

# Key to *Potentillas* of Colorado

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(Key based in large part on Weber and Wittman, 2001a and 2001b. Plant dimensions are based on the References and additional measurements by the author on the collection at COLO. Many rachis measurements are from Johnston, 1980. Percentage of rachis occupied should be determined on the most mature leaves. Geographic ranges are based on Weber and Wittman, 2001 and 2001b, and the collections at COLO, CS, and RM through 2004-2005. )

## POTENTILLA L.

Flowers single or cymose; petals 4 or 5; stamens 10 or more; calyx of 4 or 5 sepals alternating with bracteoles; styles deciduous, attached near apex of achene; leaves compound.

### ————— CREEPING —————

- 1a. Plants creeping, with slender whip-like branches rooting at nodes; leaves palmately compound; flowers solitary in axils of stem leaves and petiolate. ....(1.1)
  - 1.1a. Flowers mostly 4-merous (the rest 5-merous), 12-18 mm wide; leaflets 3-5, leaf teeth serrate. **P. anglica** Laicharding (*P. procumbens*). Occasionally found in landscape plantings.
  - 1.1b. Flowers 5-merous, 18-25 mm wide; leaflets mostly 5, leaf teeth crenate. **P. reptans** L. An apparent waif from cultivation, only one known location in Colo., along Boulder Creek at White Rocks<sup>1</sup>.
- 1b. Plants not creeping, without stolons, not rooting at nodes .....(2)

### ————— NOT CREEPING —————

- 2a. Annuals, biennials, or weedy perennials, mostly of disturbed areas; basal leaves often dried up at flowering time, but often with basal rosette of green leaves in winter.....(3)
- 2b. Long-lived perennials, with usually well-developed rootstocks; basal leaves well developed and green at flowering time .....(8)

### ————— NONNATIVE AND RUDERAL SPECIES —————

- 3a. Leaves white-tomentose beneath and strongly bicolored, digitately compound with 3-5 very narrow leaflets, 2-6 toothed or lobed above the middle, with revolute margins. **P. argentea** L. Alien, only 4 Colo.<sup>2</sup> records, along the Front Range urban corridor at 5000-7500 ft, with stems 8-40 cm tall.
- 3b. Leaves not white-tomentose beneath, green on both sides.....(4)

<sup>1</sup> First collected in 1954 and identified as *P. anglica*. A recent collection from this locality by the author found predominantly 5-merous calyxes in fruit and best fits *P. reptans*. This site, on private land, needs to be visited in flower (June?) to confirm the identity. For descriptions of *P. anglica* and *P. reptans*, see Gleason and Cronquist 1963, or Clapham et al. 1987. 1 *Key to Potentillas of Colorado*

<sup>2</sup> First Colorado collection of *P. argentea* was in 1982.

