460. ACMELLA OLERACEA
Compositae

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Summary. The taxonomy, distribution and cultivation requirements of *Acmella oleracea* (L.) R.K. Jansen (*Compositae: Heliantheae*) are discussed; a full botanical description and illustrations are provided. The problems with common names and lay-taxonomists on the World Wide Web are highlighted and a pertinent warning over the use of this, and other similar plants, is provided.

When this plant first arrived in the Herbarium, for naming, it caused some interest not least because of the striking appearance of the capitula but also because a number of staff knew of it from fieldwork in Africa, Malaysia, and South America. The Toothache plant *Acmella oleracea* (L.) R.K. Jansen is widely known and its popularity can be ascertained from a quick look at the www. One search engine produced 7500 'results' for simply inputting one of the common names of this species – Toothache plant though it threw up several spurious results with just the word toothache, or plant. The results ranged from offering seed, plants for sale or exchange, and a whole host of herbal and folk medicine sites with basic information on the species. Many of the web sites caused much amusement, mostly at the rather cringe-making attempts at 'synonymy', and to the production of some rather strange common names.

The source of the plant illustrated was from material grown by Colegrave Seeds from Ball & Co. (Illinois), now known as PanAmerican Seed Co. It apparently originated from a South African stock where the plants are grown for food and medicinal use. The species is, however, widely available, if one searches hard enough, from several seed suppliers; plants are also available from some suppliers and as a novelty it is often recommended as edge planting in subtropical schemes.

Acmella oleracea might not, at first sight, be an obvious relative of the Sunflower, but it is. As a member of the tribe Heliantheae, it has all of the necessary characters, except the obvious ray florets, common in such genera as *Zinnia*, *Cosmos*, *Rudbeckia*, *Coreopsis*, and *Helianthus* which are also members of the same tribe. Using a hand

lens, and a steady hand, the reader will be able to find all the distinguishing characters on this not unattractive dome-headed species. Following the description we have detailed the abundant uses of the plant together with a pertinent warning about believing everything that appears on the web.

Deborah Lambkin's plate might at first appear a little pale, but that's merely a feature of the plant. In full sun the leaves have a certain sheen which belies the purplish coloration when looked at from above.

Cultivation. When plants of this species first appeared in the Herbarium one of us (NH) had the opportunity to try out several in his garden in Reading.

Several species of *Acmella* grow wild in Brazil and, like those, *Acmella oleracea* prefers moist or very damp soils and will even tolerate growing along lake margins. It must be kept watered, or it will quickly wilt, and it should be planted in a rich soil. Although usually described as an annual, many web sites report that the species can be grown as a perennial if protected under glass during the winter. If it is grown as a perennial it should be pinched out frequently to prevent all the shoots flowering; in a normal summer in the UK it can soon flower itself to death. Unlike several other species in the genus *Acmella oleracea* doesn't root frequently at the nodes, so it is unlikely to spread very far, and dense plantings are recommended, preferably in full sun to get the best colour in the leaves. The original plants grown in Reading had originally been pinched out hard to keep them compact and this succeeded in flowering them early (in April) but they had all finished flowering by July. Since they're usually grown as annuals don't expect too much from them when they're in full flower like the plant illustrated; apart from producing a few more capitula they're not going to grow much bigger, though with several hundred florets in each capitulum they should flower for several weeks.

Pests and diseases. We are unaware of any diseases that may affect this species, although really damp conditions, away from full sun, may result in dead capitula rotting off, so these should be removed (and if mature enough the achenes saved for sowing the next growing season).

Pests are different matter. Slugs love it! The plants taken home to Reading were given a good soaking in a large gravel tray, and

left there for several days in about an inch or two of water. Unfortunately the slugs found the plants and after about a week many of the leaves were reduced to nothing but skeletons; the capitula were left alone. Obviously the bitterness that humans sense has no effect on slugs!

