

SOLANACEAE Part Six: NICOTIANA L. Tobacco

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Annuals to soft-woody trees and shrubs. Herbage glabrous to viscid-glandular. LEAVES simple, alternate, petioled, sessile, or clasping; margins entire, often with some degree of progressive change in leaf shape and petiolation from base to inflorescence. INFLORESCENCES generally terminal panicles with varying degrees of complexity, sometimes raceme-like. FLOWERS synsepalous, sympetalous, actinomorphic or nearly so, tubular to salverform, the calyx commonly much shorter than the tube, the lobes equal or unequal in length; corollas white to pale green or yellow, the tube-proper cylindrical to subcylindrical, often with various forms of bulging or dilation; limb subtentire to deeply 5-lobed; stamens 5, included or nearly so, the filaments inserted on corolla at various points, commonly below the middle of the tube. FRUITS apically dehiscent capsules, slightly woody in ours. SEEDS numerous, angular, globose or reniform, 0.4–1.3 mm long, surfaces with various ridges and patterns.— Ca. 65 spp. native to w hemisphere, Australia, and a few s Pacific islands; widely naturalized and cultivated. (For Jean Nicot, 1530–1604, French ambassador, diplomat, explorer). *Nicotiana tabacum* L. grown worldwide for tobacco products.

*Nicotiana attenuata*, *N. clevelandii*, *N. quadrivalvis*, and *N. sylvestris* are vespertine species and consideration should be taken when keying out herbarium material and/or specimens collected later in the day since measurements of floral characters such as limb shape, orientation, and lobe length can be obscured as flowers begin to close.

1. Shrub or small tree; herbage glabrous, glaucous; flowers yellow; pedicels strongly recurved in fruit.....*N. glauca*
- 1' Annuals to suffrutescent herbs; herbage glandular-hairy; flowers white, cream, pale green, sometimes pale purple, not yellow; pedicels not strongly recurved in fruit.
  2. Perennial herbs to 2 m tall; basal leaves clasping, 30–50 cm long; flowers in congested panicles, drooping downward; corolla slightly dilated along upper ½ of tube.....*N. sylvestris*
  - 2' Annual to suffrutescent perennial herbs, usually much less than 2 m tall; basal leaves clasping or petioled, less than 30 cm long; flowers in more or less open panicles, upright or nodding, not drooping downward; corolla tube not noticeably dilated.
  3. Herbaceous perennial, often suffrutescent; cauline leaves often clasping; flowers diurnal; calyx 1/3–3/4 the length of the corolla tube .....*N. obtusifolia*
  - 3' Annual or short-lived perennial herbs; cauline leaves not clasping (except in *N. quadrivalvis*); flowers vespertine; calyx less than ½ the length of the corolla tube.
    4. Plants ill scented; cauline leaves usually clasping (sometimes only slightly so); corolla in longest flowers 35–70 mm long; stamens attached above the middle of the tube. .... *N. quadrivalvis*

- 4' Plants not ill-scented; cauline leaves never clasping; corolla in longest flowers 20–33 mm long; stamens attached below the middle of the tube.
5. Calyx lobes unequal with one longer than the other four; capsule shorter than longest calyx lobes; cauline leaves sessile to subsessile; plants of lower elevations in sandy soils in sw AZ. ....*N. clevelandii*
- 5' Calyx lobes not markedly unequal; capsule protruding beyond the calyx lobes; cauline leaves petiolate; plants in mid and higher elevations in various habitats throughout AZ, except extreme sw AZ. ....*N. attenuata*

