

length and to depth of flooding in the wet season. In south Florida, fires occur more frequently in cypress domes than in strands, which may be why the understory in domes is less diverse than in strands (Wade et al., 1980). Cypress returned to most sites after a series of fires in 1937 in the Everglades that burned deeply into the peat layer, but it regenerated in very few stands that burned in 1962 (Craighead, 1971), perhaps because of a lowering of the water table in the interim. Drainage that has permanently lowered water tables in the Coastal Plain of the southeastern United States has increased fire frequency (Wells, 1942; Duever et al., 1986).

Fires are infrequent in undrained swamps in the Big Cypress National Preserve (Duever et al., 1986). However, increased drainage in south Florida has allowed fire to encroach farther into swamps than it did under natural conditions, and swamp species are unlikely to regenerate in drained swamps after severe fires unless the natural hydroperiod is restored (Fig. 4) (Wade et al., 1980).

Low water levels accompanied by an accumulation of organic matter increase susceptibility to fire. If a fire burns into the deep peat in the center of a cypress dome, cypress mortality will increase; if enough organic matter has accumulated around the edges of a dome that has been dry for a long time, fire can eliminate cypress completely (Ewel and Mitsch, 1978).

Seed Production, Dispersal, and Germination

Regeneration of cypress from seed apparently requires a well-defined set of conditions (Table 3).



Fig. 3. A freshly burned cypress pond in north Florida. Most of the cypress trees in this swamp survived the fire.

Natural stands of cypress tend to be even-aged (Putnam, 1951; Stubbs, 1973), and ring counts have shown that groups of cypress saplings tend to be about the same age, although their sizes may vary within each group (Demaree, 1932; Schlesinger, 1978; Duever and Riopelle, 1984). Cypress regeneration requires seed production followed by hydrologic conditions conducive to germination and seedling growth.

The quantity of seed produced varies from year to year (Schlesinger, 1978). In swamps, some seed seems to be produced every year, and a bumper crop is believed to be produced every 3 years (Mattoon, 1915). This rule of thumb seemed to hold for unaltered pondcypress domes in Florida during a 3-year period; in a dome receiving treated wastewater, however, seed production was high in all 3 years (Brown, 1978). Baldcypress trees growing along a river bank in north Florida produced seed every year for at least 4 years.

No minimum age has been documented at which cypress trees begin to bear viable seed. Cones were produced by baldcypress in the third year after 1-year-old saplings were transplanted (Deghi, 1984). We observed cone production on 1- to 2-year-old stump sprouts in the Withlacoochee State Forest in central Florida.

Cypress cones ripen in October, November, and December (Fowells, 1965). They usually disintegrate on the tree, but they sometimes fall to the ground in one piece (Duever et al., 1986). The seeds are probably dispersed primarily by water (e.g., Harper, 1927; U.S.D.A. Forest Service, 1948; Kennedy, 1972; Stubbs, 1973; Williston et al., 1980), and in very wet weather they may be carried by slowly moving floodwaters



Fig. 4. A south Florida swamp that did not survive burning, perhaps because of drainage. (Photograph by J. Ewel)