DOI: 10.1111/curt.70036

PLANT PORTRAIT

CURTIS'S
Botanical Magazine

# 1165. *Echinacea purpurea* (L.) Moench

## Compositae

**Nicholas Hind**[1] | **Masumi Yamanaka**[2] | **Naoko Yasue**[3]

[1]The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, UK

[2]Freelance artist

[3]Freelance artist

**Correspondence**
Nicholas Hind.
Email: n.hind@kew.org

**Summary**

*Echinacea purpurea* (L.) Moench (Compositae: Heliantheae: Zinniinae) is described and illustrated with a colour plate and black and white text figure. An introduction to the history of the appearance of this species in the *Magazine* appears in brief, together with comments on the treatment of the genus, and the available generic revisions. Notes are provided for the species' cultivation, propagation, likely pests and diseases, and availability, which includes a short list of the more commonly available cultivars. A full synonymy is given, along with type citations and known presence of type material, together with relevant notes. Selected illustrations of the species are cited, and statements of the species' distribution, habitat and ecology, phenology, etymology, conservation status and a lengthy list of vernacular names provided. Extensively grown as an ornamental and as a crop, naturalized material escaping from cultivation may well have extended the apparent range of the species. Also discussed and explained is the fact that what most people know as *Echinacea purpurea* is not that originally described by Linnaeus in 1753; Linnaeus' species is now correctly referred to as *Echinacea laevigata*. Discussions cover the lectotypification of the name *Rudbeckia purpurea* L., the over-abundant use of the 'drug' known as 'echinacea', the apparent lack of scientific evidence supporting its efficacy in many treatments, and the appropriate dosage rates and potential side effects. A warning is provided over the use of any plant material for medical purposes.

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## INTRODUCTION

The first issue of *The Botanical Magazine* …, published on February 1st 1787 by William Curtis (1746–1799), contained just three plates, the plants named *Iris persica* L. Persian Iris (Iridaceae), *Rudbeckia purpurea* L. Purple Rudbeckia (Compositae) [= *Echinacea purpurea* (L.) Moench – the generitype, but not strangely the subject of the present plant portrait] and *Helleborus hyemalis* L. Winter Hellebore, or Aconite (Ranunculaceae) [= *Eranthis hyemalis* (L.) Salisb.] (Curtis, 1787). In its then characteristic blue paper cover, the *Magazine* thus began its life as the 'world's longest running, continuously published botanical periodical'. Although uncredited, James Sowerby (1757–1822) was the artist of the *Iris*, that of the *Rudbeckia* and *Helleborus*, Sydenham Teast Edwards (1768–1819).

For those with good memories, and possibly a library containing the more recent volumes of the *Magazine*, readers may remember that this species also appeared as the second of six plates in the first issue in its reincarnation as '*The Kew Magazine*, incorporating *Curtis's Botanical Magazine*', in the *200th Anniversary Edition 1787–1987*, published in February 1987. The issue is striking, as it stands out with its red cover from the more usual cream-coloured paper. Under its then-editor, Christopher Grey-Wilson, a historical summary of the *Magazine* (Grey-Wilson, 1987) was followed by Ray Desmond's biography of William Curtis (Desmond, 1987), a facsimile of its first part, costing one shilling, and 'to be continued monthly' (but also containing the next three plates of part 2). The first author of the present article also contributed to the item on *Echinacea purpurea* in the 'Notes on the plants in the facsimile', along with Grey-Wilson's and Brian Mathew's contributions on the other species (see Hind, 1987). However, both the original, and the anniversary edition facsimile, lacked the now more-detailed text figures of the plant being illustrated and discussed – this is rectified in the current article (Plate 1165), as well as bringing knowledge of the species up-to-date and dispelling a myth concerning the name of the plant appearing in the original *Botanical Magazine* article – as well as apologizing for the nomenclatural shenanigans that have to be discussed as a result. The first author expands upon this in later Discussions; it is not for the faint-hearted.

Hind (2018a) has provided a 'brief history' of the small genus *Echinacea* Moench, in his article on *E. tennesseensis* (Beadle) Small (Tennessee Coneflower), although a quick review is worthwhile. In the first full revision of the genus, McGregor (1968) recognized nine species, two with two varieties (*E. angustifolia* DC. – Narrow-leaved Purple Coneflower, Black Sampson Echinacea – and *E. paradoxa* (Norton) Britton – Ozark Coneflower, Bush's Coneflower). In her later review of the taxonomy of the genus, McKeown (1999) also recognized the same taxa and pointed to the 'misuse or misunderstanding' of the diagnostic value of the ray limb colour, but admitted it was a reliable character in recognising *E. paradoxa* var. *paradoxa* with its distinctive yellow ray limbs. The wide variation in colour of 'purple' ray limbs was often considered to be a developmental issue, as well as other species possessing a notable 'geographical color cline' (McKeown, 1999: 484) throughout their ranges. In an interim phylogenetic study of the 'Coneflowers and relatives' (using Nuclear rDNA ITS and Chloroplast DNA Restriction site data – Urbatsch et al., 2000) only six of the species, and none of the atypical varieties in McGregor's revision were sampled. Binns et al. (2002), following a cladistic analysis, only recognized four species (*E. atrorubens* (Nutt.) Nutt. – Topeka Purple Coneflower – with its dark purple ray limbs, *E. laevigata* (C.L. Boynton & Beadle) S.F. Blake – Smooth Purple Coneflower, *E. pallida* (Nutt.) Nutt. (Pale Purple Coneflower) and *E. purpurea*), although this relied upon the taxa having been identified using McGregor's revision; the Binns et al. revision has remained controversial. The distinctive *E. paradoxa* was relegated to a variety of *E. atrorubens*, as was *E. paradoxa* var. *neglecta* McGregor. Also sunk into synonymy, of *E. pallida*, were *E. angustifolia* DC., *E. sanguinea* Nutt. (Sanguine Purple Coneflower – a dark red rayed taxon), and *E. simulata* McGregor (Wavy Leaf Purple Coneflower, Glade



**PLATE 1165** *Echinacea purpurea* MASUMI YAMANAKA

Coneflower, Prairie Purple Coneflower, with its somewhat fragrant capitula), as well as the distinctive *E. tennesseensis* (Beadle) J.K. Small.

Urbatsch et al. (2006), in the generic account for the *Flora North America* and, later, Kindscher (2016), in a compendium volume on the genus, have maintained the *in expanso* recognition of taxa proposed by McGregor (1968) – nine species, with two possessing two varieties. The consensus of the two most recent treatments was in an effort to still recognize the three most important species providing 'echinacea' – *E. angustifolia*, *E. pallida* and *E. purpurea* – whose identifications and concepts have been maintained in commerce and across the industry of herbal medicine.