*Nicotiana attenuata* Torr. ex S. Wats. (for attenuate leaves). Coyote Tobacco.—Erect annuals or short-lived perennials, occasionally over 1 m tall, the stems with glandular hairs. LEAVES elliptic to lanceolate, the blades 6–15 cm long, 1–4 cm wide; cauline leaves reduced distally becoming narrowly lanceolate to linear; petioles diminishing distally; basal leaves rosette forming, especially when young. INFLORESCENCES racemose. FLOWERS vespertine; calyx 5–9 mm long, the lobes subequal; corolla salverform, white to pale green, the tube-proper often flushed with purple; corolla (25–)28–35(–40) mm long; lobes obtuse; stamens unequal, attached below the middle of the tube. FRUITS ovoid, 8–15 mm long, protruding beyond the calyx lobes. SEEDS more or less reniform, surfaces with irregular, sinuous ridges.—Alluvial soils in washes and disturbed sites, occasional on flats, and slopes: Apache, Cochise, Coconino, Gila, Graham, Maricopa, Mohave, Navajo, Pima, Pinal, and Yavapai cos.; 300–2600 m (1000–8500 ft); flowering Apr–Oct; CA, CO, ID, MO, NM, NV, OR, UT, WA, WY, w Can., Mex. There are three historical records out of the otherwise known range for this species: Pima County, “Tucson, Ariz.” *J. W. Toumey s.n.*, 9/14/1891 (ARIZ); Pinal County, “River bottom near Sacaton” *G. J. Harrison 1962*, 5/29/1926 (ARIZ), and Maricopa County, “Agua Fria river bottom near Avondale P. O.” *G. J. Harrison 1817*, 5/9/1926 (ARIZ).

*Nicotiana attenuata* differs most obviously from the similar species *N. clevelandii* in its petiolate cauline leaves and exserted capsule.

*Nicotiana clevelandii* A. Gray (for Daniel Cleveland, 19<sup>th</sup> century botanist). Cleveland’s Tobacco.—Erect annuals usually less than 1 m tall; stems with glandular hairs. LEAVES elliptic to oblanceolate to lanceolate, the blades 2–12 cm long, 1–4 cm wide; cauline leaves subsessile to sessile, reduced distally; basal leaves petiolate and rosette forming. INFLORESCENCES racemose, sometimes branched into a panicle-like habit. FLOWERS vespertine; calyx 7–12 mm long; calyx lobes unequal with one longer than the 4 others; corolla white-cream to pale green, often with violet flush along the tube, 15–30 mm long; limb slightly zygomorphic, with shallow triangular lobes, these with rounded edges and acute tips, 1–3 mm long. Stamens unequal, attached below the middle of the tube. FRUITS: capsules shorter than the calyx lobes, ovate-elliptic, 7–10 mm long. SEEDS more or less reniform, the surfaces with irregular, sinuous ridges.—Dunes, washes, and other well-drained, sites, occasional on flats and slopes: sw Arizona in Maricopa, Pima and Yuma cos.; to 800 m (to 2600 ft); flowering Jan–May; s CA; Baja C., Mex. and w Son., Mex.

*Nicotiana clevelandii* differs most obviously from the similar species *N. attenuata* in its sessile to subsessile cauline leaves and the included capsule.

*Nicotiana glauca* Graham (bluish, waxy surface). Tree Tobacco.—Soft-woody, loosely branched shrub to small tree; young stems greenish or bluish-grey, glabrous and glaucous. LEAVES relatively thick, rubbery, glaucous, the blades elliptic to ovate, often with oblique bases, 1–10 cm long, 1–8 cm wide (measurements are from blade portion of the leaf, not the petiole, and from herbarium material which rarely includes basal leaves), reduced distally; petiole sometimes equal to the length of the blade. INFLORESCENCES congested panicles. FLOWERS diurnal; calyx 8–12 mm long, the lobes equal, triangular, narrowing to somewhat linear tips, 1–3 mm long, three to five times shorter than calyx tube; corolla tubular, the apical portion bulging slightly, then constricted, bright yellow to greenish yellow, 2–4.5 cm long; limb pentagonal with inconspicuous lobes ~1 mm long. FRUITS ovoid or broadly ellipsoid, 7–10 mm long, borne on strongly recurved pedicels so fruit opening is directed upward at maturity. SEEDS slightly longer than wide, angular to oval with irregular, sinuous ridges.—Riparian areas, well-drained rocky to sandy soils in washes, and disturbed sites with moisture. Cochise, Gila, Graham, Greenlee, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, and Yuma cos.; to 2500 m (to 7500 ft); flowering throughout the year; AL, CA, LA, MS, NM, TX, s UT; Mex, S. Amer.