PROPAGATION. *Acmella oleracea* is best propagated by seed or cuttings, but cuttings should be taken early before the shoots have become fertile. Ideally one plant should be used as a stock plant and prevented from flowering by persistent pinching out to stimulate vegetative growth. Seed seems to need a reasonably high temperature, 21°C, for germination and certainly seed trays or pots shouldn't be allowed to dry out at all; germination should be within a fortnight. Seedlings should be potted up and grown on for a few weeks before being planted out into borders or containers.

Acmella oleracea (L.) R.K. Jansen, Syst. Bot. Mongr. 8: 65 (1985).

Spilanthes oleracea L., Syst. Nat., ed. 13, 2: 534 (1767). Type: not cited. Holotype Herb. LINN 974.5, IDC microfiche 177.553:III.6! (The fiche shows the abbreviation 'H.U.' [Hortus Upsaliensi] alongside the specimen.)

Cotula pyrethraria L., Mant. Pl. : 116 (1767). Type: 'Habitat in America.' Holotype Herb LINN 974.6, IDC microfiche 177.554:I.1. (The fiche shows that the name *Cotula pyrethraria* is crossed out and *Spilanthes oleracea* has been written above it.)

Pyrethrum spilanthus Medik., Hist. Comment. Acad. Elect. Sci. Theod.-Palat. 3: 242, t. 18 (1775), *nom. superfl.*

Bidens fervida Lam., Encycl. 1: 415 (1785), *nom. superfl.*

Bidens fusca Lam., Encycl. 1: 416 (1785). Type: 'Cette espece est originaire de l'Amérique méridionale, & est cultivée du Jardin du Roi.' Holotype P-LA, microfiche seen, K – IDC 6207.339:II.5).

Spilanthes fusca Lam., Encycl. 1: 416 (1785), *nom. nud. pro syn.*

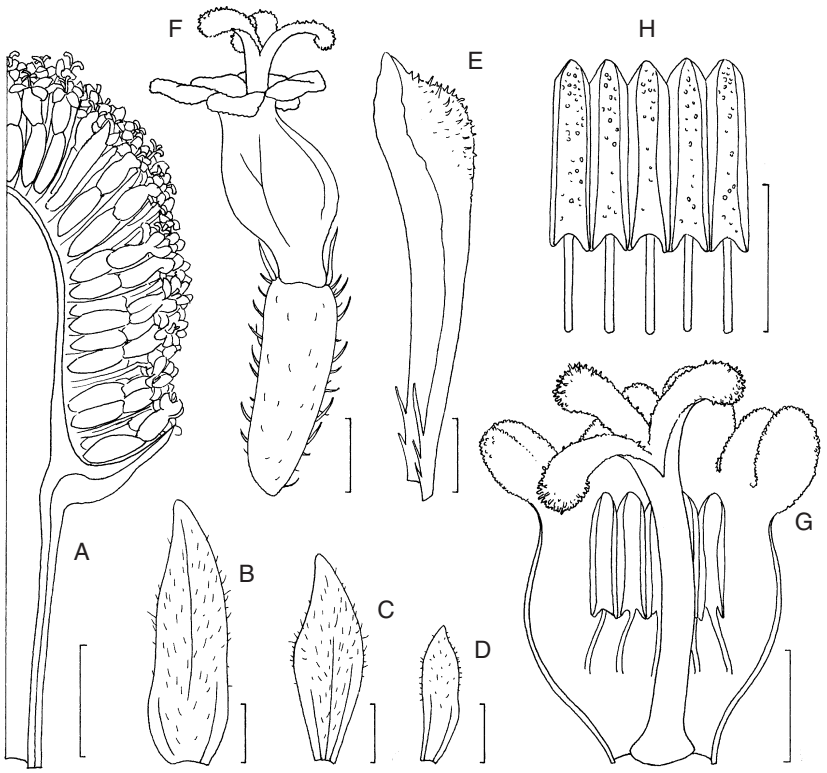
Isocarpha pyrethraria (L.) Cass., Dict. Sci. Nat. 26: 280 (1823).