- 4a. Leaves digitately compound. **P. recta** L. Flowers pale yellow; mature achenes strongly reticulate; pubescence of a short coat of often glandular hairs, and another of harsh spreading hairs (long pilose) hairs; leaves very coarsely toothed; some basal leaves often present. Sometimes long lived (10 or more years) and forming large clumps. Stems (2) 3-5 (8) dm tall. Styles ~1 -1.2 mm long. Alien<sup>3</sup>, 'List B' Noxious Weed. Current extent along Front Range and Wet Mountain Valley, 5200-8600 ft., but probably spreading. Vegetatively resembles *P. gracilis* (28b).
- 4b. Leaves pinnately compound or trifoliate .....(5)
- 5a. Leaves all pinnately compound with 5-11 leaflets; achene brown and often ridged, on one side a large, paler protuberance often nearly as large as the fruit; petals about as long or somewhat longer than sepals. **P. supina** L. subsp. **paradoxa** (Nutt.) Sojak. Apparently eastern slope only, wet bottomlands and shorelines on the plains, piedmont valleys, and San Luis Valley, 3900-7900 ft. (*P. paradoxa*).
- 5b. Some or all of the leaves with 3 leaflets (5 leaflets often on basal leaves of some *P. rivalis*) .....(6)
- 6a. Mature achenes usually strongly undulate-corrugate, stems and lower leaf surfaces with stiff spreading hairs (1-celled, nonglandular, ± pustular-based hairs); stamens 15-20; petals slightly shorter than the sepals. **P. norvegica** L. Almost always has 3 leaflets, rarely with 5 leaflets. Pastures, disturbed areas, roadsides, and shorelines, 5000-10,000 ft. Alien to western U.S.<sup>4</sup>, possibly native to eastern U.S.
- 6b. Achenes smooth or very slightly striate; stems soft pubescent below, one with glandular hairs; petals short, usually < ¾ the length of the sepals; stamens mostly 10-15.....(7)
- 7a. Non-glandular, lower cauline and basal leaves commonly 5 (9)-pinnate to subdigitate (occasionally all 3-foliate), basal portion of stems soft pubescent, often ± lanate with 1-celled hairs. **P. rivalis** Nutt. Stamens 10-15. Habit often shorter and more branched than *P. norvegica* or *P. biennis*. Floodplains and wet depressions, mostly on the east slope, 4000-9400 ft. Sometimes confused with *P. supina* ssp. *paradoxa*, which has larger petals and more obviously pinnate leaves, or *P. biennis*, which is glandular.
- 7b. Calyx glandular, lower cauline leaves 3-foliate, basal portion of stems with multicellular and glandular hairs. **P. biennis** Greene. Stamens about 10. Ruderal sites and meadows, mostly on the west slope, 7100-9000 ft. Habit and trifoliate leaves are similar to *P. norvegica*.

———— LONG-LIVED PERENNIALS —————

- 8a. [2] Style ≤ 1.0 (1.3) mm long<sup>5</sup>, shorter or only slightly longer than mature achene, often thickened and glandular roughened at base. Basal leaves with 3 or more leaflets .....(9)
- 8b. Style ≥ 1.3 (1.2) mm long or often much longer, slender, scarcely tapered, much longer than mature achene. Basal leaves with 5 or more leaflets (none with 3 leaflets)..... (14)

<sup>3</sup> First Colorado collection of *P. recta* was near Boulder in 1948.

<sup>4</sup> First Colorado collection of *P. norvegica* was from the Black Forest in 1873.

<sup>5</sup> Styles reach their maximum size early, just before anthesis (Holmgren 1997).

- 9a. Leaflets 7-15-pinnate (30-60% of rachis occupied by leaflets), to (less commonly) (5)7-subpinnate, deeply cut, commonly greenish or yellowish tomentose below; **P. pensylvanica** L. Leaflets with revolute margins; inflorescence tight-branched, the flowers clustered; stems often tall and erect, especially at lower elevations; stems with straight and spreading hairs; calyx often fine glandular; styles 0.8-1.1 (1.3) mm long; plants sometimes alpine but then leaves either clearly pinnate, stems erect-ascending, or with greenish or yellowish pubescence. Widely distributed, 5200-13,000 ft.
- The alpine subpinnate form, with 10-30% of rachis occupied by 5-7 (9?) leaflets, and leaf undersides densely covered with long white hairs is var. **paucijuga** (Rydb.) Welsh & Johnston. IMF includes var. **paucijuga** within *P. rubricaulis*.<sup>6</sup>
- 9b. Leaves always digitate, subdigitate with 3-5 (7) leaflets, or ternate ..... (10)
- 10a. Plains to montane, plant > 20 cm tall, usually erect, leaves green on both side, flowers pale yellow; achenes rugose-reticulate .....**P. recta** (4a)
- 10b. Alpine to upper subalpine, plants always short ( $\leq 25$  cm), leaf undersides white tomentose, flowers bright yellow, achenes smooth to weakly rugulose .....(11)
- 11a. Basal leaves digitate to subdigitate, 5 (7)-foliate, the lower pair sometimes very small, occupying 0-25 % of rachis; petioles conspicuously spreading-pilose, rarely also obscurely tomentose. **P. rubricaulis** Lehm. Leaflets usually deeply toothed, often revolute-margined; cymes 1-10 flowered; styles 0.7-1.1 mm long. Alpine to upper subalpine (?), (10,000) 11,500-13,500 ft. There is disagreement about how to delimit this species and whether it occurs in the subalpine.<sup>7</sup> Closely resembles *P. subjuga*, but readily separated by style length and petiole hairs. Close to *P. pensylvanica* var. *paucijuga*.
- 11b. Leaves 3-foliate (rarely 5 leaflets in *P. nivea* and *P. hookeriana*); petioles tomentose, some also with spreading, straight hairs .....(12)
- 12a. Flowers 1-3 per stem; plants densely matted, usually  $\leq 10$  cm tall; petioles densely pilose, with or without additional dense tomentum. **P. uniflora** Led. Flowers seem large in comparison to the rest of the plant. Alpine, 10,200-13,200 ft.
- 12b. Flowers > 3 on some stems, or else petioles plainly visible and plants not matted on talus slopes; petioles sparsely pilose or else densely tomentose ..... (13)
- 13a. Petioles densely tomentose, often with a few straight hairs as well; plants often low, matted. Flowers 1-9 (15) per cyme. Leaflets sometimes broadly and shallowly toothed. **P. nivea** L. Alpine, 10,400-13,000 ft.
- 13b. Petioles spreading-pilose, sometimes tomentose as well; plants taller, usually > 10 cm tall. Leaflets usually more deeply and narrowly toothed than the last. Flowers 3-15 per cyme. **P. hookeriana** Lehm. Alpine, 11,000-13200 ft. Some authors put it within *P. rubricaulis*.<sup>8</sup>