*Nicotiana obtusifolia* M. Martens & Galeotti (blunt or rounded leaf apex). Desert Tobacco.—Perennial herbs suffrutescent with age, to 1.5 m tall; herbage with glandular hairs, many are multicellular and branched. LEAVES mostly oblanceolate, 2–20 cm long; cauline leaves sessile and usually clasping with auriculate bases, reduced distally; basal leaves petiolate, not usually rosette forming. INFLORESCENCES panicle-like, the peduncles secund. FLOWERS diurnal; calyx 8–14 mm long, 1/3 to 3/4 as long as the corolla tube; corolla tubular, with reflexed lobes, subsalverform; pale green to whitish, 17–27 mm long; limb circular-pentagonal with broadly triangular lobes; filaments attached to corolla near base. FRUITS ovoid, 8–12 mm long. SEEDS oval to subreniform to angular, the surfaces alveolate to irregularly ridged. [*N. trigonophylla* Dunal].—Well-drained rocky to sandy soils in washes and disturbed sites, occasional on flats and slopes; all counties in AZ; to 1800 m (to 6000 ft); flowering throughout the year; CA, NM, s NV, w TX, s UT; Mex.

*Nicotiana quadrivalvis* Pursh (four valves). Indian Tobacco.—Annual or short-lived perennial to 1.5 m tall, ill scented; stems with glandular hairs. LEAVES oblanceolate to lanceolate, 3–12 cm long, 1–4 cm wide; cauline blades sessile to subsessile, usually slightly clasping, becoming shorter and narrower distally; basal leaves petiolate, rosette forming. INFLORESCENCES usually racemose, occasionally with dichotomous branching near the apex. FLOWERS vespertine, closing by midday; calyx 12–20 mm long, the lobes often unequal in length; corolla trumpet-shaped (funnel-form-salverform), 35–70 mm long, throat elongate, outer surface pale green to white, sometimes with slight violet flush along lower portion of limb; limb 5–20 mm long, conspicuously cleft into triangular lobes; stamens unequal; filaments attached at different levels above middle of tube. FRUITS narrowly ovoid to globose, 10–18 mm long. SEEDS oval-reniform, with irregular, sinuous ridges. [*Nicotiana bigelovii* var. *quadrivalvis* (Pursh) Eastw.].—Alluvial sandy soils in washes and disturbed sites, occasional on flats, and slopes; Maricopa, Mohave, and Yavapai cos.; to 1600 m (to 5200 ft); flowering Apr–Nov; s CA; Baja C., Mex., w Son., Mex. *Nicotiana quadrivalvis* has been collected 6 times in Arizona – 5 times in the Hassayampa River watershed and once in the Burro Creek watershed.

*Nicotiana quadrivalvis* differs most obviously from the similar species *N. attenuata* and *N. clevelandii* in its robust flowers with longer tube, much wider limb and longer corolla lobes.