Spilanthes radicans Schrad. ex DC., Prodr. 5: 624 (1836), non *S. radicans* Jacq. = *Acmella radicans* (Jacq.) R.K. Jansen. Type: 'Schrad.! cat. h. Goett. 1831. p. 5 ...) ... patr. incert. ... (v. s. comm. à cl. Schrader.)'. Holotype: G-DC; microfiche K! – the specimen illustrated in the microfiche from G-DC simply has 'Hort. Goetting. M. Schrader 1832.' on the label – the date doubtless referring to the year Schrader sent it to, or when it was received by, de Candolle.

Spilanthes oleracea β fusca (Lam.) DC., Prodr. 5: 624 (1836).

Spilanthes acmella var. *oleracea* (L.) C.B. Clarke ex Hook. f., Fl. Brit. India 3: 307 (1881).

Spilanthes acmella var. *oleracea* (L.) Baker in Mart., Fl. Bras. 6(3): 233 (1884), *comb. superfl.*



Acmella oleracea. A, half l. s. capitulum; B, inner phyllary; C, middle phyllary; D, outer phyllary; E, palea; F, floret; G, corolla opened out; H, anther cylinder opened out. Scale bars A = 5 mm, B – D = 2 mm, E – G = 1 mm, H = 0.5 mm. Drawn by Deborah Lambkin.

Description. *Prostrate to ascending annual herbs* (apparently up to 60 or 90 cm tall), *or sometimes short-lived perennial herbs* (if protected and kept warm during the winter months). *Stems* not usually rooting at nodes. *Leaves* opposite, petiolate, petiole 20–64 mm long, flattened, grooved on upper surface, narrowly winged, sparsely pilose; lamina broadly ovate to deltoid, 53–106 mm long, 40–79 mm wide, base truncate, attenuate in upper leaves, hairs sparse on both surfaces, mainly on upper midrib, hairs eglandular, uniseriate, base multicellular, slightly swollen, brown, tip unicellular, long, slender, white, lamina margin dentate, apex acute. *Inflorescences* of solitary, terminal and axillary pedunculate capitula; peduncles 3.5–12.5 mm long, ebracteolate, hollow, glabrous to sparsely pilose, hairs eglandular; capitula 10.5–23.5 mm high, 11–17 mm diameter, pedunculate, homogenous, discoid, florets yellow with distinct purple to red paleae visible in immature capitulum; involucre shallowly campanulate, 3–7 mm high, 9–15 mm diameter; phyllaries

triseriate, imbricate, green, lanceolate, apices purple to red, margins entire, ciliate, apices acute, outer phyllaries 5–6, 5.8–7.3 mm long, middle phyllaries 5–6, 5.8–7.3 mm long, inner phyllaries 5–6, 5.5–6.5 mm long; receptacle oblanceolate or conical, white, spongy, 8.3–21.5 mm high, 3.5–8.5 mm diameter, paleaceous; paleae 5.3–6.2 mm long, 1–1.2 mm wide, white, top 0.5 mm purple to red, glabrous, except at tip, hairs translucent, uniseriate, short, paleae base with right-angled narrow keel, apex acute. *Florets* hermaphrodite, numerous (400–620), fertile; corolla-tube 2.7–3.3 mm long, green, glabrous, constricted into a tube at base; tube 0.5–0.7 mm long, 0.2–0.4 mm diameter, throat inflated, 2.2–2.6 mm long, 0.5–1 mm diameter; corolla-lobes (4)–5, 0.5–0.6 mm long, yellow, papillose inside; anther cylinder included within corolla throat; filaments white, attached to base of corolla throat, flattened, lacking obvious anther collar; anthers 5, black; apical anther appendages triangular, with thickened apices, wider than long; basal anther appendages short, triangular, entire; pollen bright orange fading to pale yellow; style base with distinct node, glabrous; style shaft glabrous; style arms frequently 3 in this material (other herbarium material of cultivated specimens at Kew have 2 style arms), apices truncate, papillose. *Achenes* 2–2.5 mm long, 0.9–1.1 mm wide, black, compressed with two marginal ribs, ribs ciliate along entire length, setuliferous on faces, setulae of 'twin-hairs' with excentric, scarcely divided apices; carpopodium narrowly ovate, thickened portion drying amber with an elongated, narrow, white 'tail'; pappus persistent, of 2 unequal bristles, finely and inconspicuously barbellate, longer 0.5–1.5 mm long, shorter 0.3–1.3 mm long, tips straight.

