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BREEDING SYSTEM IN FICUS CARICA, THE COMMON FIG. II. POLLINATION EVENTS[1]

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ABSTRACT

Pollination events are examined in *Ficus carica*, the common fig. The stigma of the long-styled female flower is wet. Stigma and stylar secretions consist of mucopolysaccharides, lipids, and insoluble carbohydrates. The pollen from anthers of the male flowers is dimorphic, being tri- and diporate. Pollen tubes grow in intercellular secretions of the solid style until they reach the obturator which forms on the funiculus of the ovarian cavity. The obturator secretes primarily insoluble carbohydrates which remain sequestered under the cuticle. A pollen tube grows through the stylar tissues emerging beneath the cuticle of the obturator into these secretions and then penetrates the micropyle. Differences were observed between timed pollination trials in two sites in California. At one site, a characteristic coiling of pollen tubes occurred in the region of the funiculus before pollen tube penetration of the micropyle. At the other site, presyngamy pollen tube coiling was not observed and pollen tube growth rates were doubled. There were higher temperatures at the second site during the pollination experiment. The stigma of the short-styled flowers is nearly dry, and the transmitting tract shows decreased amounts of secretion. The funiculus did not have a differentiated obturator and secretions there were insufficient to raise the cuticle over the micropyle. The short-styled flowers appear to be losing their ability to function as fully viable females.

The breeding system of *Ficus carica*, the common fig, is complex, consisting of two tree morphs, three functional floral forms, and an ovipositing/pollinating wasp (Condit, 1932, 1947; Galil, 1977; Janzen, 1979; Valdeyron and Lloyd, 1979; Kjellberg et al., 1987; Beck and Lord, 1988). Flowers are borne inside a syconium, a false fruit (Lawrence, 1951) consisting of shortened fleshy internodes (Penzig, 1894). One tree morph, the Caprifig, produces syconia containing male and short-styled (SS) female flowers; the other tree morph, the Edible fig, produces syconia containing long-styled (LS) female flowers. Seeds from pollinated LS female flowers produce both tree morphs (Solms-Laubach, 1882). The two female floral forms serve different purposes in the breeding system; the SS flowers' primary role is to act as an oviposition site for the pollinator wasp, while the LS flowers' role is to act as a seed floral forms (Solms-Laubach, 1882, 1885; Condit, 1932), as both could set seed in the presence of pollen (Condit, 1932; Galil and Neeman, 1977). Low seed set in the SS flower was presumed to be due to efficient oviposition or damage by the wasp (Condit, 1932, 1947; Galil and Eisikowitch, 1971). A comparative developmental study has demonstrated that the two female floral forms differ from inception and that the SS flower shows sufficient structural divergence to suggest a dysfunction in its ability to set seed (Beck and Lord, 1988).

The bulk of the literature on *Ficus carica* focuses on the pollination agent and structural details of the pollination process are scarce (Solms-Laubach, 1882, 1885; Eisen, 1896; Longo, 1909; Condit, 1922, 1932; Saleeb, 1965). In this paper we focus on the function of the three floral forms. Emphasis is placed on pollination events, including the mature

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producer (Hill, 1967; Galil and Eisikowitch, 1971; Ramirez, 1974; Janzen, 1979), thus separating the seed-producing and oviposition site functions between tree morphs. It was thought that only superficial differences between the styles and stigmas occurred in the two female structure of the gynoecial tissues involved in the growth of pollen tubes for both female forms, and the sequence of events leading to syngamy in the LS flower form of *Ficus carica*.

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MATERIALS AND METHODS—Pollen used was from commercial Caprifigs (CF) grown in Madera County, California, provided by the California Fig Growers Institute. Figs containing dehiscing anthers were cut open and dried for 24 hr before pollen removal to prevent contamination by latex secretions from cut tissues. Pollen was shaken onto wax paper and stored

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