*Nicotiana sylvestris* Spegazzini & Comes (of the forest). Woodland Tobacco, South American Tobacco.—Annual, biennial, or perennial to 2 m tall, glandular hairy. LEAVES elliptic-ovate, to approximately 50 cm long and 30 cm wide; cauline leaves reduced distally, elliptic-ovate and auriculate-clasping, the uppermost becoming ovate-triangular with acuminate apices; basal leaves auriculate-clasping, usually rosette forming. INFLORESCENCES congested panicles, sometimes described as glomerulate. FLOWERS versperine, drooping downward, the pedicels to 25 mm at maturity; calyx 10–15 mm long, the lobes equal or nearly so. Corolla white, salverform, 6–10 cm long exclusive of limb; upper ½ of tube slightly dilated; limb 10–15 mm long, with broadly triangular to acute lobes; stamens unequal; filaments attached below middle of tube. FRUITS oval or ovoid, 15–18 mm long. SEEDS oval-subreniform, dull, surfaces with irregular, sinuous ridges.—Riparian and residential areas; Santa Cruz and Cochise cos.; 1000–1500 m (3,500–5,000 ft); flowering Aug.

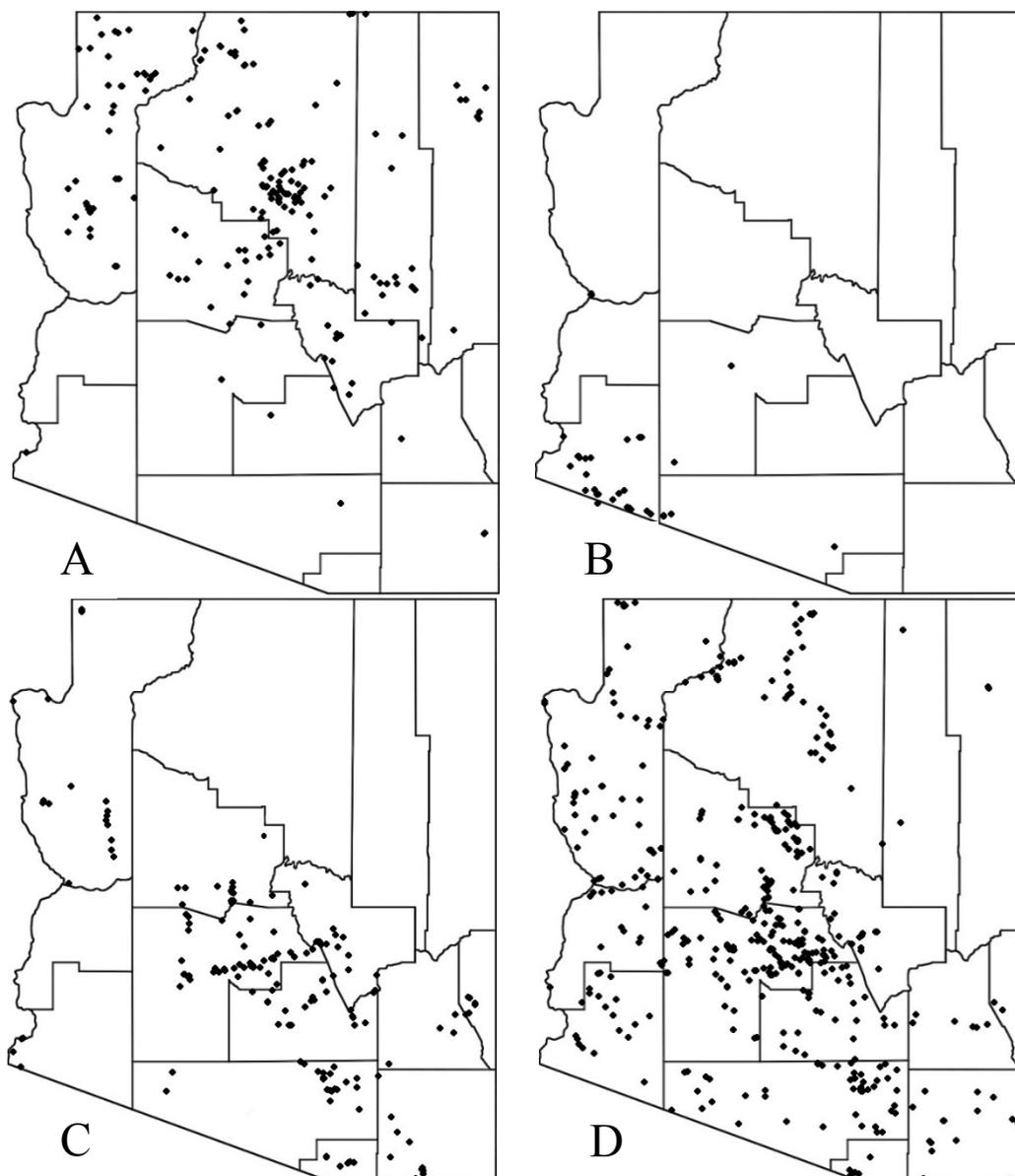
*Nicotiana sylvestris* is native to South America and cultivated as an ornamental throughout the US. It has occasionally escaped cultivation and has been collected twice in AZ: Santa Cruz County, Patagonia Lake along Sonoita Creek (*T. R. VanDevender & A. L. Reina G. 2010-840*) in 2010 (ARIZ, ASU); Cochise County, Chiricahua National Monument residential area (*T. Reeves R-4050*) in 1975 (ASU). The Cochise County plant(s) is no longer there. A third locality was confirmed from a photo taken by Craig Riedl taken on 24 November 2016, also along Sonoita Creek, just upstream from Patagonia Lake. A visit to this locality is needed to collect a voucher specimen.