Only three of the species have been illustrated in the *Magazine*. Hind (2023[2024]: 390–391) listed seven of the species in his Appendix 1 – 'One hundred and six interesting North American Prairie Compositae', omitting only *E. sanguinea* (which has sometimes been placed as a variety under *E. pallida*) and *E. atrorubens*.

## CULTIVATION

*Echinacea purpurea* [sensu auctt.] has a long history of cultivation. Sweet (1823: 237) recorded the species (as *Rudbeckia purpurea*) as having been introduced into cultivation in 1699. However, the entity that Sweet knew is certainly not the species in cultivation under that name today. The explanation for this is discussed elsewhere in this article (see Discussions below) but, safe to say, Sweet knew the species as *Rudbeckia serotina* (Nutt.) Sweet, a plant apparently in cultivation since 1816 (see Sweet, 1823), and now known as *Echinacea laevigata* (C.L. Boynton & Beadle) S.F. Blake). The widely grown, and refined concept of the species *E. purpurea*, is discussed from here on in.

At between 0.5 and 1.5 m, the true species is an excellent clump-forming perennial for blocks of colour within mixed borders in full sun, as well as in scattered, or specimen, plantings in meadows and less formal wildlife gardens (to attract butterflies and seed-eating birds, etc.) or prairie plantings. It is also ideal species for city/courtyard gardens, cottage/informal, and ordinary flower borders and beds. Several of the modern cultivars are a lot shorter at up to 50 cm, but can also be used to great effect in large borders. The species never really has an abundance of capitula but they contrast well with its dark green leaves, and flower for a long time with the added benefit of the post-flowering fruiting capitula being useful for their architecture and the achenes they contain as a food source for a wide range of garden visitors. The presence of a good honey-scent is an added benefit.

The species, and most of the cultivars, also do well as fresh cut flowers and usually have a reasonable vase life of between one and two weeks. Without the rays the receptacle can last for a lot longer: capitula from which the ray florets have been removed are sometimes sold through the Dutch cut flower markets. Dried mature capitula, of just the receptacle, are also useful in dried flower arrangements. Post-flowering capitula can be cut from the source plant/s and dried (hanging upside down) in an airy place (to avoid fungal growth amongst the paleae) and used when needed.

Plants should be grown in full sun and prefer well-drained, medium to moist soils, and a wide tolerance of soil types from sandy, loamy or clayey. The species and cultivars are all considered hardy, H5 (−15°C to −10°C) in a cold winter (Jeffrey, 1992). Diboll & Cox (2023: 102) suggest a moderate life span of between five and ten years, although the RHS are much more conservative suggesting a shorter longevity of two to five years; *Echinacea purpurea* is considered shorter-lived than other species, although similar to *E. tennesseensis*.

Other than the colour extremes of one or two cultivars, *E. purpurea* tends to stand out amongst most other plants, with many prairie plants offering a complete colour contrast. Using a Compositae planting scheme, similar sized plants might include *Eupatorium maculatum*

L. (see Hind & Langhorne, 2025[2026]), or *Vernonia missurica* Raf. (see Hind & Langhorne, 2023[2024]), whereas size and colour contrasts can be found in *Eurybia spectabilis* (Aiton) G.L. Nesom (see Hind & Lambkin, 2023a[2024a]), *Symphyotrichum laeve* (L.) G.L. Nesom (see Hind & Lambkin, 2023c[2024c]) or *S. oolentangiense* (Riddell) G.L. Nesom (see Hind & Lambkin, 2025a[2026c]). Lower-growing, but still contrasting plants, could include *Echinacea tennesseensis* (Beadle) Small (see Hind, 2018a), *Parthenium integrifolium* L. (see Hind & King, 2023[2024]) or *Ratibida columnifera* (Nutt.) Wooton & Standley var. *pulcherrima* (DC.) D.J.N. Hind (see Hind, 2006). Similar specimen plantings with a different architecture could include *Arnoglossum plantagineum* Raf. (see Hemsley, 1905 – as *Cacalia tuberosa* Nutt.), or the tall spikes of *Liatris aspera* Michx. (see Hind & Lambkin, 2023e[2024e]), *L. scariosa* (L.) Willd. (see Sims, 1815), or *L. spicata* (L.) Willd. (see Sims, 1811) can be used to advantage. *Rudbeckia maxima* (see Hind, 2018b) and *Helianthus salicifolius* A. Dietr. (as a rather spectacular backdrop, see Hind & Smith, 2019), with their different leaf architecture, could certainly provide an overtopping colour contrast. All-yellow plantings for different heights and front-of-border plants might also include *Coreopsis lanceolata* L. (see Hind et al., 2023[2024]), *Heterotheca camporum* var. *camporum* (see Hind & King, 2025[2026]), *Rudbeckia hirta* L. (albeit with its dark cone – see Hind & Lambkin, 2023d[2024d]), or *Solidago nemoralis* Aiton (see Hind & Lambkin, 2023b[2024b]). There are clearly many more options, some of which are included by Hind (2023[2024] – Appendix 1), that will make same-family combinations much more interesting, depending upon the season and continuity of flowering and corolla colour required or sought after.

Propagation. Routine propagation of *Echinacea purpurea* (and many of the cultivars coming true from seed) is by sowing seeds/achenes following cold moist stratification. Hind (2023[2024]: 387) has outlined this, but it is worth repeating the details, together with adding dry stratification. Division of established plants is also a guaranteed method, but cuttings less so. The RHS (2025) suggests 'root cuttings', yet this might prove difficult with *Echinacea purpurea*, a species well-known for its fibrous roots.

Cold moist stratification – Ripe achenes require 4–6 weeks treatment to break their dormancy and improve germination; this method effectively mimics overwintered achenes under a layer of soil or snow. The achenes should be sown (in the autumn or early winter) onto the surface of a damp (but not soaking wet) proprietary seed compost mix in pots or trays and covered with a thin layer of grit or vermiculite. The containers should then be bagged and placed in a fridge or other cold location for between four and six weeks. If the achenes begin to germinate, remove the containers, bag-free, to a bright warm place. When the seedlings are large enough to handle, they can be potted on, keeping them moist all the time. Alternatively, the achenes can be sown in the spring, provided they have been stratified. The achenes can be mixed with moist sand and stored in the fridge for about 60 days before sowing. The achene/sand mix can be spread into the plants' final growing positions as some species suffer from root disturbance.

