajasthan, the authors collected dead twigs of *Azadirachta indica* A. Juss. bearing black fruiting bodies. On microscopic examination it was found to be a species of *Massarina*. The ascospores of the present species were not surrounded by mucous sheath which is often present in the species of *Massarina*. Earlier, five species of *Massarina* were reported[1], in which the ascospores are without mucous sheath. The present species differs from all these in morphological characters.

Massarina azadirachticola sp. nov.

Perithecia separata, hemispherica, partim immersa, ostiolata, brunnea, 135-165 μ diameter, paries 18·9 - 27·0 μ crassitudine, cellulis crasse tunicati, atro-fuscis, 2.7-5.4 μdiam; asci numerosi, octospori, paraphysati, bitunicati, apice crassetunicati, hyalinae, cylindricei vel claviformis 54-68 × 11-19 μ; ascosporae biseriatae, hyalinae, rectatae, ellipticae, apice rotundatae, 3-septate, septis nonconstrictae, 16·2-18·9 × 5·4-6·75 μ. Ad ramuculos emortuos *Azadirachta indica* A. Juss. collecta ex Jodhpur, March, 1979.

Perithecia numerous, hemispherical, partly embedded, ostiolate, dark brown 135-165 μ in diameter, perithecial wall 18.9-27.0 μ in thickness and composed of small thick walled brown polyhedral cells, measuring, 2·7-5·4 μ in diam. (figure 1a);

