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Worthy of love: *Geleznowia amabilis* (Rutaceae), a stunning new species of 'Yellow Bells' from Kalbarri in Western Australia

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SHORT COMMUNICATION

'Yellow Bells' is an appropriate appellation for the endemic Western Australian genus *Geleznowia* Turcz. (Rutaceae) since its members have eye-catching, bright yellow flowers surrounded by whorls of yellow sepals and petaloid bracts. While perhaps not widely known outside of the State, Yellow Bells are commercially harvested as native cut-flowers from both natural stands and private property across the northern sandplains and in the adjacent wheatbelt region during spring. This paper describes a new, range-restricted *Geleznowia* that is only known from a few populations in the Kalbarri region and has significant horticultural potential due to its tall growth form, silvery green leaves, and captivating clusters of golden yellow flowers (Figure 1). With a Latin name that means 'worthy of love', this beautiful species undoubtedly requires careful management to ensure its long-term conservation.

Geleznowia amabilis K.A.Sheph. & A.D.Crawford, *sp. nov*.

Type: Kalbarri, Western Australia [precise locality withheld for conservation reasons], 23 September 2009, *K.A. Shepherd & J.A. Wege* KS 1305 (*holo*: PERTH 08152012; *iso*: CANB, NSW).

Geleznowia sp. Red Bluff (A. Crawford ADC 597), Western Australian Herbarium, in *FloraBase*, https://florabase.dpaw.wa.gov.au/ [accessed 29 January 2018].

Geleznowia verrucosa subsp. *formosa* L.M.Broadh. ms, *p.p.* [with respect to PERTH 05496624 and PERTH 05599016].

Erect, single-stemmed *shrub* to 2 m high; branchlets terete, glandular-verrucose, glabrous or sometimes with an indumentum of sparse, simple, minute hairs to 0.05 mm long. *Leaves* silvery green, sessile, overlapping, coriaceous, elliptic to obovate, 4.6–11.5 mm long, 2.5–7 mm wide, adaxial surface slightly concave and glabrous, abaxial surface glandular-verrucose and glabrous; apex obtuse or retuse; margin entire, sometimes with simple hairs to 0.04 mm long. *Inflorescence* a dense head of 5–13 flowers, (22–)32–37 mm wide. *Pedicel* 1.8–7 mm long, with moderately dense hairs 0.2–0.6 mm long. *Bracts* petaloid, 8–10 at base of inflorescence, golden yellow (rarely becoming tinged with

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red in fruit), elliptic to obovate, 7–16 mm long, 3.6–13 mm wide, sessile or shortly stalked; adaxial surface glabrous or with minute hairs to 0.04 mm long; abaxial surface glandular-verrucose, glabrous or with minute hairs to 0.04 mm long; apex rounded or retuse; margin entire, with sparse, simple hairs to 0.02 mm long. *Bracteoles* golden yellow, narrowly obovate, narrowly elliptic or oblanceolate, 7–16 mm long, 1.7–6 mm wide, sometimes with an attenuate base, glabrous or with scattered, minute hairs to 0.04 mm long; apex rounded; margin entire, glabrous or with sparse, simple hairs to 0.02 mm long. *Sepals* golden yellow, elliptic to oblong, longer than petals, 8.5–14 mm long, 4.3–9 mm wide, glabrous or sometimes with hairs at the point of attachment. *Petals* bright yellow, concave to cupped, coriaceous, narrowly elliptic, 4.8–10 mm long, 1.7–5 mm wide, glabrous. *Stamens* 10; *filaments* 3–4.3 mm long, broadening at base to 0.3–0.5 mm wide, glabrous; *anthers* oblong, 1.4–2.3 mm long, 0.4–0.8 mm wide. *Carpels* 5, free, 1.4–3.5 mm long, 1.6–2.3 mm wide, blunt, verrucose, glabrous, with 2 *ovules* per carpel; *style* glabrous, 4.5–5.9 mm long; *stigma* narrower than style, 0.1–0.3 mm wide. *Fruit* obovoid, 5.5–5.7 mm long, 8–10 mm wide. *Seeds* dark brown to black with a pale aril, 3.7–5.0 mm long, 2.3–3.0 mm wide. (Figure 1)

Diagnostic characters. This species can be distinguished from others in the genus by virtue of the following combination of characters: a tall, single-stemmed habit with silvery green leaves; glandular-verrucose branchlets that are glabrous or with scattered, minute hairs; a dense inflorescence head with 5–13 flowers surrounded by 8–10, golden yellow bracts that are glabrous or have minute hairs scattered on the margin; petals that are shorter than the sepals; and a style that is 5.8–7 mm long with a narrow stigma.

Specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 6 Sep. 1990, *D.E. Albrecht & B.A. Fuhrer* DEA 4235 (MEL, PERTH); 6 Aug. 1967, *A.M. Ashby* 2209 (AD, MEL, PERTH); 1 Sep. 2012, *G.N. Brand* 351 (PERTH); 14 July 1994, *L. Broadhurst* 3 (PERTH); 18 Oct. 1996, *L. Broadhurst* 18 (PERTH); 11 Oct. 1996, *M.G. Corrick & B.A. Fuhrer* MGC 11388 (MEL, PERTH); 29 Nov. 1995, *A. Crawford s.n.* (PERTH 04398947); 30 Nov. 2001, *A. Crawford* ADC 118 (PERTH); 3 Oct. 2004, *A. Crawford* ADC 596 (PERTH); 3 Oct. 2004, *A. Crawford* ADC 597 (PERTH); 3 Oct. 2007, *A. Crawford* ADC 1383 (PERTH); 3 Oct. 2007, *A. Crawford* ADC 1384 (PERTH); 3 Oct. 2007, *A. Crawford* ADC 1385 (PERTH); 11 Sep. 2008, *A. Crawford* ADC 1850/1, ADC 1850/2, ADC 1850/3 (PERTH); 11 Sep. 2008, *A. Crawford* ADC 1851/1, ADC 1851/2, ADC 1851/3 (PERTH); 2 Sep. 1985, *H.A. Froebe & R. Classen* 505 (PERTH); 3 Oct. 1991, *W. Greuter* 22513 (PERTH); 22 July 2004, *M. Harding* 7 (PERTH); 22 July 2004, *M. Harding* 8 (PERTH); 28 Sep. 1985, *N. Hoyle* 520 (CANB, PERTH); 24 Oct. 2000, *B.J. Lepschi & L.A. Craven* 4343 (CANB, MEL, PERTH); 23 Sep. 2009, *K.A. Shepherd & J.A. Wege* KS 1306 (DNA, PERTH); 1 Dec. 2002, *L.S.J. Sweedman* 5977 (PERTH); 18 Dec. 2011, *L.S.J. Sweedman* 8398 (PERTH).

Phenology. Flowering from mid-winter to spring (July to October), with fruits forming through to late spring. The golden yellow bract colour in *G. amabilis* is generally maintained throughout flowering, although some outer bracts rarely become tinged with red in late development or during fruiting.

Distribution and habitat. This species is presently only known from a few populations in the Geraldton Sandplains bioregion of the South-West Botanical Province. It is found on yellow or brown sand over sandstone, or red-brown sandy loam with laterite, in dense heath, low mallee woodland or *Acacia* shrubland with *Calytrix*, *Grevillea* and *Melaleuca*.

Conservation status. Currently listed as Priority Two under Conservation Codes for Western Australian Flora (Smith & Jones 2018), under the name *G.* sp. Red Bluff (A. Crawford ADC 597). While some populations of this range-restricted species occur in Kalbarri National Park, they are situated near

