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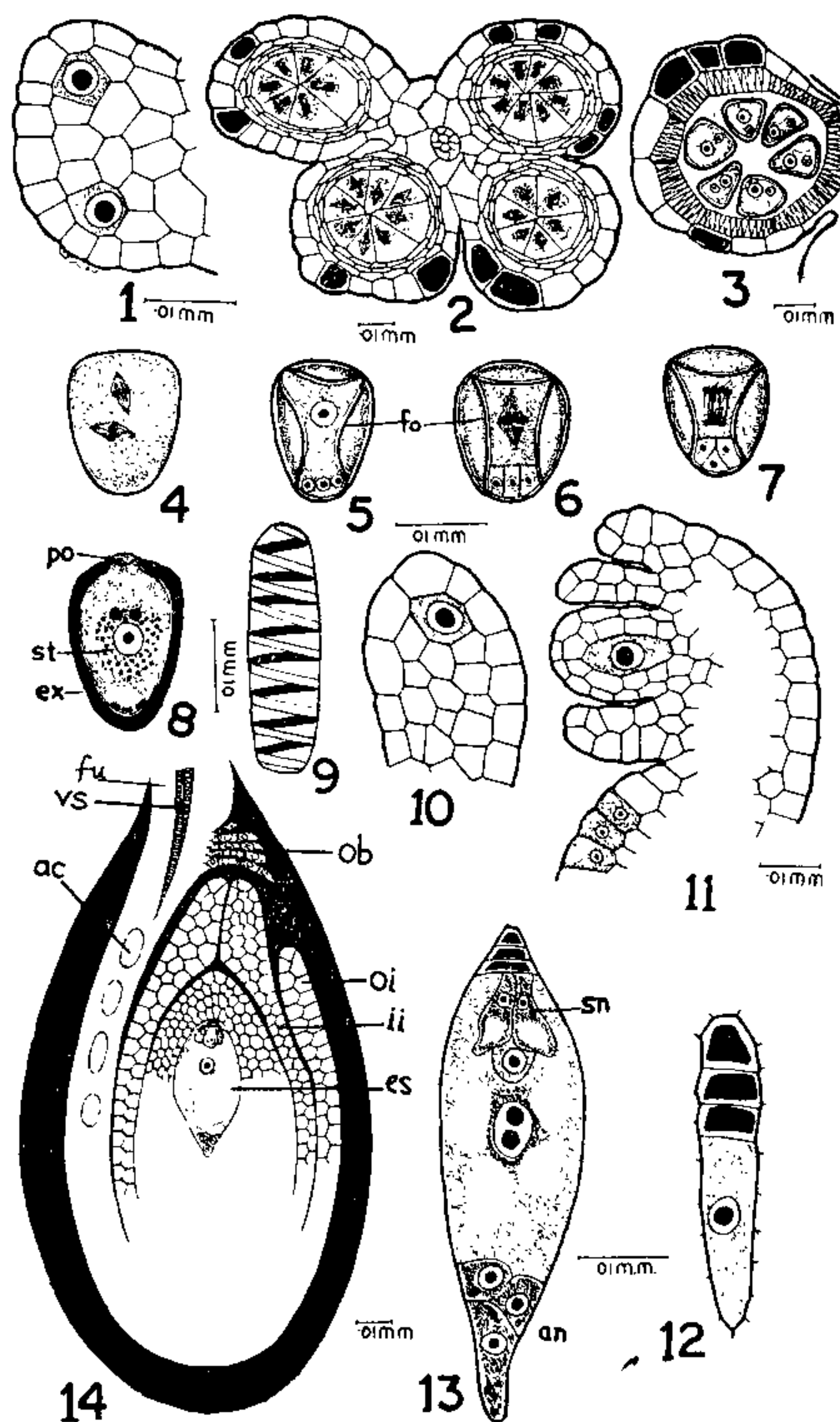
GAMETOPHYTES OF *CYPERUS ALTERNIFOLIUS* LINN.

Cyperus alternifolius Linn., the common umbrella plant, is the only ornamental sedge commonly grown in the garden and is found in the warmer regions of the world (Lawrence, 1963). The present note relates to the male and female gametophytes of this taxon.