#### ACKNOWLEDGEMENTS

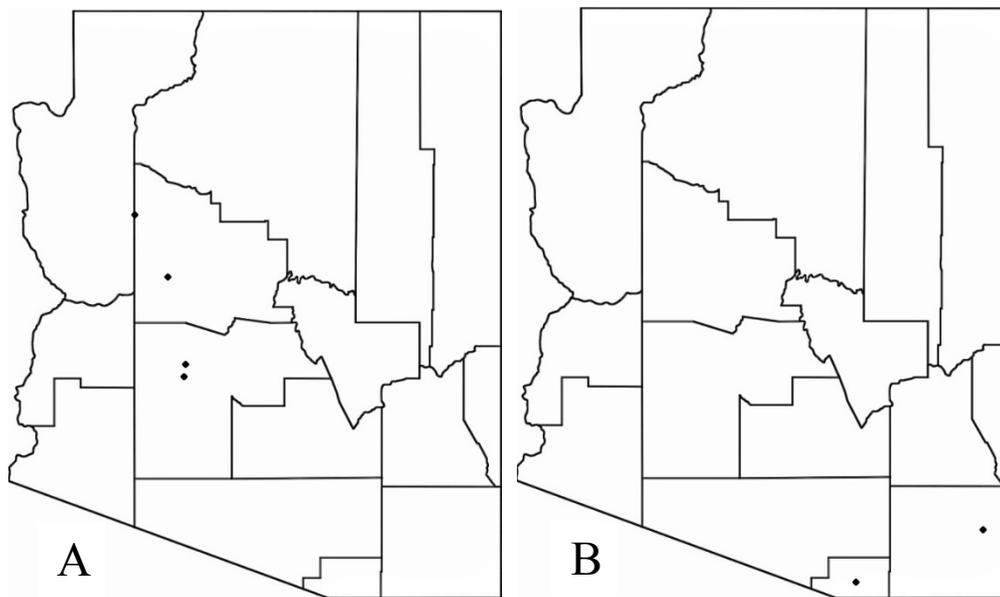
We thank the Rancho Santa Botanic Garden Herbarium (RSA) for their generous loan of specimens, and the University of Arizona Herbarium for making their specimens available. Maps were made using Daryl Lafferty's program [<http://symbiota4.acis.ufl.edu/dlafferty/PlantMap/>] using the specimen data available on SEINet [<http://swbiodiversity.org/seinet/index.php>].