Dry stratification – In general, ripe achenes can be pre-treated by subjecting them to cold (of c. 0°C) for a month or more (typically between 30 and 60 days). Dry achenes can be stored in sealable plastic bags in a fridge, or in a rodent-proof container (typically a storage tin) in an unheated building (outhouse, shed, etc.) over winter depending upon the species. The achenes can then be sown directly into prepared ground in their final growing position/s or, for those species that don't mind disturbance, the achene/sand mix can be sown in pots or trays and seedlings pricked out when they're large enough to handle.

Cuttings & Division. For most garden purposes when vegetative reproduction is desirable, division is the best option for established clumps. It can be carried out in the early autumn

before the plants shut down completely, or in the spring as plants start into active growth in the warming soil. Basal cuttings taken very early in spring may have some success but will need particular care. Commercial production of *Echinacea* clones is usually by tissue culture.

Pests & Diseases. Whilst the RHS (2025) considers the species 'generally pest free' and 'generally disease-free, young foliage can certainly be savaged by slugs and snails, and rabbits sometimes also take a similar liking. Diboll & Cox (2023: 102) suggest deer might be an issue in the States, which could be similarly translated as an issue in the UK, as well as suggesting that the roots are eaten and damaged by gophers: in Europe that rôle may be taken by voles.

Availability. Cubey et al. (2023, 2024) listed the species as widely available along with numerous (>30) cultivars in a range of heights, capitulum size, colour (from darker, bright magenta tones to white, or white tinged green) and abundance of ray flowers. In addition, the species has been much used in recent breeding work and cultivars attributed to the species may be hybrids with other taxa.

## NOMENCLATURE AND DESCRIPTION

**Echinacea purpurea** (L.) Moench, Methodus (Moench): 591 (1794).

*Rudbeckia purpurea* L., Sp. Pl.: 907 (1753 1771). Types: 'Habitat in Virginia, Carolina.' Conserved type: 'U.S.A. Arkansas: *Nuttall* "Echinacea serotina Arkansa" (BM no. 541360' designated by Binns et al. (2001b: 1199) = BM(000541360) – see Discussion below as this maintains the current concept of the species, and not the Linnaean'.

*Rudbeckia aspera* Pers., Syn. Pl. 2: 477 (1807), non Desf. (1804: 107)[= Rudbeckia fulgida Aiton]. Type: '*R. scabra* Cav.? Hab. in Amer. septentr. ♃'. Type material: unknown.

*Rudbeckia purpurea* L. [var.] β* *serotina* Nutt., Gen. N. Amer. Pl. 2: 178 (1818). Type: 'Hab. On the plains of Lower Louisiana.' Lectotype (selected by Binns et al., 2001b: 1199): BM(000541360).

'*Lepachis purpurea* (L.) Raf., Amer. Monthly Mag. & Crit. Rev. 4 (3): 195 ([Jan.]1819)' appears in IPNI (2025). Note: no combination of the specific epithet and the generic name was provided by Rafinesque, hence the combination is not validly published. Rafinesque's '*Lepachis*' was based on *Rudbeckia purpurea*, although a mis-spelling for his *Lephachys*, not formally described until August of the same year in J. Phys. Chim. Hist. Nat. Arts 89(2): 100 ([Aug.] 1819).

*Rudbeckia serotina* (Nutt.) Sweet, Brit. Fl. Gard. 1: No. 4 (1823).

*Rudbeckia hispida* Hoffmanns., Verz. Pfl.-Kult. 2: 201 (1824)[1826]. Type: not stated.

*Helichroa linnaeana* Raf., Neogenyton: 3 (1825), nom. inval.

*Helichroa elatior* Raf., Neogenyton: 3 (1825), nom. inval.

*Helichroa amoena* Raf., Neogenyton: 3 (1825), nom. inval.

*Helichroa uniflora* Raf., Neogenyton: 3 (1825), nom. inval.

*Helichroa alba* Raf., Neogenyton: 3 (1825), nom. inval.

*Helichroa fusca* Raf., Neogenyton: 3 (1825), nom. inval.

*Helichroa crocea* Raf., Neogenyton: 3 (1825), nom. inval.

'*Helichroa purpurea* (L.) Raf., Neogenyton: 3 (1825)' whilst listed in IPNI (2025), this binomial does appear in *Index Kewensis* 1 (Fasc. 2): 1113 (Jackson, 1893), but as a nom. inval. since the epithet was not combined with the generic name. IPNI also noted that the generic name was superfluous for *Echinacea* Moench, of which *Rudbeckia purpurea* is the generitype. In

that Rafinesque mentioned how his listed species 'blended under *R. purpurea*' this may be correct, although he did mention how it differed from *Rudbeckia*.

*Echinacea serotina* (Nutt.) D. Don ex G. Don, Hort. Brit. (Loudon), ed. 2: 587 (1832).

*Helichroa fuscata* Raf., Atlantic J. 1 (4): 150 (1832). Type: [U.S.A."] 'Glades of the Wabash. Estival flowers of a brown purple, 3 inches diameter, rays narrow, stem 1 to 3 feet high.' Note: Rafinesque referred back to his earlier description of *Helichroa*. However, IPNI (2025) noted that the name *Helichroa fuscata* is 'nom. inval. nom. nud.'; it is certainly not num. nud.

*Echinacea intermedia* Lindl. ex Paxton, Paxton's Mag. Bot. 15 ([fascicle] 172): 79 [1848](1849). Type: '(Intermediate Hedgehog-flower.) … The blooming season of this fine new herbaceous plant is from the end of July until the beginning of November, and it is one of our finest autumnal border plants. We made our drawing from a specimen sent us by Messrs. Backhouse and Son, of the Fishergate Nurseries, York, in August last, with whom it continued long in bloom, and was deservedly admired.' Type material: It is unclear if Paxton (or Lindley) prepared any herbarium material of the material the plate was drawn from, or from any other flowering material from Backhouse & Sons.

*Brauneria purpurea* (L.) Britton in Porter & Britton, Mem. Torrey Bot. Club 5: 334 (1894).

*Echinacea purpurea* (L.) Moench var. *serotina* (Nutt.) L.H. Bailey, Stand. Cycl. Hort., 2: 1088 (1914).

*Echinacea purpurea* (L.) Moench var. *arkansana* Steyerm., Rhodora 40 (No. 470): 71 (1938). Type: [U.S.A.:] 'Boggy Springs, Sevier Co.,Arkansas, July 19, 1937, *Brinkley* 259 (type in herbarium of Field Museum).' Holotype: F(0049425); isotype: GH(00006496).