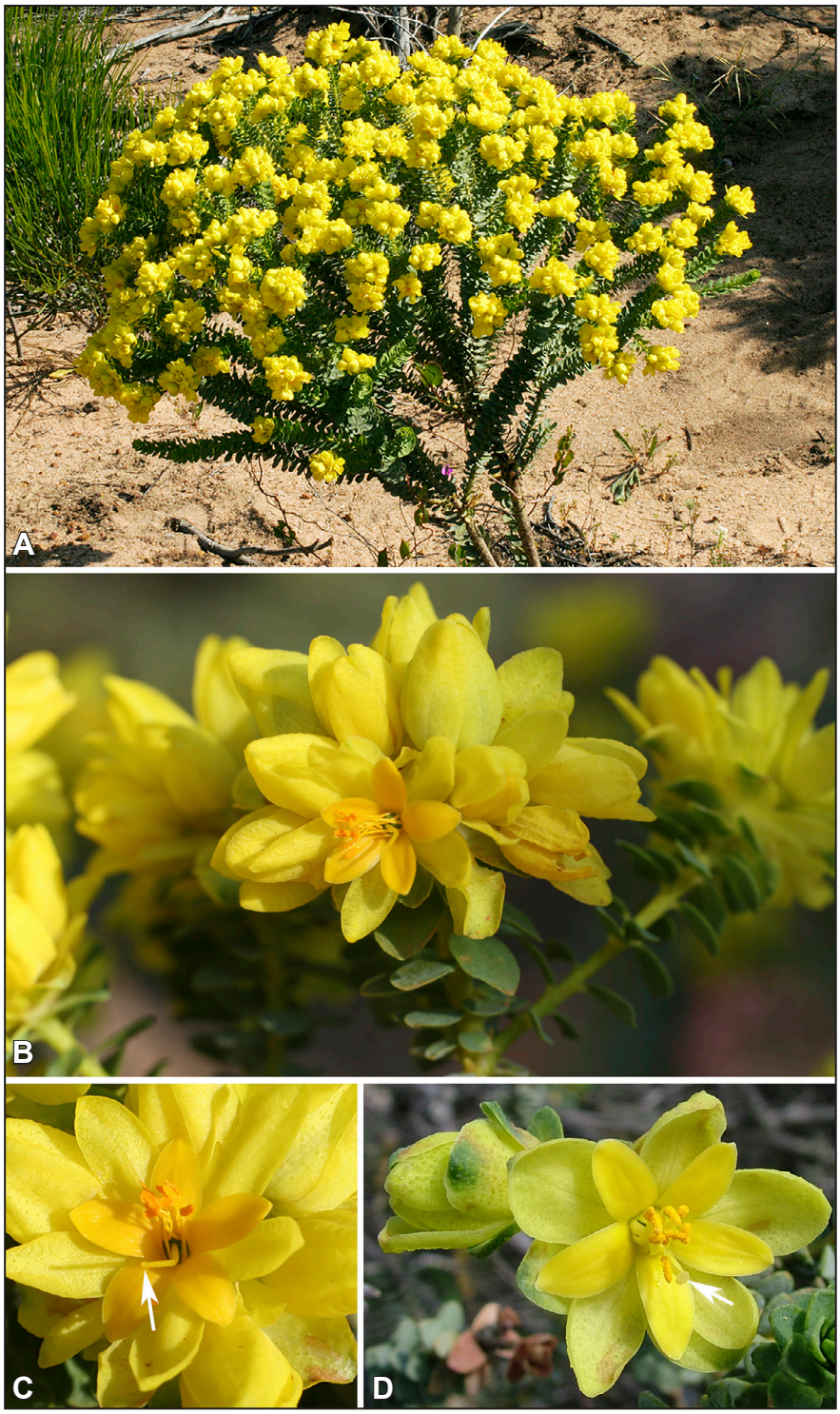

Figure 1. *Geleznowia amabilis*. A – habit; B – flowering heads with golden yellow bracts and sepals; C – a flower highlighting the long style with a narrow stigma (white arrow) and sepals that are much longer than the petals. *Geleznowia verrucosa*. D – single flower showing the lemon yellow petals and capitate stigma (white arrow). Images by K.A. Shepherd (A–C) from *K.A. Shepherd & J.A. Wege* KS 1305 and R. Davis (D) from *R. Davis* RD 11223.

infrastructure and road corridors and so may be impacted by grading and other management activities. Furthermore, this species could be inadvertently harvested by licenced collectors if mistaken for the more widespread *G. verrucosa* Turcz. Further survey is urgently needed to determine whether a Threatened status is warranted.

Etymology. From the Latin *amabilis*, meaning worthy of love.

Vernacular name. Kalbarri Yellow Bells.