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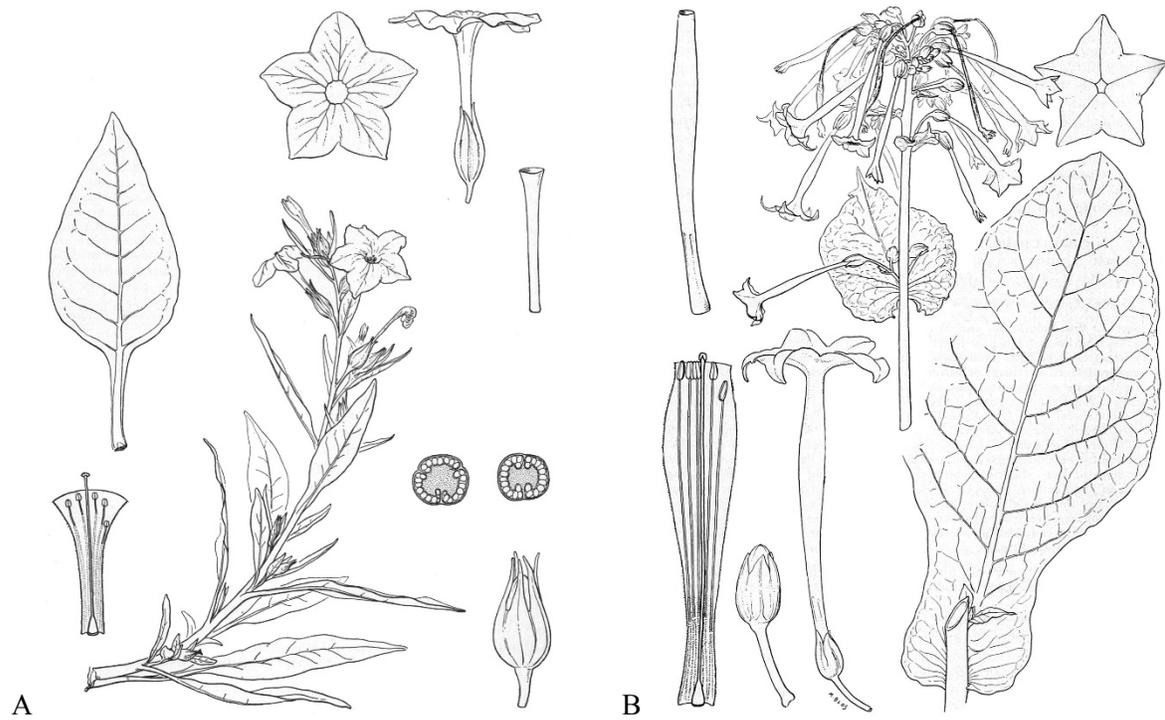
**Solanaceae: *Nicotiana*.** Figure 1. Distributions. (A) *N. attenuata*; (B) *N. clevelandii*; (C) *N. glauca*; (D) *N. obtusifolia*.