Distribution. This species was described, and is only known, from cultivation, but escapes into weedy areas. Summarizing the various accounts of the species, and judging by a look at herbarium material, it is grown widely in the USA, northern South America, Haiti, India, South Africa, and appears to have become naturalized in East Africa. It also appears to be cultivated in a number of botanic gardens worldwide.

Material in the Herbarium, R.B.G., Kew, together with Jansen's comments suggest that it has been widespread in cultivation for some considerable time. In Kew I found a number of old sheets of cultivated material. The oldest by far was a sheet of material cultivated in the Botanic Garden on St. Vincent, dated May 1791! Material from the Jardin des Plantes in Paris dates from the mid-1830s. Apparently escaped material is common in parts of Tropical East Africa and there are several sheets from Uganda (1920s), Kenya and Tanzania (1910s). All of this material is either from lake-margins, or similarly damp areas, and margins of secondary woodland. Seed may well have been brought in from India (it had been cultivation in India from at least the 1840s) by the Indians who were predominant in railway construction in these African states. Jansen's account is not that helpful in determining how long the species has been in cultivation (none of his cited material is dated!). What is certain is that in South America there are collections from Peru and Brazil, perhaps supporting its probable origin from *Acmella alba*.

HABITAT. Largely grown for ornamental and medicinal purposes. Not apparently known from the wild, although where naturalized it occurs in moist places on lake margins.

FLOWERING PERIOD. Flowering throughout the year in the tropics; flowering during the early summer when cultivated in temperate areas.

CONSERVATION NOTES. Following the '2000 Categories and Criteria' (IUCN 2001) for assessing the conservation status of species we would have to suggest that *Acmella oleracea* is currently data deficient (DD). Although Jansen (1985) suggested the probable wild origin for the species as Peru or Brazil more fieldwork is needed to confirm this. Since this species is widely known in cultivation, and appears to be naturalized in some areas of Tropical East Africa it is unlikely that the species is under any immediate threat.

COMMON NAMES. AGRIAO DO PARA, JAMBU, PARA-CRESS (almost certainly the translation of Agrião do Pará, as Agrião is the Portuguese name often applied to water-cress), and TOOTHACHE PLANT. Interestingly Baker (1884) in his short account of useful plants of Brazil also cited PIMENTEIRA DO PARA (along with the German PARAKRESSE and the French CRESSON DE PARA) for a group of species, but undoubtedly all referring to material of *Acmella oleracea*. It is also known as BREDE MAFANE in French. There are also some very weird common names now turning up on the www – such as EYE BALL PLANT (which is doubtless an obvious one because of the appearance of the capitula – but who has yellowish sclera with a reddish iris), SPOT PLANT (for much the same reason), NOVACAINE PLANT (IMPORTANT – see warning below!), SALAD CRESS, SPILANTHES CRESS, SPILANTHES PLANT, PHAK KHRAAT HUA VAN (Thai), BRAZIL CRESS, or just SPILANTHES or ACMELLA. In its recent 'launch' of the species the parent company of Colegrave Seeds provided yet another common name – PEEK-A-BOO SPILANTHES!

USES. Much economic value has been given to *Acmella oleracea*, as an ornamental plant in horticulture, as a food flavouring and for medicinal purposes. A brief search of the www as mentioned in the introduction produced a vast array of internet sites citing uses. A literature search gave some basis for the their claims and provided a few more.