*Echinacea purpurea* (L.) Moench f. *ligettii* Steyerm., Rhodora 44 (No. 520): 150 (1942). Type: [U.S.A.:] 'Missouri: highway 54, west of Niangua River, Dallas Co., transplanted to yard of Mr. William Liggett in University City, Saint Louis Co., July 9, 1940, *William E. Liggett* 1 (type, in Herb. Field. Mus.)' Holotype: F(0049426).

Illustrations (selected). J. W. Loudon, Ladies' Fl.-Gard. Ornam. Perenn. 1: Pl. 45 (1843) (a combined plate illustrating *E. purpurea* sensu auctt. [= *E. laevigata*], *E. heterophylla*, *E. dicksoniii* and *E. serotina* [= *E. purpurea* s.str.]) (col); Nicolson, Ill. Dict. Gard., Div. II: 498, Fig. 687 (1884) (illustrating '*E. purpurea intermedia*' – habit and capitulum) (b&w); Nicholson, Ill. Dict. Gard., [Vol. 3] Div. VI: 332, Fig. 396 (Nov. 1886) (under 'the correct name' *Rudbeckia purpurea*) (habit) (b&w); Britton & Brown, Ill. Fl. N. US. & Canada, 3: 420, Fig. 3895 (1898) (b&w); Britton & Brown, Ill. Fl. N. US & Canada, Ed. 2, 3: 475, Fig. 4456 (1913). (b&w); Fisher, Dicot. Ohio 2(3 – Asteraceae): 139 (1988) (b&w); Antonio & Masi (2001: 292–293) (col); Yatskievych, Steyermark's Fl. Missouri 2: Pl. 277 e & f (2006) (b&w); Chadde (2019: 148) (b&w); Mohlenbrock (2019: 115, Fig. 48) (b&w); Diboll & Cox (2023: 103) (col).

*Perennial herb*, 50–120 (−180) cm tall; roots fibrous. *Stems* usually brownish-green at base and mid-green above, often few branched, but mostly in upper parts forming a lax inflorescence, usually leafy through to ultimate pedicels each with only a pair of opposite, reduced leaf-like bracts, terete, but typically sulcate on pedicel beneath involucre, indumentum throughout stem and pedicels, conspicuously hispid, hairs septate, bicellular or multicellular with basal plate in epidermis. *Leaves* opposite, usually hispid to strigose hairy, hairs spreading to ascending, to 2 mm, sometimes glabrous; basal leaves sessile or pseudopetiolate to distinctly petiolate, petioles 0–7(−30) cm, often grooved above and yellowish-green, margins winged and herbaceous, lamina 3- or 5-veined, ovate to narrowly lanceolate, 5–30 × (1–)5–12 cm long × 2–11 cm wide, bases usually rounded to cordate, midrib yellowish green and markedly prominent beneath, insculpate and only yellowish green for about $^{2}/_{3}$ length of lamina above, sparsely to moderately hispid-hairy above, more densely so and prominently hispid-hairy beneath, margins

usually serrate to dentate, rarely entire, apices long-acute to attenuate, cauline leaves petiolate to pseudopetiolate or sessile, petioles (when present) (10–)30–60(−180) mm long, lamina (40–)110–170(−240) mm long × (20–)45–90(−110) mm wide, linear-lanceolate or rarely ovate. *Inflorescences* usually a few-headed, lax corymbiform structure, or of solitary terminal capitula, capitula pedicellate, pedicels 8–25 cm long, usually slightly inflated and certainly fistulose at flowering time, markedly so in fruit/post flowering, conspicuously ridged, scabrid-pubescent, hairs with multicellular basal portion, whitish apical portion (easily broken and leaving hispid base) multicellular, uniseriate with apical cell very long acute. *Capitula* heterogamous and radiate, c. 12 cm diam. (across ray limbs) in full flower, in bud central disc depressed and surrounded by erect rolled ray limbs, disc soon becoming convex as ray florets unroll and start spreading, disc eventually conical until ultimately ray florets turn brown and whither with disc becoming rounded-conical in fruit; *involucre* c. 15–45 mm diam., ultimately disc-like in fruit with phyllary bases obviously swollen and apices perpendicular beneath withered ray limbs; *phyllaries* multi-seriate, linear to lanceolate, 8–17 × 1–8 mm, outer with markedly retrorse to recurved apices, innermost erect and often alternating with base of ray floret limbs, margins evenly ciliate, cilia of coarse hispid trichomes; *receptacle* at first convex, eventually markedly conical, 20–40 mm tall ×14–45 mm diam., solid, off-white, paleaceous, *paleae* 9–15 mm, base light-green, body markedly keeled, margins scarious, apices orange, tips reddish-orange to bright orange, straight or slightly curved, sharp-pointed. *Ray florets* neuter, uniseriate, 12–20 (−30), limb at first erect in bud and tightly inrolled, greenish and somewhat reddish purple at apex, in maturity limb spreading to recurved, 30–80 mm long × 7–19 mm wide, sparsely hairy abaxially, distinctly 2-ridged beneath, usually described as pink to purple (ranging from Magenta Rose $_0$27/$_1$ or $_0$27/$_2$ to Fuchsia Purple 28/$_2$, Hort. Colour Chart – RHS, 1938, almost appearing Spinel Red in some variants; Red-purple 58A, Red-purple 67A or even Greyed-purple 186B, RHS Colour chart – RHS, 1995), apex 2-lobed (and often somewhat creamish/pale-coloured alongside sinus), marcescent; *achenes* abortive. *Disc florets* hermaphrodite, numerous, at first functionally male, with lengthening style arms pushing a dark and rich yellow pollen (when fresh) out through anther cylinder, florets then becoming female, disc corollas 4.5–5.7 mm long, c. 1.5 mm diam. above inflated and fleshy base of corolla tube, base c. 1.8 mm diam., green at first, becoming reddish-purple post dehiscence as achenes start to mature, glabrous, and surrounded by pappus scales, corolla lobes 5, c. mm long, erect or straight and greenish at first and turning dark pink or purple, sometimes almost burgundy-coloured as floret become functionally female; anther cylinder at first markedly exserted from throat at dehiscence, eventually shrinking and included within corolla throat, anthers brownish-purple, apical anther appendages triangular, brownish-purple to blackish at dehiscence, paling as florets become female, basal anther appendages sagittate; style base nodal and sitting within a cupuliform nectary, glabrous, style shaft glabrous, style arms markedly divergent, spreading and eventually recurved, papillate sweeping hairs abaxially at apex, sweeping hairs longest at very apex and appearing penicillate, style arms and papillae purple to burgundy-coloured. *Achenes* (disc floret) 3.5–5 mm, usually glabrous (ray cypselae sometimes hairy on angles), off-white; *pappus* an erose crown of ± equal teeth, c. 1.2 mm long, at first green, later drying to light brown. n = 11; $2n = 22$ (McGregor, 1968: 136). Figure 1.