<sup>6</sup> Holmgren 1997.

<sup>7</sup> Welsh et al. 1993.

<sup>8</sup> Welsh et al. 1993.

LONG STYLE

- 14a. [8] Mature basal leaves mainly pinnate, leaflets occupying  $\geq 10\%$  of the rachis ..... (15)
- 14b. Mature basal leaves mainly digitate, leaflets usually occupying  $\leq 10\%$  of the rachis, rarely more .. (23)

LONG STYLE, PINNATE LEAVES

- 15a. Leaves green on both sides, often glabrous on both sides, but sometimes silky, pilose or slightly tomentose on underside..... (16)
- 15b. Lower leaf surfaces grayish tomentose or hirsute ..... (19)
  
- 16a. Plants large, usually  $> 4$  dm high; leaves over 2 dm long; stems densely pilose. **P. ambigenus** Greene. Stems (2) 3-8 dm tall; leaves with (4) 6-7 pairs of leaflets, silky villous on the rachis and underside veins. Sporadic, Front Range and Creede areas, 6700-8400 ft. Small or immature plants resemble *P. hippiana* in habit.
- 16b. Plants smaller in all respects, mostly glabrous, sometimes strigose, foliage and stems not densely pilose ..... (17)
  
- 17a. Moist to wet bottoms, streamsides, and mountain meadows. **P. plattensis** Nutt. Hairs of lower stem and petioles mostly straight and appressed. Leaflets 11-23. Eastern Slope and the upper Gunnison Basin, 4500-10,000 ft.
- 17b. Drier habitats, rocky ridges and well-drained meadows ..... (18)
  
- 18a. Leaflets toothed or lobed  $< 2/3$  to midrib; flower petals separated by gaps about 1/2 to 1 mm, with little or no orange spot at petal base; base of plant often crowded with old petiole and stem bases, stems erect to ascending. **P. rupincola** Osterh. Narrow endemic, on granitic outcrops and very thin soils, Larimer County and the southwest side of Tarryall Mts., 6600-10,800 ft. Intergrades with *P. effusa* where their ranges overlap. Distinguished from *P. effusa* by leaves shiny green on top and  $\pm$  glabrous beneath (except for strigose hairs on the midrib and margins).
- 18b. Leaflets usually deeply lobed,  $> 2/3$  to midrib; flower petals nearly touching, with a prominent orange spot at petal base; base of plant not crowded with old dried material; stems decumbent to ascending. **P. ovina** Macoun. Hairs of lower stem and petioles with hairs mostly crinkly and loose, sometimes glabrous. Leaflets (5) 9-18 (21), varying from deeply pinnately dissected to apically few toothed. Rocky ridges and dry slopes, submontane to alpine, 8000-13,000 ft. Plants with few leaflets closely resemble *P. rupincola*.
  
