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Figs and Fire

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TREES WITH THICK BARK OR OTHERWISE WELL-INSULATED VASCULAR CAMBIA often survive low intensity fires. Palms also thrive in fire-prone areas in the tropics, perhaps because they lack a vascular cambium and because their terminal buds are well-insulated (*e.g.*, Anderson *et al.* 1991). Trees with a well-developed capacity to sprout after their aboveground portions are destroyed also dominate in areas where fires are common (*e.g.*, Uhl *et al.* 1981). We wish to add the hemiepiphytic habit to this list of characteristics that allow tree persistence through fires. Our observations in fire-ravaged forests in Borneo and in fire-maintained savannas in Venezuela indicate that hemiepiphytic figs (*Ficus* spp.) readily develop new root connections down to the ground when the basal portion of the stem is destroyed by fire. This conclusion also is supported by data on regrowth of aerial fig roots cut during silvicultural treatments in Malaysia.

Fires associated with the 1982/83 drought burned 3.2–3.7 million ha areas of primary forest in Borneo (Lennertz & Panzer 1983). In Kutai National Park in East Kalimantan, Leighton and Wirawan (1986) reported that 25 percent of the canopy trees in a 3 km^2 area near the Mentoko Field Station were killed by the drought and fire. While conducting a study on the role of remnant trees as seed dispersal foci in this same area 10 years after the fire (Susilo, pers. obs.), we observed that some figs appeared to have regenerated terrestrial connections that were destroyed by the fire.

To estimate how many ground-rooted figs reestablished connections with the ground after the 1982/83 fire, we censused the reproductively mature figs in a 3 km^2 area at Mentoko in late 1992. Primarily on the basis of inspection of trunk/root structure, we estimate that of the 104 reproductively mature figs now present, 61 (58.6%) burned in 1982/83 but regenerated new root connections with the ground. The regenerated figs most commonly had a single large diameter, downward-growing root that branched into numerous smaller roots 1–2 m above the ground. In several cases these roots grew over patches of charred wood on the host trees' stems. The 43 mature fig trees that apparently did not lose ground connections during the fire must have either grown down to the ground for the first time during the 10 yr that elapsed between the fire and our observations or escaped damage in small patches of forest that were not burned. We do not know how many figs were killed by the fire.

We have additional evidence for the regenerative capacity of hemiepiphytic fig roots from Ulu Segama Forest Reserve in Sabah, Malaysia where, in the process of cutting woody vines prior to logging, the roots of some hemiepiphytic figs were inadvertently severed. We determined the fate of cut figs along ten 100 × 20 m random transects through a 450 ha area that was silviculturally treated 9 mo prior to our census. Of the 28 figs on which all ground connections were cut, 25 produced new roots down to the ground.

Although we have no quantitative data on postfire root regeneration by hemiepiphytes in frequently burned savannas, the abundance and root structure of figs and other hemiepiphytes (*e.g., Clusia* and *Coussapoa*) on palms in the Venezuelan llanos (Putz & Holbrook 1989) and in many other fire-maintained communities elsewhere in the tropics suggests that ground fires are not necessarily lethal to hemiepiphytes. The distinctive feature of hemiepiphyte fire resistance is that they resprout downwards.

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