NOTE: The ray limb corolla colour may not always agree with the colour range provided above, and is highly dependent upon whether the colour has been determined in bright sun or in a north facing window in bright light. In full flower the ray limbs are clearly discolorous and a slightly more metallic colour beneath. Older ray limbs will eventually become brownish and wither, the reddish/purplish colour often darkening, and some cultivars differ dramatically (or are cultivated for their off-white/white rays, such as cv. 'White Swan', etc.). The reddish/purplish rayed species usually have marcescent limbs, these turning brown/blackish on drying (see Torrey & Gray, 1841: 305).

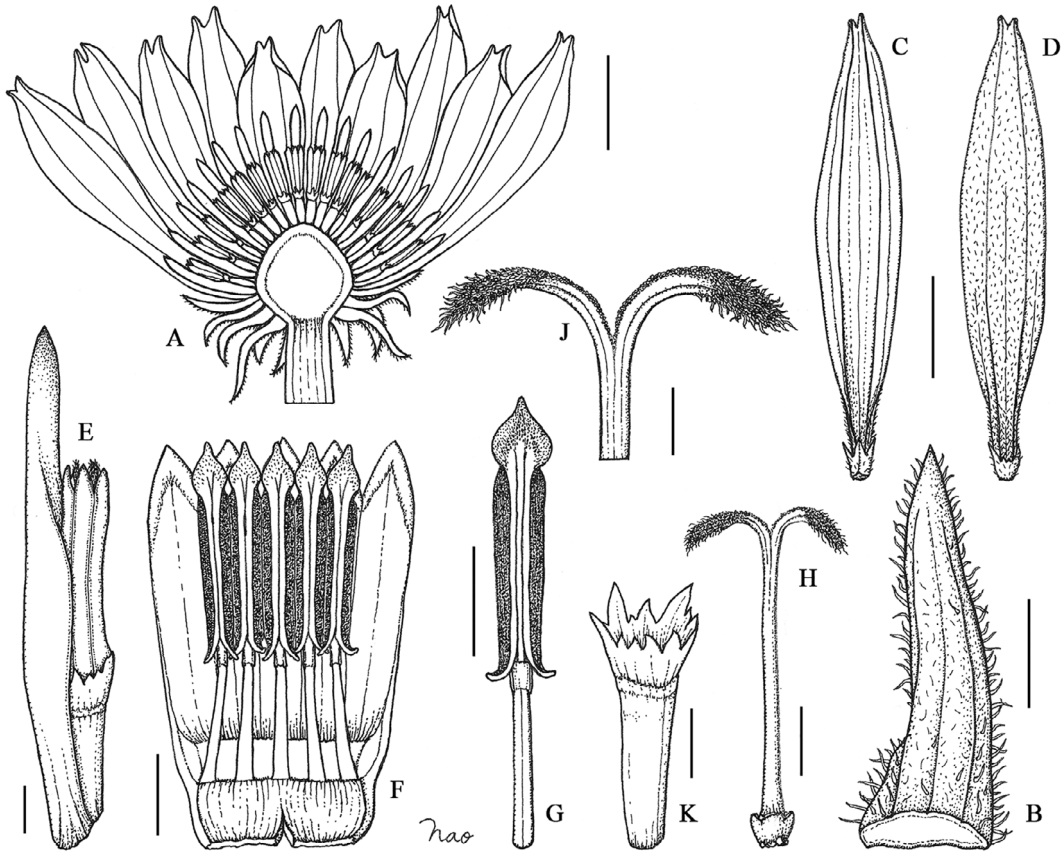



**FIGURE 1** *Echinacea purpurea*. A, l.s. flowering capitulum, showing solid receptacle and fistulose pedicel; B, phyllary; C, ray floret, adaxial surface of ray limb; D, ray floret abaxial surface of ray limb; E, disc floret with conduplicate palea surrounding floret; F, disc floret corolla and anther cylinder opened out showing attachment points of anther filaments; G, stamen; H, disc floret style; J, detail of disc floret style arms; K, disc floret achene showing cupulate, erose-margined pappus. Scale bars: A = 1 cm; B = 2 mm; C–H, K = 1 mm; J = 0.5 mm. Drawn by Naoko Yasue from material (Accession No. 2019–1380 KELW, cv. 'Magnus') growing in the Compositae beds of the Agius Evolution Garden at the Royal Botanic Gardens, Kew.

DISTRIBUTION. This is the most widely distributed species in the genus. Canada (Ontario - introduced); United States of America (Alabama, Arkansas, Florida (Wunderlin, 2020), Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, Tennessee, Texas, Wisconsin* (* introduced according to Chadde, 2019: 147). Note: *Echinacea purpurea*, and its many cultivars, are extensively grown in gardens, wildflower roadside plantings, and prairie restoration sites and, because of its popularity as a herbal remedy, it is also grown commercially. As a result of such activities, naturalized and often persisting populations may extend the species' apparent natural range.

HABITAT & ECOLOGY. Rocky, open woods, thickets, prairies, especially near waterways; 10–400+ m. Diboll & Cox (2023: 102) did not consider our species a 'true prairie plant', but more a 'denizen of woodland edges', albeit in a book on prairie plants; we consider it a good prairie plant.

PHENOLOGY. Flowering late spring–summer. July–October. Diboll & Cox (2023: 102) stated June – September.

ETYMOLOGY. The generic name, *Echinacea* is derived from the Greek ἐχῖνος (ekhinos) = sea urchin or hedgehog; the specific epithet is from the Latin *purpurea* = purple, alluding to the colour of the ray limbs.

CONSERVATION STATUS. McGregor (1968: 137) noted that this was the most widespread species of the genus, also commenting that it was not the most abundant. With the exception of the northeastern States, the species is spread throughout the central prairie states in the Great Plains bioregion, south into Florida and west into Texas. Locally, habitat destruction has reduced population sizes, although it might still be regarded as LC (Least Concern) (Meredith et al., 2024). Kindscher (2006), and other authorities in the States, use a non-standard terminology to describe extinction risks to plants. In some of the state-by-state citations *Echinacea purpurea* is variously cited as between 'Presumed Extirpated' and 'Apparently Secure'.

