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# Key To Southwestern Trees



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## KEY TO SOUTHWESTERN TREES

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This key to the native trees of New Mexico and Arizona (132 species with 3 additional naturalized species) is a supplement to the non-technical illustrated handbook, *Southwestern Trees*.<sup>2/</sup> Its primary purpose is to provide foresters, botanists, students, and others with a precise, ready, non-technical means of identifying trees and tree specimens throughout the year, including seasons when flowers and leaves are lacking. However, many native trees can be named easily by reference to the drawings, descriptions, distribution notes, and common names in the handbook.

### Identification by Families

Often you can recognize the plant family to which a specimen belongs. These plant families are listed in the usual botanical order in *Southwestern Trees* under Contents (page ii). The List of Species of *Southwestern Trees* on pages 25 to 28 of this key groups the 135 species into 60 genera and 32 plant families. Fourteen of these families have only 1 tree species each, however.

Most southwestern tree species are grouped within relatively few large families, the 5 largest containing 75 species. The pine family (Pinaceae, page 10), first and largest with 18 tree species, contains the conifers or softwoods (gymnosperms) with needlelike or scalolike evergreen leaves and seeds borne exposed in a cone: pine, pinyon, spruce, Douglas-fir, fir, cypress, and juniper. The willow family (Salicaceae, page 31), well represented in moist soils along streams, has 17 tree species: 4 of cottonwood, quaking aspen, and 12 of tree willow. Members of this family bear male and female flowers on different trees in early spring in long narrow clusters (catkins) and have seed capsules with many cottony seeds. The 12 tree species of oak, comprising the beech family (Fagaceae, page 46), are recognized by the acorn fruit with cup at base and by the winter buds 3 or more in a cluster at tip of twig. Another large family, the rose family (Rosaceae, page 55), is represented by 13 tree species with roselike flowers, including vauquelinia, serviceberry, hawthorn, cliffrose, mountain-mahogany, cherry, chokecherry, and plum. The legume family (Leguminosae, page 63) has 15 tree species characterized by beanlike pods and seeds: lysiloma, acacia, mesquite, screwbean, redbud, Jerusalem-thorn, palo verde, mesquitebean, kidneywood, smoke thorn, locust, tesota, and coralbean.

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<sup>2/</sup> Little, Elbert L., Jr. *Southwestern trees, a guide to the native species of New Mexico and Arizona*. U. S. Department of Agriculture, Agriculture Handbook No. 9, 109 pp., illus. 1950. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 30 cents.



Three more families contain 19 additional tree species. The lily family (Liliaceae, page 26) has 5 tree species of yucca and 1 of nolina, small trees with stout trunk unbranched or with few stout branches and with grasslike or bayonetlike evergreen leaves. Seven species of tree cacti, with swollen succulent green branches and numerous clusters of radiating spines, such as saguaro, organpipe cactus, senita, and cholla, are in the cactus family (Cactaceae, page 88). The olive family (Oleaceae, page 98), with 5 tree species of ash and 1 of forestiera, is characterized by paired (opposite) leaves.

#### How to Use This Key

The key is especially useful for distinguishing closely related species in large groups, such as oaks and willows, and for naming specimens of various small-leaved species with superficial resemblance and specimens of small, unfamiliar families. A key is an outline or short cut for identifying a specimen by elimination, the species being arranged into two groups according to one or more pairs of contrasting characters and each group subdivided successively into two until only the single species fitting the specimen remains. Paired groups in this key are designated by the same letter, single and double, beginning with "A" and "AA," at the left of the page and are equally indented by steps. Follow the key step by step under the group agreeing with the specimen until you reach the name with page number in the handbook. Then compare the drawing, description, and range as a check. If a species is not found in both New Mexico and Arizona, this fact is mentioned in the key as a further aid.

In this nontechnical key, simple descriptive terms have been substituted for botanical terminology with only slight loss of technical accuracy. Readily distinguishable leaf, twig, spine, and bud characters, are used, with supplementary references to fruits when these remain attached or are important. As flowers are not mentioned, trees or specimens can be identified at any season. Technical keys based upon natural botanical relationships best shown by flower and fruit characters are available in published floras of New Mexico and Arizona.

As mentioned in the key, leaves usually are single (alternate) or paired (opposite) or sometimes crowded together at a place (node) on a twig. After leaves are shed, their leaf scars and winter buds just above mark the nodes and leaf arrangement. The key distinguishes leaves as simple (with a single blade) and compound (divided into leaflets). Leaflets usually are smaller than leaves and are attached on a common leafstalk that sheds with them. Also, the leaf has a developing bud at its base, while the leaflets of a compound leaf do not. In nine southwestern tree species of the legume family the leaves are twice compound (bipinnately compound), that is, with the leafstalk or axis branched into divisions on each side. Southwestern Trees illustrates for each species (except conifers or gymnosperms) a single leaf, showing whether it is simple or compound.

Suggestions from users of this key about any parts which may not be satisfactory, as well as improvements, will be gratefully appreciated.

### The Five Parts of This Key

Begin identifying specimens directly with one of the following five parts of this key, according to the descriptions and notes at the head of each part:

- Part 1, Key to Conifers or Softwoods (Gymnosperms), page 4.
- Part 2, Key to Yuccas, Nolinas, and Palms (Monocotyledons), page 6.
- Part 3, Key to Spiny Hardwoods (Dicotyledons), page 7.
- Part 4, Key to Spineless Hardwoods (Dicotyledons), page 11.
- Part 5, Winter Key to Deciduous Spineless Hardwoods (Dicotyledons),

page 20.

Since most species of southwestern trees are evergreen or spiny, you can use Parts 1 to 4 throughout the year. However, use the extra, winter key, Part 5, instead of Part 4 for spineless trees in seasons when the foliage is shed. If in doubt about which part to use, first try the following summary key to the five parts:

- A. Trees resinous, usually with straight trunk and single axis; leaves needlelike or scalelike, mostly not spine-tipped, evergreen; seeds borne exposed on scales of a cone (berrylike and enclosing seeds in juniper); trunk with bark and wood distinct and with annual rings in wood—Part 1, Key to Conifers or Softwoods (Gymnosperms), page 4.
- AA. Trees mostly nonresinous, with branched or straight trunk; leaves of various shapes, commonly flat and broad, deciduous or evergreen (if scalelike, not evergreen) or none; seeds produced from a flower and enclosed in a dry or fleshy fruit—Flowering Plants (Angiosperms).
- B. Trees with stout trunk unbranched or with few very stout branches, bearing at end a cluster of many long, spine-tipped or spiny (except nolina), grasslike or bayonetlike (or fanlike), parallel-veined, evergreen leaves; dead leaves remaining attached against trunk and branches; trunk with woody portions irregularly distributed, without clear distinction of bark and wood and without annual rings—Part 2, Key to Yuccas, Nolinas, and Palms (Monocotyledons), page 6.
- BB. Trees usually with many branches and slender twigs (or few swollen green branches in cacti) bearing net-veined leaves (or scalelike or none) variously arranged, deciduous or evergreen but shedding promptly upon death; trunk with bark and wood usually distinct and with annual rings in wood—Hardwoods (Dicotyledons).
- C. Trees spiny, with branches or twigs bearing spines or ending in sharp points or with spiny-toothed evergreen leaves; leaves deciduous or scalelike or none or spiny-toothed evergreen (except tesota)—Part 3, Key to Spiny Hardwoods (Dicotyledons), page 7.
- CC. Trees without spines on branches, twigs, or leaves; leaves deciduous or evergreen, mostly broad and flat.
- D. Leaves present—Part 4, Key to Spineless Hardwoods (Dicotyledons), page 11.
- DD. Leaves absent (shed)—Part 5, Winter Key to Deciduous Spineless Hardwoods (Dicotyledons), page 20.