The anthers are tetrasporangiate. The male archesporium is hypodermal and unicellular (Fig. 1). However, multicellular archesporium for the family is reported by Padhye (1960, 1967, 1968) and Shah (1962). A four-layered anther wall developing according to monocotyledonous type of Davis (1963) is formed (Fig. 2). At anthesis anther wall shows epidermis with some tannin-filled cells and hypodermal endothecium with constituent cells possessing distinct lignified spiral thickenings (Figs. 3, 9). The middle layer is ephemeral. The secretory tapetum is uninucleate. Meiotic divisions (Figs. 2, 4) are not synchronous in sporogenous cells in four lobes of anther. The 'pseudomonad' at close of meiosis shows 1 + 3 arrangement of nuclei and folds appear on the wall of the young microspore (Fig. 5). Septum formation is observed between functional and non-functional nuclei as also between the latter (Figs. 6, 7). Mature pollen grains are monoaperturate, 3-celled and show starch grains. The remains of effete nuclei persist in them (Fig. 8) unlike in other members of the family where they are absorbed by this stage.

The single ovule arising from the base of ovary is anatropous, bitegmie and crassinucellate. The micropyle is organised by the inner integument. The outer integument on the funicular side is absent (Fig. 14). The funicular region shows presence of air chambers a short distance from the vascular strand (Fig. 14).

This character not recorded so far in any member of the family seems to be an adaptation to aquatic habitat. It is further interesting to note that the vascular strand fades away immediately after entering the funiculus unlike in others where it goes right upto the chalazal end of ovule terminating below the hypostase.



FIGS. 1-14. Figs. 1-3. T.S. anther showing wall formation. Figs. 4-7. Stages in development of pollen-grain. Fig. 8. Mature pollen-grain. Fig. 9. Single endothelial cell showing spiral thickening. Fig. 10. Female archesporium. Fig. 11. Megaspore mother cell. Fig. 12. Megaspore tetrad. Fig. 13. Embryo-sac. Fig. 14. L.S. ovule showing embryo-sac, obturator and air chambers. (ac, air chambers; an, antipodals; es, embryo-sac; er, exine; fo, folds; ii, inner integument; ob, obturator; oi, outer integument; po, pore; st, starch; sn, synergids; vs, vascular strand; fu, funiculus.)

The female archesporium is a single hypodermal cell (Fig. 10). It divides periclinally. A parietal tissue of 3 layers is developed (Fig. 14) as in *Eleocharis geniculata* (Padhye, 1968). In *Fimbristylis quinquangularis*

(Dnyansagar and Tiwari, 1956) and *Scirpus mucronatus* (Padhye, 1967) it is massive and consists of six to eight layers. Meiotic divisions in megaspore mother cell (Fig. 11) result in a linear tetrad of megaspore (Fig. 12). The functional chalazal megaspore develops into the Polygonum type of megagametophyte (Fig. 13). At the base of funiculus, a group of superficial cells divide and redivide to form a bundle of elongated, flexuous cells that loosely cover the micropylar region. This constitutes funicular obturator (Fig. 14). It is reported earlier in the family by Padhye (1960, 1968).