VERNACULAR NAMES. LATE-FLOWERING HISPID-STALKED RUDBECKIA (Sweet, 1823: No. 4); PURPLE CONEFLOWER, PURPLE CONE-FLOWER, BLACK SAMPSON (Britton & Brown, 1898: 420 – as *Brauneria purpurea*); EASTERN PURPLE CONEFLOWER (Urbatsch et al., 2006: 92), ECHINACEA, KANSAS SNAKEROOT, SNAKEROOT, NARROW-LEAVED PURPLE CONEFLOWER, SCURVY ROOT, INDIAN HEAD, COMB FLOWER, BLACK SUSANS, HEDGE HOG (Stevens, 2000), BLACK SAMSON, EASTERN PURPLE CONEFLOWER, HEDGEHOG CONEFLOWER, PURPLE DAISY, PURPLE RUDBECKIA (RHS, 2025); HEDGEHOG CONEFLOWER, ECHINACEA, PURPLE DAISY, PURPLE RUDBECKIA. NOTE: Commercial products often labelled as being MISSOURI SNAKEROOT have also been shown to be based on *E. purpurea* or, worryingly, upon the adulterant *Parthenium integrifolium* L. (see also Hind & King, 2023[2024]).

## DISCUSSIONS

### Curtis's *Rudbeckia purpurea* – "What is it?" – the lectotypification of the name *Rudbeckia purpurea* L.

The first author of the present article, although having commented on the article in the first issue of *The Botanical Magazine* (see Hind, 1987, 2018), made a conscious decision to reassess what was originally painted by Sydenham Edwards back in 1787 – especially following a conversation with the current Editor of the *Magazine*, who had queried the identification. It should be more than obvious that what was painted (albeit under the basionym *Rudbeckia purpurea*) is not the same as the plant commonly cultivated under the name *Echinacea purpurea*. Edwards' plate is of a species now correctly named as *E. laevigata* (C.L. Boynton & Beadle) S.F. Blake (Figure 2).

One of the commonest species of *Echinacea* available in horticulture and widely cited in phytomedicine is called *Echinacea purpurea*, and yet this is not conspecific with the combination Moench provided when the genus was recognized in 1794. It is an error that has clearly perpetuated following McGregor's revision of the genus (McGregor, 1968), when the name was lectotypified, but can be shown to date from an early North American Flora account by C.L. Boynton & Beadle (in Small, 1903) – where the genus *Brauneria* Neck. was accepted. However, in treating a broad concept *Echinacea purpurea* (which included Nuttall's unranked infrataxon '*serotina* Nutt.'), rather than recognizing de Candolle's *E. serotina* (Nutt.) DC. as a distinct species.



**FIGURE 2** '[Plate] 2. RUDBECKIA PURPUREA. PURPLE RUDBECKIA', from *The Botanical Magazine* 1 (1) (Curtis, 1787), now identified as *Echinacea laevigata* (C.L. Boynton & Beadle) S.F. Blake.

Linnaeus's concept of *Rudbeckia purpurea* was based on three polynomials appearing in his *Species Plantarum* protologue (Linnaeus, 1753: 907). The name-giving polynomial had been provided by Gronovius (1739: 104) – *Rudbeckia foliiis lanceolato-ovatis alternis indivisis, petalis radii bifidis* – in a text-only account citing both Plukenet's and Catesby's

polynomials – *Chrysanthemum americanum, doronici folio, flore perfici coloris: umbone magno prominente ex atro purpureo viridi & aureo fulgente* (Plukenet, 1696: 99; Catesby, 1736: p. '56').

Leonard Plukenet (1642–1706) provided one of three impressions of the same species (Plukenet, 1696: Tab. XXI, Fig. 1.) (Figure 3), but it is highly stylized showing a plant with alternate simple leaves with entire margins, acute leaf bases, parallel leaf venation, and a

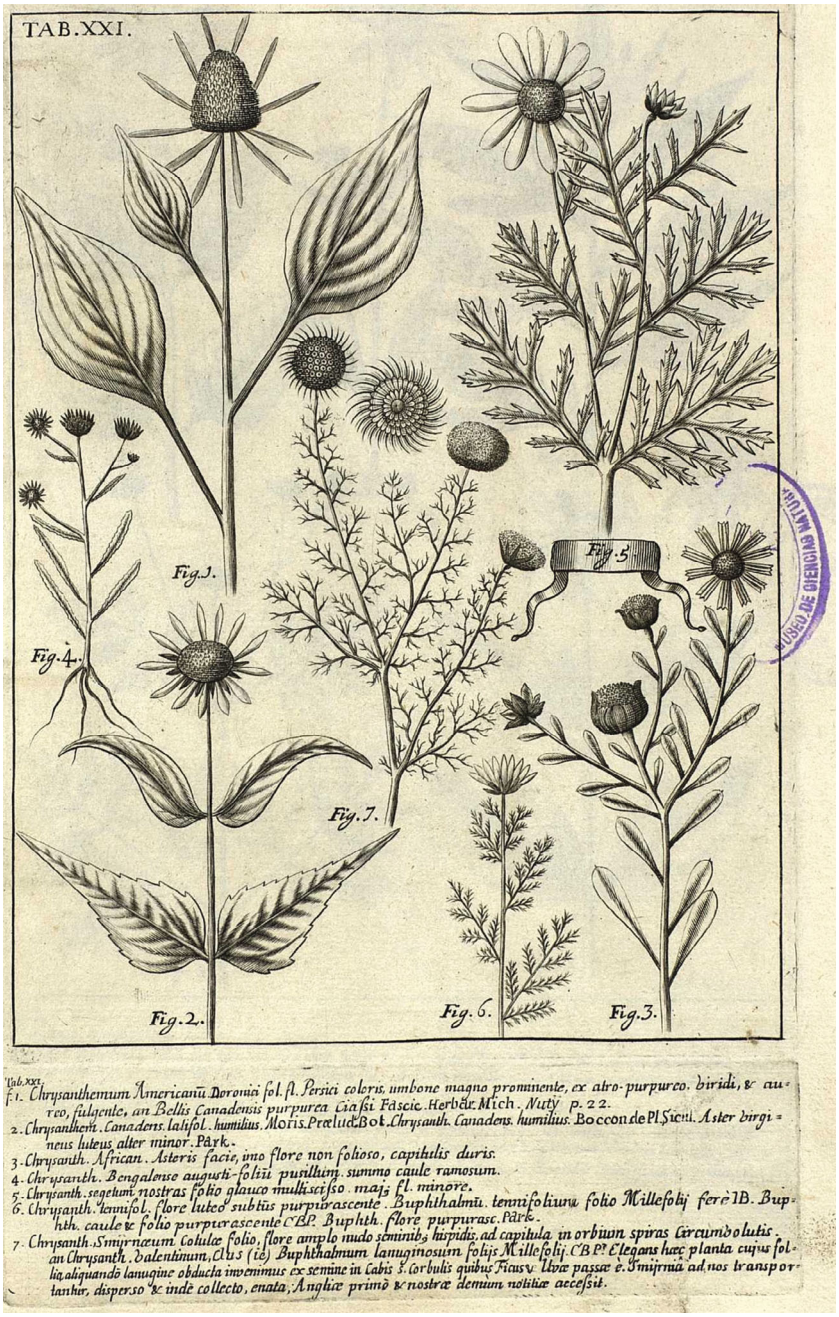



**FIGURE 3** '*Chrysanthemum Americanu Doronici fol. fl. Persici coloris*, …' from Plukenet's *Almagestum Botanicum sive Phytographiae Pluc'Netianae Onomasticon* … (Plukenet, 1696: Tab. XXI. f. 1).