PART 1, KEY TO CONIFERS OR SOFTWOODS (GYMNOSPERMS)

Trees resinous, mostly with straight trunk and single axis; leaves needlelike or scalelike, mostly not spine-tipped, evergreen; seeds borne exposed on scales of a cone (berrylike and enclosing seeds in juniper).

- A. Leaves needlelike, more than 5/8 inch long.
  - B. Needles in bundles of 2 to 5 or sometimes single, with a sheath at base (at least when young)--PINE, PINYON (Pinus).
  - C. Needles less than 4 inches long.
    - D. Needles 2 or 3 in bundle or single.
      - E. Needles 1 to 2 inches long.
        - F. Needles 3 in bundle, slender, dark blue green--MEXICAN PINYON (Pinus cembroides Zucc.), page 10.
        - FF. Needles 2 in bundle or single, mostly stout.
          - G. Needles 2 in bundle (single and slender in a form in central Arizona), yellow green--PINYON (Pinus edulis Engelm.), page 11.
          - GG. Needles single, stout and stiff, gray green; northwestern Arizona and not in New Mexico--SINGLELEAF PINYON (Pinus monophylla Torr. & Frém.), page 12.
      - EE. Needles 2½ to 4½ inches long, 3 in bundle--CHIHUAHUA PINE (Pinus leiophylla Schiede & Doppe var. chihuahuana (Engelm.) Shaw), page 14.
    - DD. Needles 5 in bundle.
      - H. Needles less than 2 inches long, dark green, numerous, densely crowded and pressed against twigs--BRISTLECONE PINE (Pinus aristata Engelm.), page 13.
      - HH. Needles more than 2 inches long, blue green, spreading and not crowded on twigs--LIMBER PINE (Pinus flexilis James), page 13.
  - CC. Needles more than 4 inches long.
    - I. Needles 4 to 7 inches long--PONDEROSA PINE (Pinus ponderosa Laws.), page 15.
    - II. Needles 8 to 12 inches or more in length--APACHE PINE (Pinus latifolia Sarg.), page 16.
  - BB. Needles single, without a sheath at base.
    - J. Needles 4-angled, sharp-pointed; older twigs roughened by peg-like bases of fallen needles--SPRUCE (Picea).
    - K. Twigs and leaf bases mostly hairy; needles not stiff, dark or pale blue green; cones about 2 inches long--ENGELMANN SPRUCE (Picea engelmanni Parry), page 17.
    - KK. Twigs and leaf bases mostly not hairy; needles stiff and spine-pointed, dull blue green or silvery blue or darker on older parts; cones mostly more than 3 inches long--BLUE SPRUCE (Picea pungens Engelm.), page 17.
    - JJ. Needles flat, blunt or pointed; older twigs not rough.



- L. Needles with short, narrowed leafstalks; cones hanging down, with 3-pointed bracts—DOUGLAS-FIR (Pseudotsuga taxifolia (Poir.) Britton), page 18.
- LL. Needles without leafstalks; cone upright, in top of tree—FIR (Abies).
- M. Needles of lower branches  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches long, pale blue green or silvery; twigs hairless or sometimes hairy; cones mostly grayish green—WHITE FIR (Abies concolor (Gord. & Glend.) Hoopes), page 19.
- MM. Needles of lower branches 1 to  $1\frac{3}{4}$  inches long, dark blue green; twigs hairy; cones dark purple—ALPINE FIR (Abies lasiocarpa (Hook.) Nutt.), page 20.
- AA. Leaves scalloped, crowded and closely overlapping, less than  $\frac{1}{8}$  inch long, or on leading twigs needlelike, up to  $\frac{1}{4}$  inch long.
- N. Leafy twigs regularly and thickly branched almost at right angles; seeds in hard, dry, rounded cones which remain attached—ARIZONA CYPRESS (Cupressus arizonica Greene), page 20.
- NN. Leafy twigs irregularly branched at small angles; seeds in a mealy or juicy "berry"—JUNIPER (Juniperus).
- O. Leafy twigs relatively slender, the younger twigs about  $\frac{1}{32}$  inch in diameter and often drooping; scale leaves gray green or blue green; older twigs becoming smoothish and reddish brown or dark red.
- P. Scale leaves mostly with a whitish resin dot or gland; bark deeply furrowed into checkered or square plates; "berry"  $\frac{1}{2}$  inch in diameter, mealy, 3- or 4-seeded—ALLIGATOR JUNIPER (Juniperus deppeana Steud.), page 22.
- PP. Scale leaves without resin dot; bark fibrous and shreddy; "berry"  $\frac{1}{4}$  inch in diameter, juicy, mostly 2-seeded—ROCKY MOUNTAIN JUNIPER (Juniperus scopulorum Sarg.), page 22.
- OO. Leafy twigs relatively stout and stiff, younger twigs almost  $\frac{1}{16}$  inch in diameter; scale leaves yellow green; older twigs scaly or shreddy, gray or brown; bark fibrous and shreddy.
- Q. Plant usually a spreading shrub with several curved branches from ground and usually without a single upright trunk; leafy twigs bunched and crowded at ends of branches; pollen and seeds borne on different trees (dioecious); "berry"  $\frac{1}{4}$  inch in diameter, juicy, 1-seeded—ONE-SEED JUNIPER (Juniperus monosperma (Engelm.) Sarg.), page 23.
- QQ. Plant usually a tree with definite upright trunk, branching usually several feet above ground; leafy twigs not conspicuously crowded at ends of branches; pollen and seeds borne on same tree (monoecious); "berry"  $\frac{1}{4}$  to  $\frac{5}{8}$  inch in diameter, mealy, 1- or 2-seed—UTAH JUNIPER (Juniperus osteosperma (Torr.) Little), page 24.

PART 2, KEY TO YUCCAS, NOLINAS, AND PALMS (MONOCOTYLEDONS)

Trees with stout trunk unbranched or with few very stout branches, bearing at end a cluster of many long, spine-tipped or spiny (except nolina), grasslike or bayonetlike (or fanlike), parallel-veined, evergreen leaves; dead leaves remaining attached against trunk and branches; trunk with woody portions irregularly distributed, without clear distinction of bark and wood and without annual rings.

- a. Leaves broad and fanlike, with long spiny leafstalk; rare in Kofa Mountains, Arizona, and not in New Mexico—CALIFORNIA WASHINGTONIA (Washingtonia filifera (Linden) H. Wendl.), page 24.
- aa. Leaves narrow, grasslike or bayonetlike, without leafstalk.
  - b. Leaves ending in a sharp spine—YUCCA (Yucca).
    - c. Leaves flat and flexible.
      - d. Leaf edges bearing many minute sharp teeth; trunk with many widely spreading branches; not in New Mexico—JOSHUA-TREE (Yucca brevifolia Engelm.), page 27.
    - dd. Leaf edges without teeth; trunk unbranched or with few branches.
      - e. Leaves less than  $\frac{1}{2}$  inch wide, with threads along edges—SOAPTREE YUCCA (Yucca elata Engelm.), page 26.
  - cc. Leaves more than 1 inch wide, without threads along edges—SCHOTTS YUCCA (Yucca schottii Engelm.), page 28.
- cc. Leaves concave and stiff.
  - f. Leaves  $\frac{3}{4}$  to  $1\frac{1}{2}$  inches wide; trunk mostly with few branches; not in New Mexico—MOHAVE YUCCA (Yucca mohavensis Sarg.), page 29.
  - ff. Leaves  $1\frac{1}{4}$  to 2 inches wide; trunk mostly unbranched; not in Arizona—TORREY YUCCA (Yucca torreyi Shafer), page 30.
- bb. Leaves not ending in a spine; not in New Mexico—BIGELOW NOLINA (Nolina bigelovii (Torr.) S. Wats.), page 30.

PART 3, KEY TO SPINY HARDWOODS (DICOTYLEDONS)

Trees spiny, with branches or twigs bearing spines or ending in sharp points or with spiny-toothed leaves; leaves deciduous or scalclike or none or spiny-toothed evergreen (except tesota).

