

Occurrence of Extra-Ovarian Ovules in Sunflower Plants (*Helianthus annuus* L.) Treated with Chlorflurenol

Morphactins (derivatives of fluorene-9-carboxylic acid) have been reported to increase or decrease the number of flowers¹, favour femaleness²⁻⁴, and cause suppression or fusion of flowers or of floral parts^{2, 5, 6}. In this laboratory, the effects of chlorflurenol (2-chloro-9-hydroxy fluorene-(9)-methylate, EMD 7301 W) are being studied on the development of the inflorescence in some members of the Compositae. One of the interesting observations made with sunflower is reported here.

Plants of *Helianthus annuus* L. var. Armavirsakij, have a terminal inflorescence bearing a whorl of sterile ray florets and 800-2,000 bisexual disc florets which form fruits. The inferior ovary has a basally attached ovule (Figure 1).

A foliar spray of aqueous chlorflurenol solution was given to 6-week-old plants at the following concentrations: 3×10^{-3} M, 10^{-3} M, 3×10^{-4} M, 10^{-4} M, and 3×10^{-5} M, along with 0.01% Tween 80 as the surfactant. The controls received only the surfactant solution. 8 to 10 weeks later, certain inflorescences of treated plants were observed in which the initiation of the disc florets was haphazard instead of being in spirals as in controls. Some of the florets showed exposed ovules (Figure 2). 1 to 7 (rarely up to 14) ovules were found projecting through the narrow apex of the corolla tube, or lying in the middle of the split-open boat-like corolla, or emerging laterally through the ovary wall. Some florets showed 2 ovules each, one basally attached, normal ovule con-

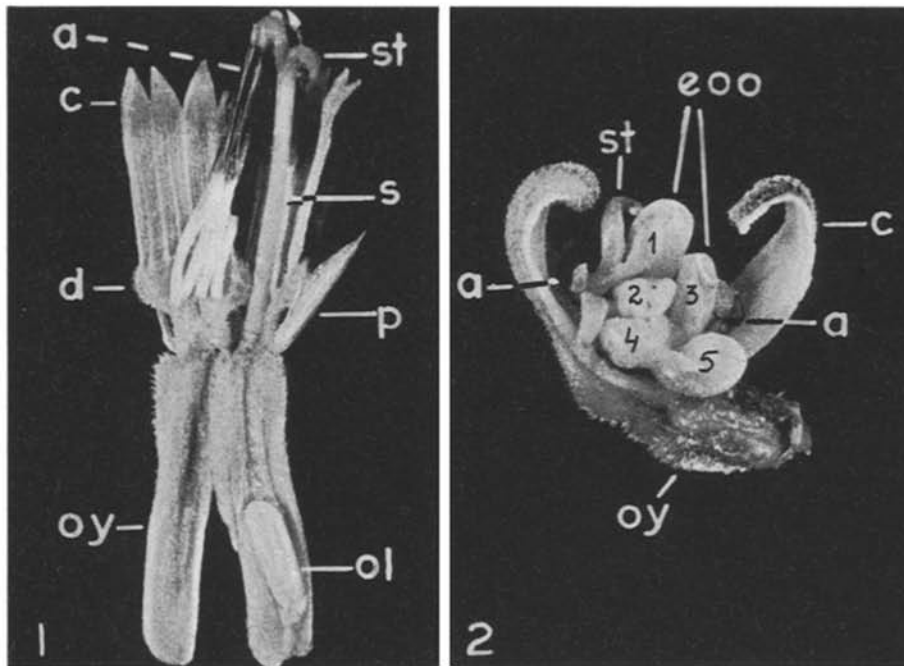


Fig. 1. Vertical halves of a normal disc floret showing a single basally attached intra-ovarian ovule.

Fig. 2. Disc floret from chlorflurenol-treated plant showing the boat-shaped corolla lobes and the 5 extra-ovarian ovules. a, anther; c, corolla; d, disc; eoo, extra-ovarian ovule; ol, ovule; oy, ovary; p, pappus; s, style; st, stigma.

fined to the ovary, another emerging laterally through the ovary wall. The florets in which the ovules had come out of the corolla were of 2 kinds: a) those in which the length of the ovary was the same as in controls and the loculus was filled with ovules, b) those in which the ovary was short and solid; the ovules being borne at the base of the corolla or on it. The extra-ovarian ovules differed from the normal ones in their size and shape, but showed the endothelium and the embryo sac.

There are many papers dealing with the effects of morphactins on flower development. To our knowledge,

the only previous report on the occurrence of exposed ovules is by UMA^{7,8} in the treated linseed plants. The ovules were found to protrude from the top of the ovary or occasionally attached to the base of a stamen. The exposed ovules of linseed contained smaller embryos and their ultimate fate was not known. In the sunflower also mature exposed seeds have not been observed. The formation of extra-ovarian ovules was recorded in plants treated at all concentrations of chlorflurenol. However, the maximum incidence of this feature was noted at the lowest concentration. The increase in the number of ovules suggests an accentuation of female sex expression. The details of ontogeny and embryology of the exposed ovules are being studied.

Summary. Foliar spray of aqueous chlorflurenol solution induced the development of 1-7 (rarely up to 14) extra-ovarian ovules in the disc florets of sunflower in contrast with a single intra-ovarian ovule found in the controls. The incidence was highest at 3×10^{-5} M concentration.

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