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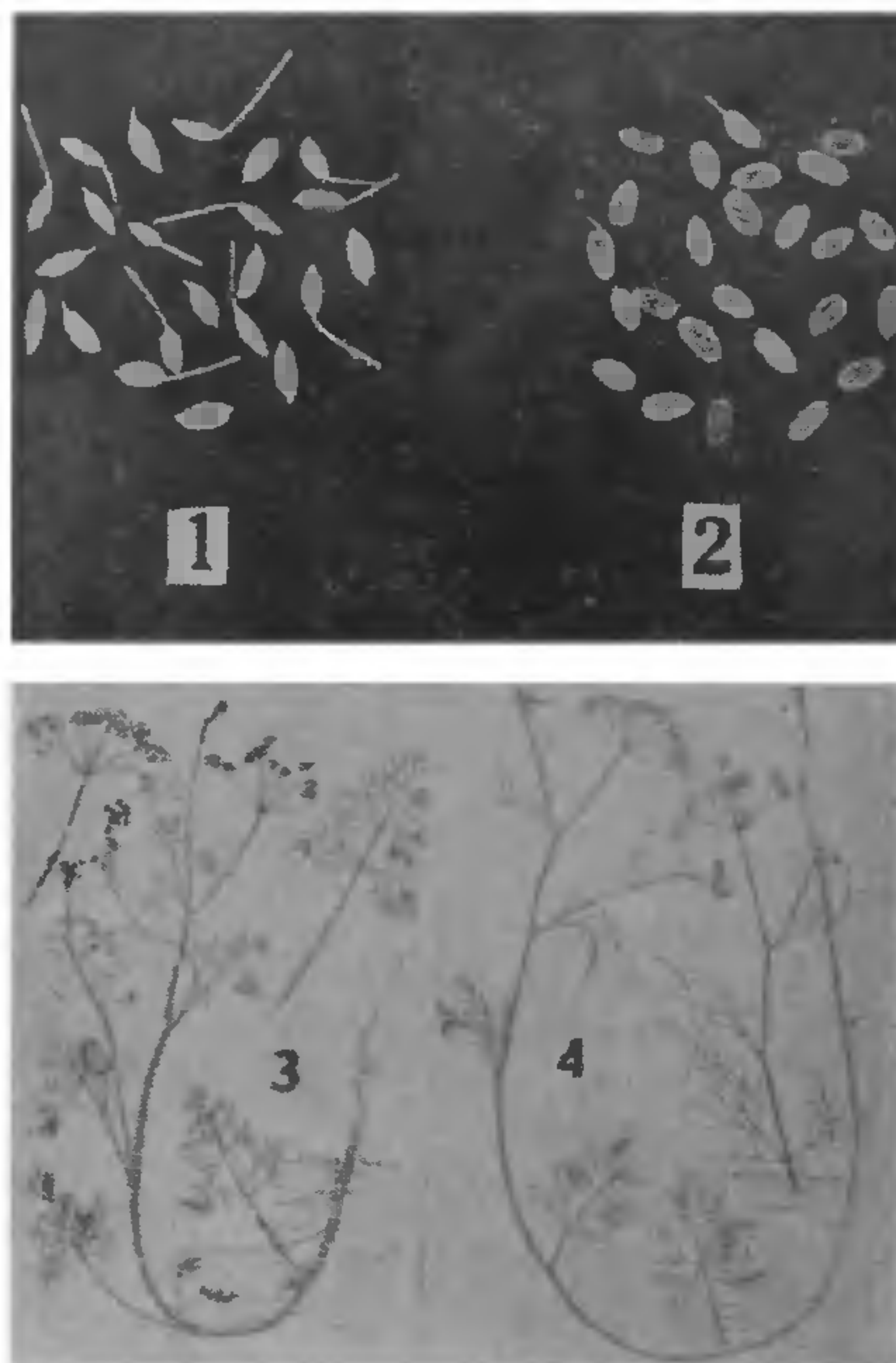
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INTRASPECIFIC VARIABILITY IN INDIAN DILL

In the local market of Gujarat we came across two varieties of Indian dill, the fruits of *Aneethum sowa*. These varieties not only differ in their morphological characters but also show distinct differences in their oil composition. One of these varieties, consisting of cremocarps, is considered to be superior and is known as Variyali sowa (Fennel sowa) (Fig. 1). The other cheaper variety occurs as separate mericarps and is known as Ghoda sowa (Horse sowa) (Fig. 2). Ghoda sowa is used as animal food and in veterinary practice while the superior variety of Fennel sowa is used as a spice and as an ingredient of aromatic carminative preparations. The volatile oil¹ of cremocarp variety contains 21% carvone and 43% dihydrocarvone, while the mericarp variety contains 34% carvone and 15% dihydrocarvone. The percentage of dillapiole in both the varieties is 12-15%. On the basis of these findings of

oil composition, these two varieties of Indian dill are considered as dillapiole mitis race with two subraces, one carvone subrace and the other dihydrocarvone subrace. Since these two varieties of sowa dill differ both in morphological characters and in oil composition, it was considered of interest to study the intraspecific variations in the plants of the two varieties.



FIGS. 1-4. Fig. 1. Fruits of cremocarp variety (Variyali sowa). Fig. 2. Fruits of mericarp variety (Ghoda sowa). Fig. 3. Pressed plant specimen of Variyali sowa. Fig. 4. Pressed plant specimen of Ghoda sowa.

The plants of both the varieties were cultivated in the pharmacognosy garden and the variations at different stages of development were observed. Variyali sowa plant looked tender and grew less vigorously than the plant of Ghoda sowa. The different characters shown by the plants of both the varieties (Figs. 3 and 4) are given in Table I.

The differences in Table I in the two varieties of Indian dill suggest that besides the chemical subraces, there exists intraspecific variability too in Indian dill.