**Tribulus cistoides** L.

**Common Name:** Puncture vine; burr-weed; Jamaican feverplant; caltrop

**Synonymy:** *Kallstroemia cistoides* (L.) Endl.

**Origin:** East Africa; Madagascar; Mascarene Islands

**Botanical Description:** Trailing perennial (sometimes annual) herb, with many-branched stems to 1 m (3.2 ft) long or longer; tap root woody; stems often slightly woody at base, tips erect, younger stems covered with silky hairs. Leaves opposite, to 10 cm (4 in) long, even-pinnate, 5-8 pairs of leaflets; leaflets elliptic or oblong, to 2.8 cm (1 in) long and 1.2 cm (0.5 in) wide, covered with silky hairs; margins entire, bases rounded, tips bluntly pointed; terminal leaflet pair spine tipped; stipules linear, to 0.7 cm (0.3 in) long. Flowers showy, solitary in leaf axils, on long, hairy stalks to 3 cm (1.1 in) long; sepals 5, lance shaped; petals 5, bright yellow, rounded, to 2.5 cm (1 in) long. Fruit a hard spiny capsule, burr-like, to 1.5 cm (0.6 in) across, splitting into 4 or 5 segments, each of which has two sharp spines to 8 mm (0.3 in) long and contains one or more seeds.

**NOTE:** Differs from the widespread, nonnative weed *T. terrestris*, which is an annual, has much smaller petals, to 1 cm (0.4 in) long, and shorter flower stalks, to 1 cm (0.4 in).

**Ecological Significance:** Naturalized in Florida by mid-1940s, spreading from military bases (Austin 1999a). Earliest introductions were possibly accidental, from fruits stuck in airplane tires (Austin 1999a) or other military equipment. Also used ornamentally as a groundcover for coastal plantings (Hammer 1999b) and for soil stabilization (Porter 1972), although the spiny fruit makes it unpopular in high traffic areas (Hammer 1999b). Reported from 47 conservation areas across south and central Florida (Gann et al. 2001, FLEPPC 2002). Invades dunes, coastal strands, sandy inland sites, pinelands, road swales, median strips, and other disturbed sites (Hammer 1999b, FTG). Forms dense mats and low thickets that clamber over other vegetation. Colonizes beaches and roadsides in the Florida Keys (Kruer and Taylor 1999). Occurs in coastal habitats on almost all Hawaiian Islands (Wagner et al. 1990). Common or present as a weed in many countries around the world (Holm et al. 1979). In the 1960s, seed and stem weevils were successfully introduced to the United States as biocontrol agents for *T. terrestris* and *T. cistoides* (Maddox 1976). Weevils are now established in several Caribbean Islands and the Bahamas, and are often spontaneous in Florida (Bennett and Baranowski 1981). Pollinated by honeybees (*Apis mellifera*) in Florida (Austin 1972). May cause photosensitization and nitrates poisoning in livestock (Newbould 1998), and toxicity in other mammals (SEPASAL 2002). Fruit spines can puncture bicycle tires (Hammer 1999b). Spiny nutlets are animal (Kruer and Taylor 1999) and human dispersed.

**Distribution:** Herbarium specimens documented from Brevard, Broward, Collier, DeSoto, Hendry, Highlands, Hillsborough, Indian River, Lee, Manatee, Miami-Dade, Monroe, Okaloosa, Okeechobee, Orange, Palm Beach, Pinellas, and St. Lucie counties (Wunderlin and Hansen 2002). Also reported from Martin County (Gann et al. 2001). Naturalized in Georgia, Louisiana, Texas, Puerto Rico, the Virgin Islands, and Hawaii (USDA NRCS 2002). Panropical weed that has naturalized throughout Old and New World tropics (SEPASAL 2002), including the Pacific Islands (PIER 2002), and Japan (RIB 2002). Targeted for removal from commercial production by FNGA/TBWG growers associations (FNGA 2001). Prohibited in Miami-Dade County.

**Life History:** Thrives in maritime habitats and dry tropical environments (Porter 1972). Salt and drought tolerant (Hammer 1999b). Well-developed taproot supports trailing stems that may form thick mats to 5 m (16 ft) wide (Newbould 1998). Flowers year-round (Taylor 1992), reproduces from seed (HEAR 2002), seeds are long-lived (Newbould 1998). Spiny fruits well equipped for efficient dispersal: they may lodge in tires and footwear, and attach to animal fur (Newbould 1998). Fruit spines may also facilitate germination on compacted soils (Squires 1969).