- A. Branches swollen, green, covered with numerous clusters of sharp, radiating spines and containing soft, watery tissue--CACTUS FAMILY (Cactaceae).
- B. Branches more than 4 inches in diameter, not jointed, composed of longitudinal ridges and grooves--CEREUS (Cereus).
- C. Trunk single, massive, more than 1 foot in diameter, becoming branched above; not in New Mexico--SAGUARO (Cereus giganteus Engelm.), page 88.
- CC. Trunk absent but many (10-50) branches from ground 4 to 8 inches in diameter, usually unbranched above.
- D. Branches cylindrical, with 12 to 19 longitudinal ridges; not in New Mexico--ORGANPIPE CACTUS (Cereus thurberi Engelm.), page 90.
- DD. Branches angular, with usually 5 to 7 longitudinal ridges; not in New Mexico--SENITA (Cereus schottii Engelm.), page 91.
- BB. Branches less than 2 inches in diameter, jointed, composed of many tubercles--CHOLLA (Opuntia).
- E. Joints of branches more than  $1\frac{1}{4}$  inches in diameter, pale green, with rounded tubercles less than twice as long as wide; spines covered with straw-colored sheaths; fruits spineless, proliferating and hanging in branching clusters; not in New Mexico--JUMPING CHOLLA (Opuntia fulgida Engelm.), page 92.
- EE. Joints of branches less than  $1\frac{1}{4}$  inches in diameter, with tubercles more than twice as long as wide; sheaths of spines mostly shedding the first year; fruits single or sometimes 2 or 3 in a chain.
- F. Tubercles of joints less than  $\frac{3}{4}$  inch long; fruits mostly not spiny, fleshy when mature, remaining attached through the winter.
- G. Joints of branches green, mostly more than 1 inch in diameter; fruits bright yellow, strongly tubercled--TASAJO (Opuntia spinosior (Engelm.) Toumey), page 93.
- GG. Joints of branches purplish green or dark green, less than 1 inch in diameter; fruits green tinged with purple or red, not strongly tubercled; not in New Mexico--STAGHORN CHOLLA (Opuntia versicolor Engelm.), page 94.
- FF. Tubercles of joints long and narrow, 1 to 2 inches long; fruits spiny, dry, not remaining attached; not in New Mexico--BUCKHORN CHOLLA (Opuntia acanthocarpa Engelm. & Bigel.), page 94.



- AA. Branches and twigs not swollen, hard, with relatively fewer single or paired spines, or with spiny-toothed evergreen leaves.
- H. Twigs not spiny; leaves spiny-toothed and evergreen.
- I. Leaves oval to nearly round, flat, edges with many spiny teeth; fruit a red berry; not in New Mexico--HOLLYLEAF BUCKTHORN (Rhamnus crocea Nutt. var. ilicifolia (Kellogg) Greene), page 84.
- II. Leaves variously shaped, if oval to nearly round then not flat; fruit an acorn--OAK (Quercus).
- J. Veins slightly sunken on upper surface and prominently raised on lower surface--NETLEAF OAK (Quercus reticulata Humb. & Bonpl.), page 46.
- JJ. Veins not sunken on upper surface and only slightly raised on lower surface.
- K. Leaves with few spiny teeth, flat, shiny yellow green on both sides--EMORY OAK (Quercus emoryi Torr.), page 52.
- KK. Leaves with many spiny teeth, mostly curved or crisp and not flat.
- L. Leaves blue green above, yellowish green beneath, mostly less than 1 inch long--SHRUB LIVE OAK (Quercus turbinella Greene), page 48.
- LL. Leaves shiny yellow green above, yellowish or whitish beneath, mostly more than 1 inch long--PALMER OAK (Quercus chrysolepis Liebm. var. palmieri (Engelm.) Sarg.), page 51.
- HH. Twigs bearing spines or ending in spines; leaves neither spiny (except southwestern coralbean) nor evergreen (except tesota).
- M. Spines formed by sharp ends of ordinary twigs (in a few species additional single spines at some leaf bases or nodes); leaves simple or scalelike or none (twice compound in yellow paloverde).
- N. Twigs green, leafless most of year.
- O. Twigs with minute longitudinal whitish lines, hairless, flexible, upright, rushlike, in broomlike masses; fruit a long-pointed capsule  $\frac{3}{4}$  inch long; not in New Mexico--CANOTIA (Canotia holacantha Torr.), page 79.
- OO. Twigs without longitudinal lines, finely hairy when young, stiff, spreading.
- P. Twigs gray green, covered with pressed silky hairs, commonly branching at small angles; clusters of old fruits with a ring of 5 to 10 dry segments  $\frac{1}{4}$  inch long remaining attached; not in New Mexico--HOLACANTHA (Holacantha emoryi A. Gray), page 74.
- PP. Twigs dark green or yellow green, hairless except when young, branching at wide angles.
- Q. Twigs mostly dark green; leaves scalelike, soon shedding; fruit a black berry less than  $\frac{1}{4}$  inch in diameter--ALLTHORN (Koeberlinia spinosa Zucc.), page 88.
- QQ. Twigs, branches and bark yellow green; leaves twice (bipinnately) compound, with leaflets  $\frac{1}{8}$  inch or less in length, soon shedding; fruit a pod 2 to 3 inches long; not in New Mexico--YELLOW PALOVERDE (Cercidium microphyllum (Torr.) Rose & Johnst.), page 68.



- NN. Twigs gray or brown; leaves present or shed (very short-lived in smokethorn).
- R. Spines few at ends of some short lateral twigs (or absent); twigs reddish brown or gray with scattered whitish dots (lenticels); leaves more than 2 inches long, with veins raised beneath; not native in Arizona--AMERICAN PLUM (Prunus americana Marsh.), page 62.
- RR. Spines many, at ends of most twigs; twigs not as above; leaves less than  $1\frac{1}{2}$  inches long, with inconspicuous veins.
- S. Twigs gray or silvery with dense pressed hairs and with brown gland dots; leafless most of year; not in New Mexico--SMOKETHORN (Dalea spinosa A. Gray), page 71.
- SS. Twigs short hairy or hairless, neither silvery nor with brown gland dots.
- T. Twigs mostly brown; leaves more than  $\frac{3}{4}$  inch long--GUM BUMELIA (Bumelia lanuginosa (Michx.) Pers. var. rigida A. Gray), page 97.
- TT. Twigs light gray, leaves less than  $\frac{3}{4}$  inch long--CONDALIA (Condalia).
- U. Leaves  $\frac{3}{8}$  to  $\frac{3}{4}$  inch long, not narrowed toward base; berrylike fruits more than  $\frac{1}{4}$  inch in diameter, blue black, sweet--LOTWOOD CONDALIA (Condalia obtusifolia (Hook.) Webberb.), page 83.
- UU. Leaves  $\frac{1}{4}$  to  $\frac{1}{2}$  inch long, narrowed toward base; berrylike fruits less than  $\frac{1}{4}$  inch in diameter, black, very bitter; not in New Mexico--BITTER CONDALIA (Condalia globosa Johnst.), page 83.
- MM. Spines scattered along twigs or at leaf bases (nodes) but not at ends of twigs; leaves simple or compound, not scalclike.
- V. Twigs reddish brown, with scattered sharp spines  $\frac{3}{4}$  to  $2\frac{1}{2}$  inches long; leaves simple, toothed; fruit round, resembling a small apple, with thin flesh and bony nutlets--HAWTHORN (Crataegus).
- W. Spines few, less than 1 inch long; leaves elliptic, not lobed--RIVER HAWTHORN (Crataegus rivularis Nutt.), page 57.
- VV. Spines many,  $\frac{3}{4}$  to  $2\frac{1}{2}$  inches long; leaves ovate, slightly lobed.
- X. Leaves slightly 3- to 7-lobed, bright green and hairless; twigs mostly hairless--CERRO HAWTHORN (Crataegus erythropoda Ashe), page 57.
- XX. Leaves slightly 7- or 9-lobed, dark green above and paler beneath, loosely hairy on both sides; twigs hairy when young; not in Arizona--FIREBERRY HAWTHORN (Crataegus chrysocarpa Ashe), page 56.
- VV. Twigs and spines not as above; leaves compound; fruit a pod with beanlike seeds--LEGUME FAMILY (Leguminosae).
- Y. Spines scattered singly along twigs,  $\frac{1}{4}$  inch or less in length.
- Z. Spines straight, single at leaf bases (nodes); twigs, branches, and bark blue green; leaves twice (bipinnately) compound, soon shedding; not in New Mexico--BLUE PALOVERDE (Cercidium floridum Benth.), page 69.