- 19a. [15] Leaflets narrow, folded, shallowly 3-toothed in upper third, densely silvery-gray hirsute beneath. **P. crinita** Gray. Distinctive. Leaflets 7-15. Uncommon in Colo.<sup>9</sup>; submontane, 6500-8500 ft., on shallow soils over shale and sandstone, Pagosa Springs, Chimney Rock area and east side of San Juan Mts.
- 19b. Leaflets broader, generally with  $> 3$  teeth, often tomentose or with sericeous hairs on ribs and margins, but not hirsute..... (20)

<sup>9</sup> Only 7 records from Colorado at COLO and RM, including some duplicates.

- 20a. Leaflets with deep narrow teeth, dissected  $\geq 2/3$  to midrib; alpine and subalpine, ridges and slopes mostly above 10,000 ft. **P. subjuga** Rydb. Leaflets 5- 7 (9), green strigose above, tomentose below, rachis 10-30 (40)% occupied by 3 - 5 terminal digitate leaflets and 1-2 lower pairs. Styles 1.5-2.4 mm long. Hairs of lower stems and petioles mostly appressed and straight<sup>10</sup>. (8700) 10,000-13,800 ft. (*P. concinna* var. *rubripes*<sup>11</sup>). Resembles *P. rubricaulis* (11a).
- 20b. Leaflets toothed  $< 2/3$  to midrib; subalpine and lower elevations ..... (21)
- 21a. Leaves strongly bicolored, green above, densely white tomentose below; often with a cluster of 5 digitate leaflets at end of rachis. **P. pulcherrima x hippiana**. Mostly montane to submontane meadows and lower slopes, usually below 10,500 ft. Leaves highly variable, some pinnate, some subdigitate, with 5-9 leaflets occupying 0 to 35 % of rachis; upper leaflets usually 5. 7000-10,500 (12,300) ft. A common cross producing many distinctive apomictic clones.
- 21b. Leaves not strongly bicolored, may be somewhat bicolored but then not densely white tomentose below; never with 5 digitately arranged leaflets at rachis end ..... (22)
- 22a. Bracteoles darker and smaller than the sepals; calyx densely white tomentose at base. Leaflets sometimes toothed irregularly, sometimes toothed only in the upper portion. **P. effusa** Dougl. Leaflets 5-11 (15). Leaf upper sides vary from gray tomentose to green subglabrous, but always with some tomentum on the undersides. Dry hillsides and rocky slopes, common on the Front Range, uncommon on the Western Slope. (5000) 6000-10,000 ft. No clear cut boundary with the next. Probably forms a continuum with *P. hippiana*.<sup>12</sup> (*P. hippiana* var. *effusa*<sup>13</sup>).
- 22b. Bracteoles the same color and length as the sepals; calyx primarily sericeous at the base, sometimes with tomentum. Leaflets evenly toothed throughout, often confluent and decurrent with the rachis. **P. hippiana** Lehm. Leaflets 9-15. Leaves often bicolored. Stems (20) 30-60 cm tall. Petioles and stems strigose and tomentose, not pilose. Longest basal leaf rachis usually  $< 2$  dm long. Dry hillsides and meadows, plains to subalpine (5200) 5600-12,000.

———— LONG STYLE, DIGITATE LEAVES —————

- 23a. [14] Plants short,  $< 2$  dm tall..... (24)
- 23b. Plants taller..... (26)
- 24a. Plant glandular; underside of flower petals creamy white. . **P. subviscosa** Greene. Leaves basal 5 (7)-digitate or subdigitate; leaflets prominently lobed; starts blooming in early spring. A species of AZ and NM; only 1 locality known in Colorado<sup>14</sup>.
- 24b. Plant not obviously glandular, petals yellow on both sides..... (25)

<sup>10</sup> *P. subjuga* is described in detail in Harrington 1954 and Johnston 1980.

<sup>11</sup> Hitchcock and Cronquist 1973

<sup>12</sup> Harrington 1954, did not recognize *P. effusa* as a separate species, and included it in *P. hippiana*.

<sup>13</sup> Dorn 2001

<sup>14</sup> *P. subviscosa* was collected twice (only two days apart) in 1941 in pine-oak association west of Trinidad at about 8000 ft. The locality is probably on private land.