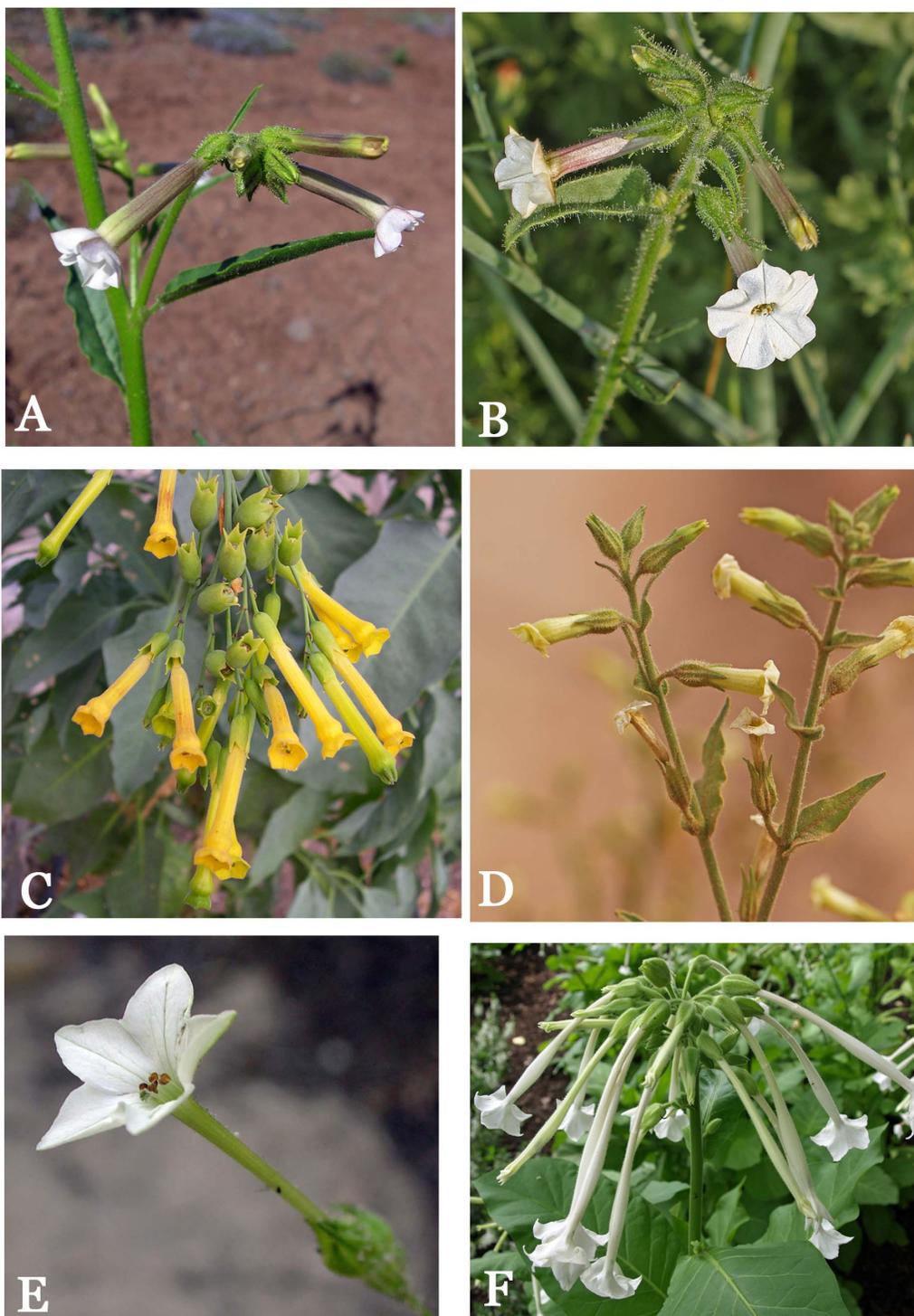
**Solanaceae: *Nicotiana*.** Figure 2. Distributions. (A) *N. quadrivalvis*; (B) *N. sylvestris*.



**Solanaceae: *Nicotiana*.** Figure 3. (A) *N. attenuata*; (B) *N. clelandii*; (C) *N. glauca*; (D) *N. obtusifolia*. Drawings by M. Blos from Goodspeed (1954).



**Solanaceae: *Nicotiana*.** Figure 4. (A) *N. quadrivalvis*; (B) *N. sylvestris*. Drawings by M. Blos from Goodspeed (1954).



**Solanaceae: *Nicotiana*.** Figure 5. (A) *N. attenuata*, (B) *N. clevelandii*; (C) *N. glauca*; (D) *N. obtusifolia*, (E) *N. quadrivalvis*, (F) *N. sylvestris* Photo credits: A,C, by Max Licher; B,D by Elizabeth Makings; E by Keir Morse; F courtesy of Longwood Gardens, Kennett Square, PA [<https://longwoodgardens.org/>].