- ZZ. Spines curved or hooked.
- a. Twigs slender, reddish brown or purplish, bearing stout, hooked, reddish spines scattered and not at nodes; leaves twice (bipinnately) compound; seeds dark brown; CATCLAW ACACIA (Acacia greggii A. Gray), page 63.
  - aa. Twigs thick, brittle, light tan, bearing many hooked spines single (sometimes paired) below leaf bases and leaf scars (nodes); leaves with spiny leafstalk and 3 triangular leaflets borne in summer; seeds bright red—SOUTHWESTERN CORAL-BEAN (Erythrina flabelliformis Kearney), page 73.
- YY. Spines paired at leaf bases and leaf scars (nodes), 1/8 to 1/2 inch or more in length.
- b. Nodes with a third, larger spine ending the very short leaf axis; leaves twice (bipinnately) compound with 1 to 3 pairs of flattened, narrow, evergreen "streamers" 8 to 20 inches long and many short-lived leaflets—JERUSALEM-THORN (Parkinsonia aculeata L.), page 67.
  - bb. Nodes with only 2 spines; leaves without evergreen "streamers."
  - c. Spines white, straight, slender, mostly 1/8 to 1/2 inch long; leaves twice (bipinnately) compound with 3 to 6 pairs of divisions, each with 10 to 25 pairs of leaflets; not in New Mexico—SWEET ACACIA (Acacia farnesiana (L.) Willd.), page 64.
  - cc. Spines otherwise; leaves with fewer leaflets.
  - d. Leaves twice (bipinnately) compound; pod not splitting open, thick and slightly sweet—MESQUITE (Prosopis).
  - e. Paired spines separate; short knotlike spurs 1/4 to 1/2 inch in diameter developing at older nodes; pod slightly flattened, 3 to 8 inches long—MESQUITE (Prosopis juliflora (Sw.) DC.), page 65.
  - cc. Paired spines united in a stalklike base bearing leafstalk; pod tightly coiled like a large screw, 1 to 1 1/2 inches long—FREMONT SCREWBEAN (Prosopis pubescens Benth.), page 66.
  - dd. Leaves once (pinnately) compound; pod splitting open, thin-walled.
  - f. Twigs brown, with brown or reddish stout paired spines 1/4 to 1/2 inch long; leaves deciduous; leaflets thin, bristle-tipped—NEW MEXICAN LOCUST (Robinia neo-mexicana A. Gray), page 72.
  - ff. Twigs green or gray, becoming light brown, with stout gray to brown paired spines 1/4 to 3/8 inch long; leaves evergreen or nearly so; leaflets thick, not bristle-tipped; not in New Mexico—TESOTA (Olneya tesota A. Gray), page 72.

#### PART 4, KEY TO SPINELESS HARDWOODS (DICOTYLEDONS)

Trees without spines on branches, twigs, and leaves; leaves deciduous or evergreen, mostly broad and flat. (The 5 species with spiny-toothed leaves are included in both Parts 3 and 4.)

Note: Use this key if leaves are present (after leaves are shed, old leaves often can be found on some twigs or on the ground). If leaves are absent, use Part 5, page 20.

- A. Leaves very small and crowded, less than  $\frac{1}{2}$  inch long, scalelike or divided into 3 to 7 very narrow lobes.
  - B. Leaves about  $\frac{1}{16}$  inch long, scalelike—FRENCH TAMARISK (Tamarix gallica L.), page 86.
  - BB. Leaves  $\frac{1}{4}$  to  $\frac{1}{2}$  inch long, wedge-shaped and divided into 3 to 7 very narrow lobes, thick with edges rolled under, with white resinous dots, evergreen—CLIFFROSE (Cowania stansburiana Torr.), page 58.
- AA. Leaves more than  $\frac{1}{2}$  inch long, variously arranged, neither scalelike nor with narrow lobes.
  - C. Leaves very narrow, more than 20 times as long as wide, 3 to 6 inches long, simple, mostly single (alternate) but partly paired (opposite) or in 3's—DESERTWILLOW (Chilopsis linearis (Cav.) Sweet), page 102.
  - CC. Leaves less than 10 times as long as broad, simple or divided into leaflets (compound).
    - D. Leaves and some twigs in pairs (opposite).
      - E. Leaves or the 3 or 5 leaflets coarsely and irregularly toothed, with veins extending to teeth; fruits paired, clustered, long-winged "keys"—MAPLE (Acer).
      - F. Twigs greenish; leaves compound with 3 or sometimes 5 leaflets, and leaflet stalked—INLAND BOXELDER (Acer negundo L. var. interius (Britton) Sarg.), page 80.
    - FF. Twigs reddish to brown; leaves simple or compound with 3 leaflets and end leaflet stalkless.
      - G. Leaves 3- or 5-lobed or with 3 leaflets, edges sharply and doubly saw-toothed—ROCKY MOUNTAIN MAPLE (Acer glabrum Torr.), page 80.
      - GG. Leaves 3-lobed, edges with a few large blunt teeth—BIGTOOTH MAPLE (Acer grandidentatum Nutt.), page 81.
  - EE. Leaves or leaflets not coarsely toothed, with veins curved within edges.
    - H. Leaves simple, ovate or elliptical, not toothed, with about 5 long, curved veins on each side of midrib—RED-OSTER DOGWOOD (Cornus stolonifera Michx.), page 95.
  - HH. Leaves compound with 2 to 9 leaflets or if simple not as above.
    - I. Leaves compound with finely saw-toothed leaflets; twigs with large pith—ELDER (Sambucus).
    - J. Leaflets 3 or 5, thick, evergreen—MEXICAN ELDER (Sambucus mexicana Presl.), page 103.
    - JJ. Leaflets 5 to 9, thin or thick, deciduous—BLUEBERRY ELDER (Sambucus glauca Nutt.), page 104.