**FIGURE 4** '*Chrysanthemum Americanum, Doronici folio, flore Persici coloris*, …'from Catesby's *The Natural History of Carolina, Florida and the Bahama Islands* … (Catesby, 1736: Tab. 59).

capitulum with 12 apparently rotate ray limbs and an almost diagrammatic umbo-like conical disc. The most recent of the pre-Linnean illustrations was the semi-life-like plate provided by Mark Catesby (1683–1749). The plate ultimately lacked much detail, has no lower leaves, and is combined with a life-like engraving of a Glass Snake superimposed over the flowering stem (Catesby, 1734: Tab. 59) (Figure 4). Linnaeus's protologue finished with a citation of Morison's polynomial and woodcut illustration – *Dracunculus virginianus latifolius, petalis florum longissimis purpurascentibus* – (Morison†, 1699: Sect. 6, Tab. 9, Fig. 1.) (Figure 5), but also citing Ray's text-only description (Ray, 1704: 218). Robert Morison (1620–1683) provided a semi-life-like illustration contemporaneous with the species' introduction into cultivation according to Sweet (1823: 237), and shows a basal leaf with pinnate venation, serrate leaf margins, and an alternate-leaved flowering stem bearing a solitary capitulum with 19 recurved/drooping ray florets, and the limb apices clearly forked; the disc is very much a stylized umbo. It is clear from Morison's text that seed was sent to him by John Banister (from Virginia), and presumably grown in Oxford, by or for Morison.

However, this does raise one issue, the correct citation of the generitype of *Echinacea* Moench. Moench was quite specific over what he transferred from *Rudbeckia* to *Echinacea* – *Rudbeckia purpurea* L., thus providing the combination *E. purpurea* (L.) Moench. As Binns et al. (2001b) were at pains to point out, especially following their lectotypification of the plant now widely called *E. purpurea*, Linnaeus's and Moench's plant is not conspecific, and should now be called *E. laevigata* (C.L. Boynton & Beadle) S.F. Blake. Using the conserved type (see Binns et al., 2001b: 1199) – 'U.S.A. Arkansas, "Echinacea serotina Arkansa", *Nuttall*, s.n. (BM000541360)' – the widespread horticultural concept of the species, i.e. *Echinacea*

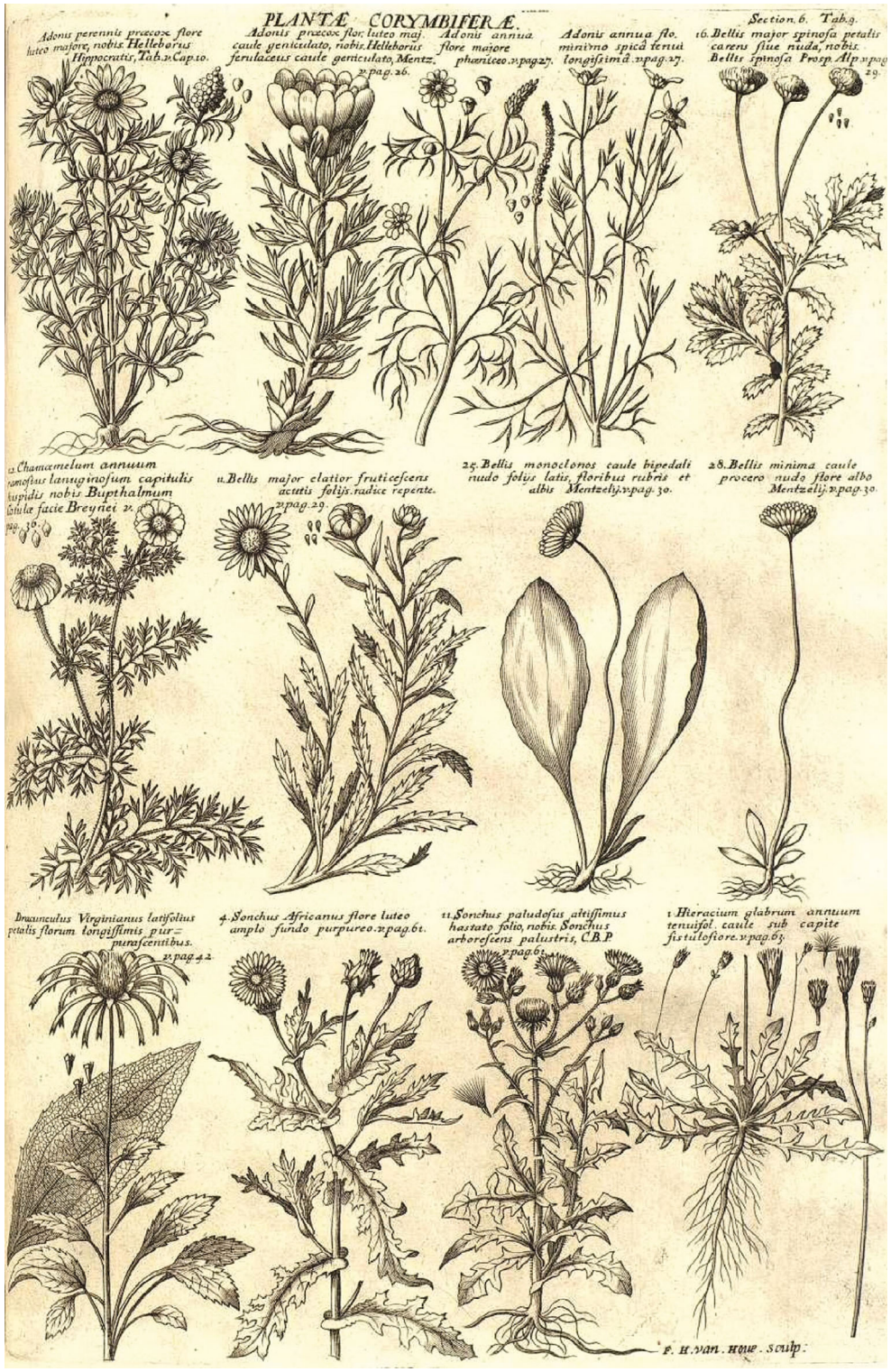



**FIGURE 5** '*Dracunculus virginianus latifolius, petalis florum longissimis purpurascentibus*.' from Morison's *Plantarum historiae Universalis Oxoniensis pars Tertia* (Morison 1699: Sect. 6, Tab. 9, f. 1).