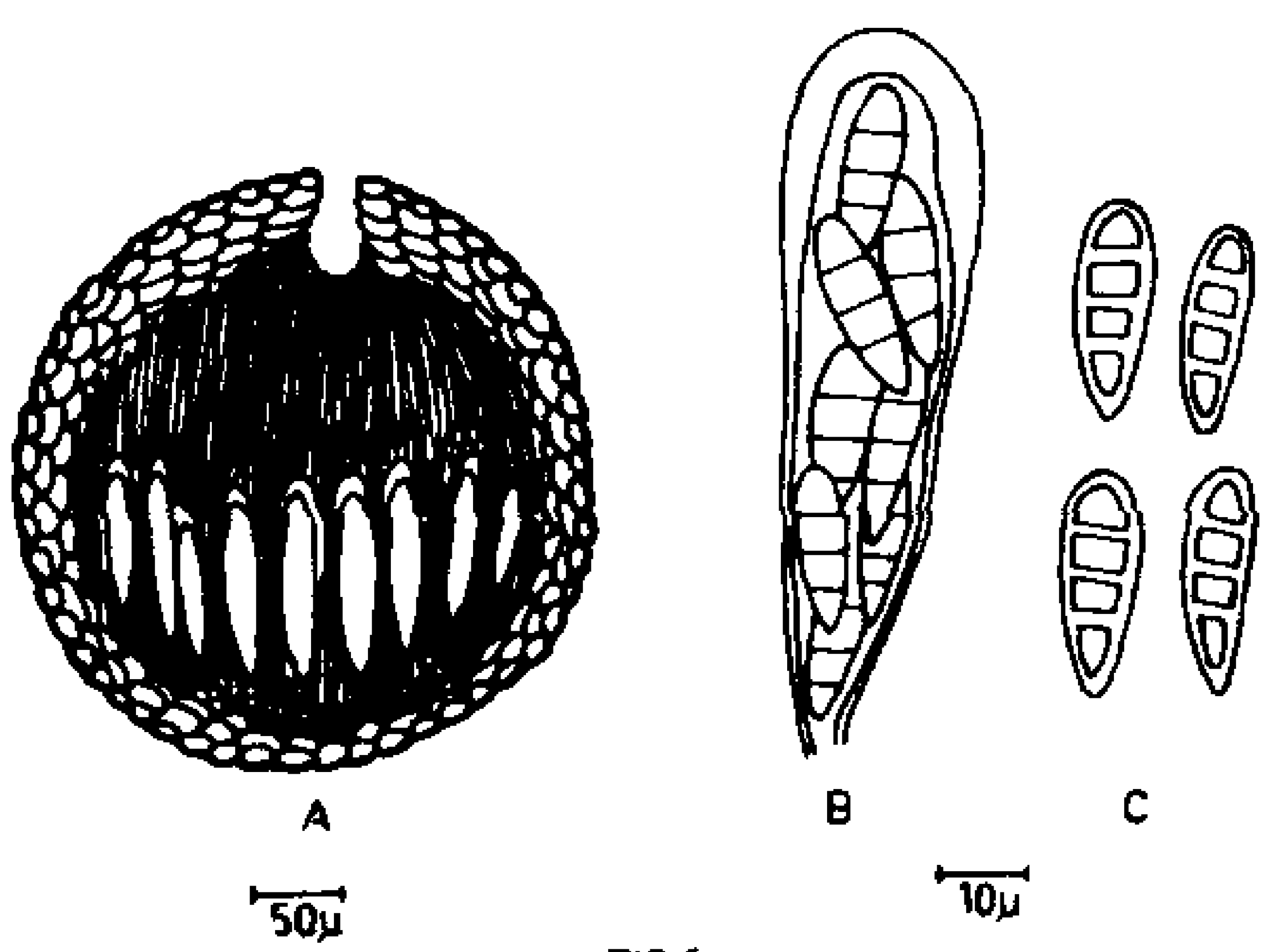

FIG.1

asci numerous, 8-spored, paraphysate, bitunicate, thickened at the apex, hyaline, cylindrical to clavate, 54-68 × 11-19 μ (figure 1b); ascospores biseriate, hyaline, straight, elliptical, rounded at the apex, 3-septate, non constricted at the septa, 16·2-18·9 × 5·4-6·75 μ in size and devoid of mucous sheath (figure 1c).

On dried twigs of *Azadirachta indica* A. Juss. collected from Jodhpur, March, 1979.

Specimen deposited with C. M. I., Kew, Herb, IMI 236247 type coll. J. U. M. L. 732.

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INDUCTION OF NEGATIVELY GEOTROPIC ROOTS IN CULTURES OF *TAGETES PATULA* L.

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IN *vitro* morphogenesis has been studied in several members of the Compositae[1-5]. In the present study negatively geotropic roots were observed to develop in cultures of hypocotyl and cotyledon explants of *Tagetes patula*, an ornamental plant.

Seeds of *T. patula* were collected from the Botanical garden of the University of Rajasthan, Jaipur and germinated aseptically in culture tubes. Cotyledon and hypocotyl explants were excised from 8-day old seedlings while stem and leaf explants were taken from young plants.

When cotyledon and hypocotyl explants were grown on Murashige and Skoog (MS) medium[6] containing indole butyric acid (IBA, 5·0 mg/ l) or naphthalene acetic acid (NAA, 0·5-2·0 mg/ l) normally oriented roots were produced. Rooting was observed from various explant types on media supplemented with different combinations of an auxin with a cytokinin. Negatively geotropic green roots were formed in large numbers from cotyledon and hypocotyl explants on a medium with 0·5-4·0 mg/l each of kinetin and IBA (figure 1 A). The negatively geotropic roots thus induced were upright, green, short and stout and showed profuse branching which resulted in anastomosis. A microscopic examination of roots showed different types of hair—normal, single celled and unbranched, single celled with knobed apices, 2-3 celled and 2-3 celled and branched. The roots frequently showed a pseudo-dichotomous branching. Upon subculture on the same medium they continued to produce the same type of negatively geotropic roots up to the third passage (figure 1C). However, in subsequent passages the number of negatively geotropic roots declined and instead positively geotropic white roots were produced.

To the best of our knowledge there are no reports of *in vitro* differentiation of such negatively geotropic roots in large numbers from hypocotyl explants. However, there are examples in which they are induced in intact plants or seedlings by various treatments particularly by morphactins[7, 8]. In nature such roots are produced in mangrove plants and in plants like *Cycas*.

Shoot buds differentiated in stem, leaf and cotyledon explants on MS medium with 5·0 mg/l each of BAP and an auxin (IAA or IBA).