

Tribulus L. CALTROP

Tribulus terrestris L., PUNCTURE VINE. Annual, taprooted, several–many-stemmed at base, matlike with radiating shoots often forked but not rooting at nodes, prostrate and trailing, < 5 cm tall; shoots strongly 2-dimensional (plagiotropic) with suntracking leaves, also closing upward in response to water stress, pubescent. **Stems:** cylindrical, 2–3 mm in diameter, sometimes zigzagged, commonly swollen at base and nodes, greenish soon becoming brownish tan, tomentose and hispid. **Leaves:** opposite and alternate, even-1-pinnately compound, pairs of lateral leaflets (2–)4–6(–7), petiolate, with stipules; stipules 2, fused to lower stem and petiole at swollen node, awl-shaped to narrowly triangular on lower stem and lanceolate and crescent-shaped on upper side, (1–)1.5–5 mm long; petiole 4–7 mm long; rachis 10–30 mm long, 2-edged on upper side, tomentose and hispid; petiolules < 1 mm long; blades of leaflets oblong or elliptic to lanceolate, 5–10 × 2–5 mm, dull, ± asymmetric and oblique at base, entire, acute at tip, pinnately veined but with midrib conspicuous and raised on lower surface, upper surface with hairs only along midrib, lower surface and margins sericeous, with irregular netlike of minor veins. **Inflorescence:** flowers solitary, axillary (opposite leaf at node when leaves alternate), lacking bracts; pedicel straight, 4–9(–15) mm long, slender. **Flower:** bisexual, radial, 6.5–10 mm across, dish-shaped; with a low, broad disc; **sepals** 5, spreading, unequal, lanceolate to ovate, 3–4.2(–5) × 1.1–1.6 mm, green with membranous margins, acuminate or with short point at tip, upper surface glabrous, lower surface hairy, deciduous; **petals** 5, ± wedge-shaped, 2.5–4.7(–6) × 1.8–3.5 mm, bright yellow; **nectaries** 5, opposite sepals and at bases of outer stamens, rectangular or sometimes weakly 2-lobed, ca. 0.2 × 0.3 mm long, fleshy, green; **stamens** 10 in 2 whorls, free, attached to disc, unequal, sometimes the outer whorl having shorter filaments and larger anthers; filaments 2–3(–4) mm long, yellow; anthers versatile, dithecal, ± ellipsoid, 0.5–1.5 mm long, yellow, longitudinally dehiscent; pollen yellow; **pistil** 1, subtended by low, broad disc; ovary superior, (4–)5-lobed, green, lobes covered with erect, colorless bristles, lobes = chambers, each chamber with several ovules attached to center; style ± club-shaped, ca. 1.5 mm long, green; stigmas = (4–)5 grooved ridges, radiating from and fused at tip of style, ca. 1.3 mm long, densely and finely puberulent. **Fruit:** schizocarp, splitting into 4–5 dry, spiny mericarps (nutlets), each mericarp 2–3(–5)-seeded, boney and indehiscent, straw-colored; intact fruit body polygonal, ± 6–7 mm + 2(–4) spreading spines (prickles), with stout prickles on outer corners, the prickles to 7 mm long and diverging 70–130°, exposed facets of original fruit puberulent and with hard projections (from thick-based prickles) resembling short knobs and horns; inner edge acute with the 2 converging facets glabrous and without spination or other projections. Late May–mid-October.

Naturalized. Prostrate annual weed occurring in waste places, especially common during summer along roadsides. Puncture vine was so named because the nasty, spiny fruits and fruit segments easily puncture the skin, but also bicycle tires. Fruits of *Tribulus terrestris* were the inspiration for a sharply pointed Roman weapon (caltrop) used to hobble cavalry horses. *Tribulus terrestris* is one of several herbaceous species in range having suntracking leaves; during daylight on sunny days its leaves are continuously oriented more or less perpendicular to the sun's rays, thereby maximizing photosynthesis. *Tribulus terrestris* has radially symmetric, bright yellow flowers.

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