- II. Leaves compound or simple; leaflets or leaves bluntly or coarsely toothed or without teeth.
  - K. Leaves less than 1 inch long, simple, with toothless edges slightly rolled under, evergreen; fruits egg-shaped,  $\frac{1}{2}$  to  $\frac{3}{8}$  inch long; not in New Mexico--DESERT-OLIVE FORESTIERA (Forestiera phyllireoides (Benth.) Torr.), page 101.
  - KK. Leaves more than 1 inch long; fruits clustered but not paired, long-winged "keys"--ASH (Fraxinus).
  - L. Twigs 4-angled.
    - M. Leaves simple or occasionally with 2 or 3 leaflets, rounded or short-pointed at apex--SINGLELEAF ASH (Fraxinus anomala Torr.), page 98.
    - MM. Leaves compound with 3 to 7 leaflets, long- or short-pointed; not in New Mexico--LOWELL ASH (Fraxinus lowellii Sarg.), page 98.
    - LL. Twigs round or rounded.
      - N. Leaflets mostly rounded at apex, with veins inconspicuous; leaf axis narrowly winged; nearly evergreen; not in New Mexico--GREGG ASH (Fraxinus greggii A. Gray), page 99.
      - NN. Leaflets pointed, with veins conspicuous; leaf axis usually not winged.
        - O. Leaflets mostly less than  $\frac{1}{2}$  inch wide, long-stalked (leaves occasionally simple in a variety)--FRAGRANT ASH (Fraxinus cuspidata Torr.), page 99.
        - OO. Leaflets  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches wide, short- or long-stalked--VELVET ASH (Fraxinus velutina Torr.), page 100.
  - DD. Leaves and twigs single (alternate) or leaves crowded together.
    - P. Leaves divided into 3 to many leaflets (compound), the leaflets attached along the extended leafstalk or axis.
      - Q. Leaves twice (bipinnately) compound with 4 to 9 pairs of featherlike divisions bearing numerous leaflets  $\frac{1}{4}$  inch long; not in New Mexico--LITTLELEAF LYSILOMA (Lysiloma microphylla Benth.), page 63.
    - QQ. Leaves once (pinnately) compound; leaflets fewer and larger.
      - R. Leaflets 3 or 5.
        - S. Leaflets 3, long-pointed, slightly wavy toothed or without teeth, with many minute clear dots, not evergreen; leaves and twigs strong scented when crushed--HOPTREE (Ptelea).
        - T. Twigs straw-colored to greenish yellow; leaflets mostly more than 3 times as long as wide--PALE HOPTREE (Ptelea pallida Greene), page 73.
        - TT. Twigs brown or dark purple; leaflets mostly less than 3 times as long as wide--NARROWLEAF HOPTREE (Ptelea angustifolia Benth.), page 74.
      - SS. Leaflets 3 or 5, short-pointed, edges without teeth, thick and evergreen--MEARNS SUMAC (Rhus choriophylla Woot and Standl.), page 78.



- RR. Leaflets more than 5.
- U. Leaflets with long narrow tapering points, one-sided.
- V. Leaflets with saw-toothed edges and characteristic walnut odor; fruit an edible walnut--  
WALNUT (Juglans).
- W. Leaflets usually 17 to 23, narrowly lance-shaped, less than  $\frac{1}{2}$  inch wide; walnut fruit  $\frac{1}{2}$  to  $\frac{3}{4}$  inches in diameter; not in Arizona--  
LITTLE WALNUT (Juglans microcarpa Berland.), page 42.
- WW. Leaflets usually 9 to 13, lance-shaped or broadly lance-shaped, mostly more than  $\frac{3}{4}$  inch wide; walnut fruit 1 to  $1\frac{1}{2}$  inches in diameter--ARIZONA WALNUT (Juglans major (Torr.) Heller), page 43.
- WV. Leaflets with edges not toothed; fruits yellow, berrylike,  $\frac{1}{2}$  inch in diameter--WESTERN SOAPBERRY (Sapindus drummondi Hook & Arn.), page 82.
- UU. Leaflets rounded, slightly notched, or blunt pointed at apex, symmetrical.
- X. Leaves with axis not winged.
- Y. Leaflets 7 to 13,  $\frac{3}{4}$  to 2 inches long, shiny, leathery and evergreen; not in Arizona--MESCALBEAN (Sophora secundiflora (Ortega) Lag.), page 70.
- YY. Leaflets about 11 to 45,  $\frac{3}{8}$  to  $\frac{3}{4}$  inch long, gray green with conspicuous brown dots beneath, resinous and with disagreeable odor--  
KIDNEYWOOD (Eysenhardtia polystachya (Ortega) Sarg.), page 70.
- XX. Leaves with winged axis, aromatic--BURSERA (Bursera).
- Z. Leaflets 5 to 11, lance-shaped,  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches long; not in New Mexico--FRAGRANT BURSERA (Bursera odorata T. S. Brandege), page 75.
- ZZ. Leaflets 15 to 30, narrowly oblong, about  $\frac{1}{4}$  inch long; not in New Mexico--ELEPHANTTREE (Bursera microphylla A. Gray), page 76.
- PP. Leaves not divided into leaflets (simple).
- a. Leaves with 3 or more main veins from base.
- b. Leaves more than 6 inches long and wide, deeply divided into 3 to 10 long-pointed lobes.
- c. Leaves heart-shaped at base, edges mostly without teeth--ARIZONA SYCAMORE (Platanus wrightii S. Wats.), page 54.
- cc. Leaves with blade surrounding end of leafstalk, edges saw-toothed; naturalized in Arizona but not in New Mexico--CASTOR-BEAN (Ricinus communis L.), page 76.
- bb. Leaves less than 4 inches long, lobes short-pointed or none.
- d. Leaves rounded or blunt-pointed at apex, about as broad as long.

- c. Leaves  $1\frac{1}{2}$  to 4 inches long and wide, nearly round, not lobed; not in New Mexico—CALIFORNIA REDBUD (Cercis occidentalis Torr.), page 67.
- ce. Leaves  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches long and wide, usually 3-lobed, evergreen; not in New Mexico—CALIFORNIA FREMONTIA (Fremontodendron californicum (Torr.) Cov.), page 86.
- dd. Leaves sharp-pointed, about twice as long as wide.
  - f. Leaves usually thick, not lobed, edges without teeth or sometimes coarsely saw-toothed—NETLEAF HACKBERRY (Celtis reticulata Torr.), page 53.
  - ff. Leaves thin, often 3- to 5-lobed, edges coarsely saw-toothed—TEXAS MULBERRY (Morus microphylla Buckl.), page 54.
- aa. Leaves with a single main vein (midrib).
  - g. Juice milky, poisonous; not in New Mexico—JUMPING BEAN SAPIUM (Sapium biloculare (S.Wats.) Pax), page 77.
  - gg. Juice watery.
    - h. Winter buds 3 or more in cluster at tip of twig; pith of twigs star-shaped in cross section; fruit an acorn—OAK (Quercus).
    - i. Leaves deeply or shallowly lobed.
      - j. Leaves deeply 7- to 11-lobed halfway or more to middle, deciduous—GAMBEL OAK (Quercus gambelii Nutt.), page 50.
      - jj. Leaves shallowly lobed.
        - k. Leaves more than  $2\frac{1}{2}$  inches long, long- or short-pointed, thin and deciduous; not in Arizona—CHINQUAPIN OAK (Quercus muehlenbergii Engelm.), page 50.
        - kk. Leaves mostly less than  $2\frac{1}{2}$  inches long, short-pointed, thick and evergreen—WAVYLEAF OAK (Quercus undulata Torr.), page 49.
    - ii. Leaves not lobed, edges toothed or without teeth, evergreen or nearly so.
      - l. Veins slightly sunken on upper surface and prominently raised on lower surface.
        - m. Leaves densely white woolly beneath, sharp-pointed and usually without teeth, edges rolled under—SILVERLEAF OAK (Quercus hypoleucoides A. Camus), page 52.
      - mm. Leaves hairy beneath, rounded or short-pointed and toothed toward apex, edges not rolled under.
        - n. Leaves slightly curved and concave beneath, teeth conspicuous and spiny—NETLEAF OAK (Quercus reticulata Humb. & Bonpl.), page 46.
        - nn. Leaves flat, teeth small and inconspicuous—ARIZONA WHITE OAK (Quercus arizonica Sarg.), page 47.
    - ll. Veins not sunken on upper surface and only slightly raised on lower surface.
      - o. Leaves with many spiny teeth.

