

Association of fasciation with opposite leaf arrangement

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Fasciated cucumber plants develop a very broad main stem, with increased numbers of leaves, tendrils, and flowers per node. Yorty (2) suggested that two recessive genes were required to produce fasciation. An alternative mode of inheritance is a single recessive gene with incomplete penetrance and variable expression. In agreement with this hypothesis, hybrids of normal and fasciated cucumber plants are always nonfasciated, and F₂ generations have varying proportions of fasciated plants in different populations, with the degree of fasciation varying in different plants from barely perceptible to grotesque stems six inches wide. Yorty (2) also obtained evidence of incomplete penetrance for fasciation.

Environment influences the proportion of fasciated plants. Yorty (2) reported that few plants become fasciated with long days and/or high temperatures. In agreement with this, a higher proportion of fasciated plants occur in the winter greenhouse at Geneva, NY than in the field during the summer. Seed treatment with radiation increased the number of fasciated plants.

Another possible case of a single recessive gene with variable penetrance in cucumber is *opp*, for opposite leaf arrangement (1). In the parental and segregating generations, opposite leaf arrangement was always associated with fasciation. All fasciated plants had opposite leaves at some of the nodes of the main stem, before the stem became fasciated and the number of tendrils and flowers increased. Penetrance was higher for opposite leaves than for fasciated stem, since not all *opp* plants become fasciated in the field.

Fasciated plants appear normal as seedlings, but as they develop, fasciation becomes more extreme. When fasciation first becomes apparent, a plant often has two instead of the normal one tendril and leaf at a node, and twice the usual number of staminate flowers. Later in development, there will be a higher multiple of the normal number of leaves, tendrils, and flowers of each sex per node as the plant becomes progressively more fasciated.

Opposite leaf arrangement is also unstable during the course of development. Opposite-leafed plants usually have two leaves per node in the seedling stage, but later always revert to a single leaf per node in alternate arrangement unless leaf number is increased by fasciation.

The association of fasciation and leaf arrangement could be due to linkage, but it is suggested that it is more likely due to pleiotropy. It may be that the same hormonal change during ontogeny is responsible for the change from opposite to normal leaf arrangement and from normal to fasciated stem.

Literature Cited

1. Robinson, R.W. 1987. Inheritance of opposite leaf arrangement in *Cucumis sativus* L. *Cucurbit Genet. Coop. Rpt.* 10:10-11.
2. Yorty, P.H. 1968. The genetics of scab resistance *Cladosporium cucumerinum*, and other characters in cucumber, *Cucumis sativus*. M.S. Thesis, Pennsylvania State Univ.