- 25a. Leaves densely white tomentose beneath, often folded; stems ascending at anthesis, prostrate or decumbent in fruit. **P. concinna** Richardson. Blooms in spring; leaves mostly basal, digitate to subdigitate. Leaflets 5-7 (9), occupying 0-10 (25) % of rachis, often folded, stigose-pustulose above, from apically few toothed (almost entire) to deeply parted into narrow lobes, mostly toothed or lobed in upper ½ (2/3). Pine woods, rocky ridges, sagebrush to alpine, 7000-13,000 ft.
- 25b. Leaves ± green on both sides, not folded; leaflets green, glaucous, or sparsely silky, never tomentose; stems erect to ascending in flower and fruit ..... **P. diversifolia** (27a)
- 26a. [23] Leaves strongly bicolored, green above and densely white tomentose below, regularly toothed < 1/2 (2/3) to midrib. **P. pulcherrima** Lehm. (*P. gracilis* var. *pulcherrima*). Leaflets usually 7 (5-11), subdigitate to digitate, toothed along their whole length with 10-15 teeth per side; plants often large, with erect stems, large flowers; stems 30-60 (80) cm tall. Submontane to lower alpine, abundant, 5300 to 12,700 ft. Often forms hybrid swarms with *P. hippiana* (22b).
- 26b. Leaflets either not strongly bicolored, or more deeply toothed..... (27)
- 27a. Leaflets often glaucous, highly variable, few toothed to deeply lobed, often only in the upper half, 1-5 cm long; anthers 0.4-0.7 mm long; plants usually smaller, stems 10-35 (50) cm high. **P. diversifolia** Lehm. Leaflets 5-7, digitate to subdigitate, glaucous, green or sparsely silky, not tomentose. Abundant in alpine and subalpine, (8400) 10,500-13,900 ft. May intergrade with *P. gracilis*.<sup>15</sup>
- 27b. Leaflets never glaucous; regularly toothed or deeply lobed throughout, 3-10 cm long; anthers (0.6) 0.7-1.4 mm long; plants usually larger, stems (2) 4-8 dm high. **P. gracilis and allies**. Leaflets 5-9 digitate to rarely subdigitate, usually green above, never glaucous, variably glabrous to tomentose below; montane and subalpine ..... (28)
- 28a. Leaflets bicolored, white tomentose below, with deep, often linear, lobes extending > 2/3 to midrib, some lobes often > 1 cm long. **P. flabelliformis** Lehm. Moist soils, 7000-9500 ft. Rare in Colorado<sup>16</sup>, common in the Northwest (*P. gracilis* var. *flabelliformis*).
- 28b. Leaflets not bicolored, subglabrous to ± equally pubescent above and below; varies from coarsely crenate to deeply and narrowly toothed. **P. gracilis** Dougl. Vegetatively resembles *P. recta*, but flowers bright yellow, styles 1.6-2.5 mm long, and achenes only faintly areolate or veined. (7000) 8000-11,000 (12,000) ft. Often subdivided into varieties based on hairs and depth of leaf teeth.<sup>17</sup>

<sup>15</sup> Errter 1993.

<sup>16</sup> Only 7 records from Colorado at COLO, RM and CS.

<sup>17</sup> Welsh et al. 1993 and Dorn 2001.

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- Harrington, H.D., 1954, **Manual of the Plants of Colorado**. Useful for detailed descriptions of plants, but taxonomy is outdated, and descriptions are limited to collections before 1954. One of the few places where *P. subjuga* is described in detail (Johnston 1980 is the other). Does not contain *P. anglica*, *P. argentea*, *P. flabelliformis*, *P. hookeriana*, or *P. recta*. *P. nivea* and *P. uniflora* are apparently lumped together. *P. ovina* is apparently included within *P. plattensis*. *P. gracilis* is divided into 3 entries (*P. gracilis*, *P. brunnescens*, and *P. pectinisetia*). *P. rivalis* is divided into 2 entries (*P. rivalis* and *P. leucocarpa*). *P. norvegica* is synonymous with *P. monspeliensis*.
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