- p. Leaves blue green above, yellowish green beneath, mostly less than 1 inch long—SHRUB LIVE OAK (Quercus turbinella Greene), page 48.
- pp. Leaves shiny yellow green above, yellowish or whitish beneath, mostly more than 1 inch long—PALMER OAK (Quercus chrysolepis Liebm. var. palmeri (Engelm.) Sarg.), page 51.
- oo. Leaves with few small teeth or none.
- q. Leaves blue green.
  - r. Leaves rounded at apex, without hairs at maturity—MEXICAN BLUE OAK (Quercus oblongifolia Torr.), page 46.
  - rr. Leaves blunt or short-pointed at apex, densely hairy beneath—GRAY OAK (Quercus grisea Liebm.), page 48.
- qq. Leaves shiny yellow green.
  - s. Leaves less than 1 inch long; not in New Mexico—TOUVEY OAK (Quercus toumeyi Sarg.), page 48.
  - ss. Leaves more than 1 inch long—EMORY OAK (Quercus emoryi Torr.), page 52.
- hh. Winter buds 1 or none at tip of twig; pith of twigs mostly round or nearly so in cross section (in a few species 3- or 5-angled); fruit not an acorn.
- t. Leaves thick, evergreen, with edges flat or turned under.
- u. Leaves densely and finely hairy beneath.
  - v. Leaf edges flat, irregularly saw-toothed—TORREY VAUQUELINIA (Vauquelinia californica (Torr.) Sarg.), page 55.
- vv. Leaf edges rolled or turned under, with or without teeth.
  - w. Leaves more than  $1\frac{1}{4}$  inches long, edges finely and inconspicuously toothed, fruit a berry  $\frac{3}{8}$  inch in diameter—CALIFORNIA BUCKTHORN (Rhamnus californica Eschsch var. ursina (Greene) McMinn), page 84.
- ww. Leaves less than  $1\frac{1}{4}$  inches long; fruit with a twisted hairy tail  $1\frac{1}{2}$  to 3 inches long—MOUNTAIN-MAHOGANY (Cercocarpus).
- x. Leaves shiny and leathery, edges without teeth and strongly rolled under; not in New Mexico—CURLLEAF MOUNTAIN-MAHOGANY (Cercocarpus ledifolius Nutt.), page 58.
- xx. Leaves not shiny or leathery, edges toothed above middle and slightly turned under.
  - y. Leaf edges with few rounded teeth near apex—HAIRY MOUNTAIN MAHOGANY (Cercocarpus breviflorus A. Gray), page 59.



- yy. Leaf edges finely toothed above middle with pointed teeth; not in New Mexico—BIRCHLEAF MOUNTAIN-MAHOGANY (Cercocarpus betuloides Nutt.), page 60.
- uu. Leaves hairless or nearly so.
  - z. Leaves spiny-toothed, oval to nearly round, hollylike; not in New Mexico—HOLLYLEAF BUCKTHORN (Rhamnus crocea Nutt. var. ilicifolia (Kellogg) Greene), page 84.
  - zz. Leaves not spiny and without teeth (or sometimes toothed in madrone), somewhat longer than broad.
    - A. Twigs red, finely hairy when young, becoming reddish brown and scaly—MADRONE (Arbutus).
    - B. Leaves lance-shaped, short-pointed—ARIZONA MADRONE (Arbutus arizonica (A. Gray) Sarg.), page 96.
    - BB. Leaves oval to lance-shaped, rounded or short-pointed at apex; not in Arizona—TEXAS MADRONE (Arbutus texana Buckl.), page 96.
    - AA. Twigs not reddish and not scaly.
      - C. Twigs and leaves blue green; leaves not leathery—TREE TOBACCO (Nicotiana glauca Graham), page 101.
      - CC. Twigs brown or gray; leaves leathery—SUMAC (Rhus).
        - D. Leaves short-pointed, not flat but curved upward at midrib, shiny light green on both sides; not in New Mexico—SUGAR SUMAC (Rhus ovata S. Wats.), page 78.
        - DD. Leaves rounded or blunt-pointed at apex, flattened, dark green above with whitish veins; Tinajas Altas Mountains, Arizona, and not in New Mexico—KEARNEY SUMAC (Rhus kearneyi Barkley), page 78.
- tt. Leaves thin, deciduous, flat.
  - E. Leaf blades more than 3 times as long as wide, edges finely saw-toothed (or leaf blades broader and edges without teeth).
  - F. Twigs slender, yellowish to red, purple or brown; winter buds covered by a single scale; seed capsules many on an upright axis (catkin) and containing many cottony seeds—WILLOW (Salix).
  - G. Leaves very narrow, less than  $\frac{1}{4}$  inch wide, almost stalkless.
    - H. Leaves less than  $1\frac{1}{4}$  inches long, slightly hairy—YEWLEAF WILLOW (Salix taxifolia H. B. K.), page 39.



- HH. Leaves 2 to 4 inches long, with long silky white hairs pressed against lower surface—COYOTE WILLOW (Salix exigua Nutt.), page 38.
- GG. Leaves more than 1/4 inch wide, distinctly stalked.
- I. Leaf edges finely saw-toothed; leaves usually hairless at maturity.
- J. Leaf edges with yellowish gland-tipped teeth.
- K. Leaves paler or whitish beneath—PACIFIC WILLOW (Salix lasiandra Benth.), page 35.
- KK. Leaves green on both sides—WHIPLASH WILLOW (Salix caudata (Nutt.) Heller var. bryantiana Ball & Bracelin), page 35.
- JJ. Leaf edges saw-toothed but without yellowish glands.
- L. Leaves green on both sides—GOODDING WILLOW (Salix gooddingi Ball), page 36.
- LL. Leaves paler or whitish beneath.
- M. Leaves long-pointed.
- N. Leaves broadest near middle and tapering to base; twigs red or purple—BONPLAND WILLOW (Salix bonplandiana H. B. K.), page 36.
- NN. Leaves broadest below middle; twigs yellowish—PEACHLEAF WILLOW (Salix amygdaloides Anderss.), page 37.
- MM. Leaves short-pointed.
- O. Leaves usually wedge-shaped at base, 2 to 6 inches long; small or medium-sized tree; not in New Mexico—RED WILLOW (Salix laevigata Bebb), page 36.
- OO. Leaves broad and rounded at base, 1 to 3 inches long; usually shrubby—YELLOW WILLOW (Salix lutea Nutt.), page 40.
- II. Leaf edges without teeth or slightly wavy; leaves more or less white hairy beneath.
- P. Leaves about 5 times as long as wide—ARROYO WILLOW (Salix lasiolepis Benth.), page 40.
- PP. Leaves less than 3 times as long as wide.

- Q. Upper leaf surface yellow green or shiny, nearly hairless—SCOULER WILLOW (Salix scouleriana Barrett), page 41.
- QQ. Upper leaf surface dull green, hairy—BEBB WILLOW (Salix bebbiana Sarg.), page 41.
- FF. Twigs stout, yellowish but becoming light gray; winter buds with about 5 scales exposed, resinous—NARROWLEAF COTTONWOOD (Populus angustifolia James), page 31.
- EE. Leaf blades less than 3 times as long as wide, edges coarsely or finely toothed.
- R. Leafstalks flattened, long, slender, about as long as leaf blade; leaf edges with curved teeth; seed capsules many on a drooping axis (catkin) and containing many cottony seeds—COTTONWOOD, ASPEN (Populus).
- S. Leaf blades nearly round, finely toothed—QUAKING ASPEN (Populus tremuloides Michx.), page 32.
- SS. Leaf blades broadly triangular, coarsely saw-toothed.
- T. Leaf blades long-pointed; not in Arizona—PLAINS COTTONWOOD (Populus sargentii Dode), page 34.
- TT. Leaf blades short-pointed.
- U. Leaf blades mostly abruptly short-pointed; seed capsules narrow and mostly shorter than stalks; not in Arizona—RIO GRANDE COTTONWOOD (Populus wislizeni S. Wats.) Sarg.), page 34.
- UU. Leaf blades mostly bluntly short-pointed; seed capsules egg-shaped and longer than stalks—FREMONT COTTONWOOD (Populus fremontii S. Wats.), page 33.
- RR. Leafstalks round, short, less than half as long as leaf blade; leaf edges coarsely or finely saw-toothed; seeds not cottony and not borne in capsules.
- V. Leaf edges usually doubly saw-toothed with alternating teeth mostly uneven; fruit dry, conelike.
- W. Young twigs with some glandular hairs or gland dots; conelike fruit papery or membranous.
- X. Leaves hairy beneath; twigs with glandular hairs; conelike fruit of baglike, papery bracts—KNOWLTON HOPHORNBEAM (Ostrya knowltoni Cov.), page 44.
- XX. Leaves not hairy; twigs with many gland dots; cone fruit with membranous scales—WATER BIRCH (Betula occidentalis Hook.), page 44.