*purpurea* sensu auctt., was maintained (see also Barrie, 2006: 798), and that is more than adequately shown in the current plant portrait.

This state of play has been brought about to avoid causing nomenclatural chaos in phytomedicine, the horticultural trade, agricultural industries and many popular publications. All who have referred to the name have been using the wrong name for a considerable time (at least since 1903, if not long before – see Boynton & Beadle in Small, 1903). Binns et al. (2001a, b) clarified that the name that should have been used for *E. purpurea* sensu auctt. is *E. serotina* (Nutt.) DC.

## Chemistry and medicinal/herbal/homeopathic uses

There is a somewhat concerning abundance of 'literature' covering 'echinacea', a term apparently applied the 'drug' 'echinacea', more specifically to a variety of extracts of *Echinacea purpurea* but including *E. angustifolia* (NARROW-LEAVED PURPLE CONEFLOWER) and *E. pallida*, either specifically, as admixtures, or as adulterants. 'Echinacea' has maintained a pre-eminent position in terms of herbal supplement sales in recent years, and is a multi-million-dollar industry in the USA alone (estimated at about $300 M by Brevort in 1998, and expected to rise to about $3.48 Bn by 2029 – see the *Echinacea Extract Global Market Report 2025*). Binns et al. (2004), effectively repeating the results of their earlier taxonomic revision of the genus (Binns et al., 2002), provided an element of confusion in contrast to several of the other papers in Miller (2004). *Echinacea angustifolia* was considered by Binns et al. (2002, 2004) as a variety of *E. pallida*, *E. pallida* var. *angustifolia* (DC.) Cronquist, which is of some significance in the importance of the constituents of 'echinacea'.

**IMPORTANT NOTE. The use of plants for medicinal purposes is not recommended by RBG, Kew without the supervision of a general medical practitioner or a registered herbalist**. Stopping taking prescribed medication in preference to taking 'herbal teas', tisanes, or other extracts, should certainly not be considered lightly.

The uses of 'echinacea' cover immunostimulatory (boosting the immune system), shortening the length of the common cold, and flu, as an anti-inflammatory in reducing symptoms such as sore throats, coughs and fever, as well as anti-anxiety, anti-depressive, anti-mutagen and showing cytotoxicity, with reports into its properties as an antioxidant, antibacterial, antiviral and larvicidal agent. There is no doubt that 'echinacea', and the three species themselves are sources of alkamides, caffeic acid, cichoric acid, polysaccharides, glycoproteins and flavonoids. Traditional uses have included treatments for toothache, bowel pain, snake bite, skin disorders, seizures, chronic arthritis and cancer. Veterinary uses are also recorded (Pearson, 2004). Barrett (2003) has provided a 'critical review of the medicinal properties' but also, tellingly, suggested 'there is a great deal of moderately good-quality scientific data'; this somewhat countered by CRUK (2025) pointing out that human trials have not been able to prove the bulk of the benefits.

Any online search will probably result in many dozens of ointments, tinctures, 'natural teas' (= tisanes or infusions), tablets, capsules, lozenges, or 'food supplements' (sometimes in liquid form) made from extracts of leaves or more often roots of one of the three main species considered to provide 'echinacea'. Most of the products are found under the category of herbal remedies, and doubtless some come with proposed dosages, but all should certainly carry warnings about potential side effects and the need to consult with a registered herbalist, and a general practitioner (especially if the remedy is being taken in preference to a prescribed medication); all too frequently they do not. It should be noted that, without any warnings, some are recommended as an 'excellent ingredient in culinary dishes …'; it cannot be over-stressed that this is not recommended at all, especially without outlining the potential for side effects.

## Issues in cancer research

CRUK (2025) came to the conclusion that, even though it is the most used natural product, there is no scientific evidence to support the use of 'echinacea', a herbal remedy, as a cancer treatment. It is critical that CRUK point to no human trials supporting any of the widely made claims as to the efficacy of 'echinacea'. CRUK did however, point to three studies/reviews by researchers, and these indicated that taking 'echinacea' did not make any difference to how long colds lasted, and only very minimal effects on preventing people catching colds. The researchers were also concerned that there is no 'best dose', nor which was the recommended part of the plant to use or the differences between the three species providing 'echinacea' individually or in various mixtures. Regrettably, CRUK did not consult with any botanical authorities, and the terminology they use is ignorant of the basics; the three species nominally providing 'echinacea' are called 'varieties.'

## Novel foods and European legislation

The unforeseen consequences, in legislation, of introducing novel 'foods' has also arisen with extracts of *Echinacea purpurea* derived from cell cultures. The European Regulations have resulted in a conflict with the general rules of the EU list of 'authorized novel foods'; Ballke (2019) has summarized this under the tile of 'The *Echinacea* paradox'.

## Reading matter

It is worth pointing the reader, for information's sake only, to three compendium guides to 'echinacea'. The earliest that may be found is Hobbs (1990), a popularist guide – possibly best described as a herbalists' guide to 'echinacea' (but eventually commenting on the other species); it is poorly illustrated with grey tones. Miller (2004) has provided an edited compendium volume containing a number of articles on 'everything you might want to know about 'echinacea''. Regrettably it is lacking an obvious statement at the beginning that 'echinacea' is the combined concept of the extract from the three possible species, although the volume does also cover the other six found in the genus. One of the more recent guides, also a compendium volume is that of Kindscher (2016), which is clearly referring to the 'drug' 'echinacea', and not applying it to a particular species. The authors do eventually comment, in the various chapters on the other species that are often used/abused (sometimes as adulterants, etc).

**ORCID**

*Nicholas Hind* https://orcid.org/0000-0002-0399-1909

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*Caecilia maculata*' = Anguis ventralis L. and '*Chrysanthemum Americanum, Doronici folio, flore Persici coloris, umbone magno prominente ex atro purpures viridi & aurea fulgente*' = *Rudbeckia purpurea* L.]

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**How to cite this article:** Hind, N., Yamanaka, M. & Yasue, N. (2025) 1165. *Echinacea purpurea* (L.) Moench. *Curtis's Botanical Magazine*, 42(4), 499–520. Available from: https://doi.org/10.1111/curt.70036