Affinities. *Geleznowia verrucosa* is currently the only formally named species in the genus; however, the floriculture industry has long recognised several distinct forms (Plummer *et al.* 2000) and Wilson (2013) also suggested additional taxa should be recognised as distinct on account of the considerable variation evident in the indumentum, leaves and flowers. Besides the newly recognised *G. amabilis*, there are two other potentially new taxa curently listed on Western Australia's vascular plant census that are the subject of ongoing taxonomic work: *G.* sp. Marchagee (A. Crawford ADC 1353) and *G.* sp. Binnu (K.A. Shepherd & J. Wege KS 1301) (Western Australian Herbarium 1998–). Within the genus, *G. amabilis* is distinctive but morphologically most similar to *G.* sp. Binnu, a taxon restricted to the Northampton area. Both species share a taller habit than *G. verrucosa* and *G.* sp. Marchagee (1.2–2 m vs 0.25–0.75 m high) and have more floriferous inflorescences (4–13 flowers vs 1–3, rarely 4). *Geleznowia amabilis* differs from *G.* sp. Binnu in its silvery green rather than dull green leaves, and deep, golden yellow bracts that are glabrous or with very scattered minute hairs to 0.04 mm long on both surfaces (vs lemon yellow bracts with dense hairs 0.2–1.2 mm long on the outer surface and towards the margins on the inner surface). It also tends to have more flowers per inflorecence than *G.* sp. Binnu (5–13 vs 4–9) and its stigma (Figure 1B) consistently has a narrower apex (0.1–0.3 mm wide vs capitate and 0.4–0.5 mm wide).

Geleznowia verrucosa and *G.* sp. Marchagee are widespread species with distributions that extend from Goomalling to near Shark Bay and include the Swan Coastal Plain, Avon Wheatbelt, Geraldton Sandplains and Yalgoo bioregions, with the latter species extending to the southernmost boundary of the Carnarvon bioregion. As stated, *G. verrucosa* and *G.* sp. Marchagee have a smaller habit and fewer flowers than *G. amabilis* and both taxa have a distinct, capitate stigma (Figure 1D). *Geleznowia verrucosa* is differentiated by its creamy yellow floral bracts that become tinged with red post-pollination (*cf.* golden yellow bracts that rarely become tinged with red in *G. amabilis*), while *G.* sp. Marchagee is distinguished from *G. amabilis* by it smaller, dull green leaves 2–5 mm long (vs silvery-green leaves 4.6–11.5 mm long) and shorter sepals 5.9–8.7 mm long (vs 8.5–14 mm long) that barely exceed the petals (vs sepals that are distinctly longer than the petals).

Notes. Linda Broadhurst's PhD and subsequent studies (Broadhurst 1998, 2000; Broadhurst *et al.* 1999, 2001) utilised allozyme and morphological data to assess variation within *G. verrucosa*. She concluded that a new subspecies, *G. verrucosa* subsp. *formosa* L.M.Broadh. ms, could be segregated from typical *G. verrucosa*, although some intermediate populations were evident, which she postulated represented ancient hybridisation events. This taxon was never formally published and, following the adoption of national naming standards (Barker 2005), the manuscript name was changed to the informal phrase name *G. verrucosa* subsp. Kalbarri (L.M. Broadhurst 123). Unfortunately, the phrase name voucher (*L.M. Broadhurst* 123) was not lodged in any Australasian Herbarium (AVH 2018) and the name was inconsistently applied by Broadhurst: her voucher collections include material of

G. amabilis (*L. Broadhurst* 3, PERTH 05496624; *L. Broadhurst* 18, PERTH 05599016) and *G.* sp. Binnu (*L. Broadhurst* 11, PERTH 05645298), while a specimen annotated by her as the holotype of her new subspecies (*R.V. Smith* 66/370, PERTH 00967580) falls within the variation we currently recognise as typical *G. verrucosa*. A final sheet, *L. Broadhurst* 20 (PERTH 05901510), includes three fragments taken from separate plants apparently collected along a transect that were noted to represent possible hybrids between 'two forms' at the site (L. Broadhurst *in sched.*). The topmost branchlet represents *G.* sp. Binnu while the middle and bottom fragments appear somewhat similar to *G. verrucosa* albeit with slightly larger and hairer bracts. Detailed morphological and molecular studies of this and other variable populations would be required to confirm the presence of hybrids.

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