- WV. Young twigs hairy or hairless but not glandular; cone fruit with hard black scales, remaining on tree in winter---ALDER (Alnus).
- Y. Leaves slightly lobed, with rounded, straight, or slightly heart-shaped base---THINLEAF ALDER (Alnus tenuifolia Nutt.), page 45.
- YY. Leaves mostly not lobed, gradually narrowed at base---ARIZONA ALDER (Alnus oblongifolia Torr.), page 45.
- VV. Leaf edges with uniform teeth; fruit juicy, round.
  - Z. Leaves nearly round to elliptic, edges coarsely toothed above middle---UTAH SERVICE BERRY (Amelanchier utahensis Koehne), page 56.
  - ZZ. Leaves about twice as long as wide, edges finely toothed from base to apex.
    - a. Leafstalks, young twigs, and naked buds with dense coat of minute light brown hairs---BIRCHLEAF BUCKTHORN (Rhamnus betulaeifolia Greene), page 85.
    - aa. Leafstalks, young twigs, and buds hairless or slightly gray hairy---CHERRY, CHOKECHERRY, PLUM (Prunus).
      - b. Leaves long-pointed at apex, appearing slightly wrinkled, with veins raised beneath; not native in Arizona---AMERICAN PLUM (Prunus americana Marsh.), page 62.
      - bb. Leaves short-pointed or rounded at apex, flat, with veins not raised beneath.
        - c. Leaves not shiny above, edges with blunt gland-tipped teeth---BITTER CHERRY (Prunus emarginata (Dougl.) D. Dietr.), page 60.
        - cc. Leaves shiny above, edges sharply saw-toothed.
          - d. Leaf blades rounded or heart-shaped at base, whitish beneath---COMMON CHOKECHERRY (Prunus virginiana L.), page 61.
          - dd. Leaf blades short-pointed at base, only slightly paler beneath---SOUTHWESTERN CHOKECHERRY (Prunus virens (Woot. & Standl.) Shreve), page 62.



PART 5, WINTER KEY TO DECIDUOUS SPINELESS HARDWOODS (DICOTYLEDONS)

Note: Use this key for trees with neither leaves nor spines. If old leaves are found on some twigs or on the ground, it may be easier to use Part 4, page 11. All species of Part 5 are also in Part 4.

- A. Scale leaves 1/16 inch long or their broken bases remaining attached singly (alternate) on slender reddish or yellowish twigs; leaf scars absent (leafy twigs shedding and leaving a round twig scar)—FRENCH TAMARISK (Tamarix gallica L.), page 86.
- AA. Scale leaves absent; leaf scars from larger leaves present.
  - B. Leaf scars and winter buds mostly single (alternate) but partly paired (opposite) or in 3's; leaf scars with 1 dotlike bundle scar; fruit a very long and narrow seed capsule or pod 4 to 10 inches long, remaining attached in winter—DESERTWILLOW (Chilopsis linearis (Cav.) Sweet), page 102.
  - BB. Leaf scars and winter buds either all paired (opposite) or all single (alternate) or sometimes crowded together; leaf scars with 3 or more dotlike bundle scars; individual fruits less than 2 inches long, variously shaped.
    - C. Leaf scars, winter buds, and some twigs in pairs (opposite).
      - D. Twigs with large, soft pith—BLUEBERRY ELDER (Sambucus glauca Nutt.), page 104.
      - DD. Twigs with small pith.
        - E. Winter buds mostly pointed; leaf scars small, with 3 bundle scars.
          - F. Winter buds stalked; some bases of leafstalks remaining attached and covering leaf scars; twigs purplish red—RED-OSIER DOGWOOD (Cornus stolonifera Michx.), page 95.
          - FF. Winter buds not stalked; bases of leafstalks not remaining attached; twigs greenish or red to brown—MAPLE; BOXELDER (Acer).
            - G. Twigs greenish—INLAND BOXELDER (Acer negundo L. var. interius (Britton) Sarg.), page 80.
            - GG. Twigs red to brown.
              - H. Winter buds of 2 scales meeting at edges, hairless—ROCKY MOUNTAIN MAPLE (Acer glabrum Torr.), page 80.
              - HH. Winter buds of 4 or more overlapping scales, slightly hairy—BIGTOOTH MAPLE (Acer grandidentatum Nutt.), page 81.
          - EE. Winter buds rounded or blunt; leaf scars relatively large, nearly half round, with many bundle scars—ASH (Fraxinus).
            - I. Twigs 4-angled.
              - J. Leaf scars mostly less than 1/8 inch wide—SINGLELEAF ASH (Fraxinus anomala Torr.), page 98.
              - JJ. Leaf scars mostly more than 1/8 inch wide; not in New Mexico—LOWELL ASH (Fraxinus lowellii Sarg.), page 98.
            - II. Twigs round or rounded.



- K. Leaf scars raised; winter buds dark brown; twigs slender, hairless--FRAGRANT ASH (Fraxinus cuspidata Torr.), page 99.
- KK. Leaf scars not raised; winter buds brown; twigs mostly stout, hairy or hairless--VELVET ASH (Fraxinus velutina Torr.), page 100
- CC. Leaf scars, winter buds, and twigs single (alternate) or sometimes crowded together.
- L. Winter buds apparently not composed of scales.
- M. Winter buds naked, composed of minute immature leaves densely covered with short light brown hairs--BIRCHLEAF BUCKTHORN (Rhamnus betulacifolia Greene), page 85.
- MM. Winter buds sunken, appearing as a tuft of pale yellow silky hairs in a horseshoe-shaped leaf scar; twigs with strong odor when crushed--HOPTREE (Ptelea).
- N. Twigs straw-colored to greenish yellow--PALE HOPTREE (Ptelea pallida Greene), page 73.
- NN. Twigs brown or dark purple--NARROWLEAF HOPTREE (Ptelea angustifolia Benth.), page 74.
- LL. Winter buds covered by one or more scales.
- O. Winter buds 3 or more in cluster at tip of twig; pith of twigs star-shaped in cross section; fruit an acorn--OAK (Quercus).
- P. Twigs slightly hairy toward tip--GAMBEL OAK (Quercus gambelii Nutt.), page 50.
- PP. Twigs not hairy; rare and local in New Mexico and not in Arizona--CHINQUAPIN OAK (Quercus muehlenbergii Engelm.), page 50.
- OO. Winter buds 1 or none at tip of twig; pith of twigs mostly round or nearly so in cross section (in a few species 3- or 5-angled); fruit not an acorn.
- Q. Twigs more or less zig-zag, with leaf scars and winter buds in 2 vertical rows along twig.
- R. Winter buds covered by a single exposed scale; leaf scar ring-shaped and surrounding winter bud--ARIZONA SYCAMORE (Platanus wrightii S. Wats.), page 54.
- RR. Winter buds with 2 or more scales exposed; leaf scar short at base of winter bud.
- S. Winter buds pressed closely against twig; pith with partitions (chambered)--NETLEAF HACKBERRY (Celtis reticulata Torr.), page 53.
- SS. Winter buds spreading from twig; pith solid.
- T. Twigs with hairs or glands near tip.
- U. Twigs hairy and with some glandular hairs--KNOWLTON HOPHORNBEAM (Ostrya knowltoni Cov.), page 44.
- UU. Twigs with many gland dots--WATER BIRCH (Betula occidentalis Hook.), page 44.
- TT. Twigs without hairs or glands; not in New Mexico--CALIFORNIA REDBUD (Cercis occidentalis Torr.), page 67.

- QQ. Twigs straight or curved, not zig-zag, with leaf scars and winter buds in more than 2 vertical rows along twig.
- V. Winter buds covered by a single exposed scale; twigs mostly slender--WILLOW (Salix; the different species not readily distinguished in winter condition).
- VV. Winter buds with 2 or more scales exposed.
  - W. Winter buds stalked, of 2 or 3 scales meeting at their edges; fruit a black cone remaining on tree in winter--ALDER (Alnus).
  - X. Twigs finely hairy toward tip; winter buds slightly hairy--THINLEAF ALDER (Alnus tenuifolia Nutt.), page 45.
  - XX. Twigs and winter buds hairless or nearly so--ARIZONA ALDER (Alnus oblongifolia Torr.), page 45.
- WW. Winter buds not stalked, of overlapping scales; fruit not a cone.
  - Y. Winter buds of inconspicuous scales, mostly rounded, short, and small.
  - Z. Winter buds and young twigs hairy; bark rough or scaly.
    - a. Young twigs bearing many dots.
      - b. Young twigs brown with brown gland dots; 2 needlelike scales (stipules)  $\frac{1}{3}$  inch long present at some leaf scars--KIDNEYWOOD (Eysenhardtia polystachya (Ortega) Sarg.), page 70.
    - bb. Young twigs reddish brown with many light brown dots (lenticels); without scales (stipules) at leaf scars--LITTLELEAF LYSILOMA (Lysiloma microphylla Benth.), page 63.
  - aa. Young twigs not dotted; buds often 2 together (superposed), 1 above the other at a leaf scar.
    - c. Buds gray; twigs brown or gray, with characteristic walnut odor; pith brown, with partitions (chambered)--WALNUT (Juglans).
    - d. Tree small or shrubby, usually branching near ground; walnut fruit  $\frac{1}{2}$  to  $\frac{3}{4}$  inch in diameter; not in Arizona--LITTLE WALNUT (Juglans microcarpa Berland.), page 42.
    - dd. Tree small to medium-sized, with trunks branched above; walnut fruit 1 to  $1\frac{1}{2}$  inches in diameter--ARIZONA WALNUT (Juglans major (Torr.) Heller), page 43.

- cc. Buds yellow to brown; twigs yellow green, becoming gray; pith pale yellow, solid—WESTERN SOAPBERRY (Sapindus drummondi Hook. & Arn.), page 82.
- ZZ. Winter buds and twigs without hairs; bark papery; strongly aromatic trees—BURSERA (Bursera).
- e. Twigs bright green (brown in dried specimens); not in New Mexico—FRAGRANT BURSERA (Bursera odorata T. S. Brandegee), page 75.
- ec. Twigs reddish brown; not in New Mexico—ELEPHANTTREE (Bursera microphylla A. Gray), page 76.
- YY. Winter buds of conspicuous scales, mostly pointed and long.
- f. Winter buds resinous or sticky, shiny; lowest bud scale centered over leaf scar (directly in front); twigs stout, mostly light gray—COTTONWOOD, ASPEN (Populus).
- g. Winter buds  $\frac{1}{4}$  inch or less in length, short-pointed, only slightly resinous—QUAKING ASPEN (Populus tremuloides Michx.), page 32.
- gg. Winter buds more than  $\frac{3}{8}$  inch long, long-pointed, very resinous.
- h. Winter buds hairless or nearly so, young twigs yellowish; tree of mountain zones—NARROWLEAF COTTONWOOD (Populus angustifolia James), page 31.
- hh. Winter buds minutely hairy; young twigs green to gray; trees chiefly of desert and plains zones.
- i. Tree of Great Plains region in northeastern New Mexico; not in Arizona—PLAINS COTTONWOOD (Populus sargentii Dode), page 34.
- ii. Tree of Southwest.
- j. Tree of western half of New Mexico; not in Arizona—RIO GRANDE COTTONWOOD (Populus wislizeni (S. Wats.) Sarg.), page 34.
- jj. Tree of Arizona and southwestern New Mexico—FREMONT COTTONWOOD (Populus fremontii S. Wats.), page 33.
- ff. Winter buds not resinous or sticky; lowest bud scales at side of bud; twigs slender, purplish, reddish, gray, or brown.



- k. Winter buds slightly one-sided; leaf scars round or nearly so; twigs light brown, finely hairy toward tip—TEXAS MULBERRY (Morus microphylla Buckl.), page 54.
- kk. Winter buds not one-sided; leaf scars much broader than high; twigs darker, purplish or reddish to gray, hairless or hairy.
  - l. Leaf scars narrowly crescent-shaped; winter buds long-pointed, with loosely arranged pointed scales—UTAH SERVICE BERRY (Amelanchier utahensis Koehne), page 56.
  - ll. Leaf scars half-round or half-elliptical; winter buds short-pointed, with regularly overlapping rounded scales—CHERRY, CHOKECHERRY, PLUM (Prunus).
  - m. Terminal bud absent at end of twig; twigs stout and stiff, widely spreading, the short lateral twigs often ending in spines; not native in Arizona—AMERICAN PLUM (Prunus americana Marsh.), page 62.
  - mm. Terminal bud present at end of twig; twigs slender, not ending in spines.
    - n. Twigs often slightly hairy near tip; usually a shrub less than 13 feet tall—BITTER CHERRY (Prunus emarginata Dougl.) D. Dietr.), page 60.
    - nn. Twigs mostly hairless.
      - o. Shrub or small tree to 25 feet tall and about 6 inches in trunk diameter, often forming dense thickets; leaves deciduous—COMMON CHOKECHERRY (Prunus virginiana L.), page 61.
      - oo. Small to medium-sized tree to 40 feet tall and 2 feet in trunk diameter or large shrub; leaves nearly evergreen—SOUTHWESTERN CHOKECHERRY (Prunus virens (Woot. & Standl.) Shreve), page 62.

## LIST OF SPECIES OF SOUTHWESTERN TREES

The 135 tree species in this key are listed below by plant families in the usual botanical order. Page numbers refer to descriptions in the handbook, Southwestern Trees. The 99 tree species found in New Mexico are designated by an asterisk (\*) and the 126 in Arizona by a dagger (/).

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- \*~~/~~pinyon (Pinus edulis Engelm.), page 11.
- ~~/~~singleleaf pinyon (Pinus monophylla Torr. & Frem.), page 12.
- \*~~/~~bristlecone pine (Pinus aristata Engelm.), page 13.
- \*~~/~~limber pine (Pinus flexilis James), page 13.
- \*~~/~~Chihuahua pine (Pinus leiophylla Schiede & Deppe var. chihuahuana (Engelm.) Shaw), page 14.
- \*~~/~~ponderosa pine (Pinus ponderosa Laws.), page 15.
- \*~~/~~Apache pine (Pinus latifolia Sarg.), page 16.
- \*~~/~~Engelmann spruce (Picea engelmanni Parry), page 17.
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- \*~~/~~Douglas-fir (Pseudotsuga taxifolia (Poir.) Britton), page 18.
- \*~~/~~white fir (Abies concolor (Gord. & Glend.) Hoopes), page 19.
- \*~~/~~alpine fir (Abies lasiocarpa (Hook.) Nutt.), page 20.
- \*~~/~~Arizona cypress (Cupressus arizonica Greene), page 20.
- \*~~/~~alligator juniper (Juniperus deppeana Steud.), page 22.
- \*~~/~~Rocky Mountain juniper (Juniperus scopulorum Sarg.), page 22.
- \*~~/~~one-seed juniper (Juniperus monosperma (Engelm.) Sarg.), page 23.
- \*~~/~~Utah juniper (Juniperus osteosperma (Torr.) Little, page 24.

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- \*~~/~~Torrey yucca (Yucca torreyi Shafer), page 30.
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- ~~/~~red willow (Salix laevigata Bebb), page 36.
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