This species has been grown as an ornamental for some time, one herbarium sheet at Kew, from a botanic garden in St. Vincent, dates from the late 1700s. This is largely owing to its 'attractive, large, and cylindrical heads' (Jansen, 1985), especially with the distinctive red to purplish paleae and bud apices which later contrast dramatically with the yellow to cream coloured open florets. Various seed companies in the USA offer it for sale as does the UK edition of Thompson & Morgans's web site catalogue (www.thompson-morgan.com/seeds/uk) under the name *Spilanthes oleracea* or Brazil Cress. It is described as 'a little known, but easy to grow annual ... '

Amongst the earliest reports on the flavour of the species is that of Lamarck in his *Encyclopédie Méthodique* (1785) where he noted that the flavour of the plant was piquant, but disagreeably so. The raw leaves are used as a pungent flavouring for salads in the USA (Bailey, 1957) and in India or as a steamed vegetable (Anon., 1976) and in soups and meats (Jansen, 1985).

Bunches of the plant are sold in markets in Brazil (according to the collecting notes by Plowman (specimens in F, K, etc.)) on his collection from Pará, Brazil, *Plowman 9922*. A few of the American seed companies, which offer it for sale as salad cress, say to use it sparingly as it causes numbing of the mouth when chewed!

The most widely reported use of *A. oleracea*, on the internet and in journals, is medicinal. Indeed, Baker (1884) was apparently enthusiastic about the plant describing its properties as '*Contra odontalgiam remedium sisit notissimum, etiam in apparatum medicaminum Europaeorum aliarumque gentium receptum; praterea contra faucium et linguae astheniam atque gingivae laxitatem commendatur*'. As one of its common names suggests, toothache plant, it has a reputation as a cure for problems of the mouth, especially the teeth and gums. Indeed many of my colleagues when seeing this plant in the Herbarium recognized it (or at least knew of the related species in Africa) and reported remedies for toothache. The plant is said to have antiseptic and bacteriostatic properties as well as being topically anaesthetic, a combination that helps to fight tooth decay and, if that fails, to relieve pain. It was amusing to read in one web site that the Toothache plant was so called because the capitula 'do look like a sore tooth'! Really! Recommendations vary from chewing the leaves, roots or capitula. The latter (apparently fresh or dry!) have a more noticeable effect. Hooker (1881) described it, as *Spilanthes acmella* var. *oleracea*, as 'having a hot burning taste which causes salivation' and that the capitula are sometimes chewed to relieve toothache and are considered by Indians as a powerful stimulant and sialogogue (a herb that promotes an increased flow of saliva). A tincture of the fresh or dried herb, as *S. oleracea*, is still used against toothache and gum problems in India (Anon., 1976). Whereas the boiled leaves and roots are used by Chinese herbalists in Malaya and the dried capitula are sold in Javanese markets for the same reason (Burkill, 1935), Jansen (1985) personally observed people in Guatemala and Ecuador chewing the capitula to relieve toothache.

Some of the other reported claims for the species are diverse: it has antifungal (recommended for use against *Candida albicans*) and antiviral properties; as a sialagogue, like galanga root (*Alpinia galanga*, in the ginger family), it improves the appetite and digestive functions and overcomes nausea and vomiting; recommended for flatulence and even to remove intestinal worms; for gout and rheumatic affections; enhances the immune system's resistance to infections, whether bacterial or viral and stimulates wound healing. The 'Common Heritage Corporation', in an extensive site on Haiti's medicinal plants, attributed our species as 'an enhancer of the immune system and a prophylactic against malaria ... ' Many of the www sites comment on the fact that the leaves have a similar flavour to *Echinacea*, or coneflower, and some of the medical properties are similar, particularly the immune-enhancing activity.

Another interesting use is that of an insecticide. Insecticidal properties have been reported for the species (see Jansen, 1985 for summary) with positive affects on both the *Anopheles* and *Culex* mosquitoes. It appears that in all of these instances (both medical and insecticidal) spilanthol (N-isobutyl-4,

6-decadienamide) is the active constituent. In Africa a decoction of dried pulverized capitula (4 per cent) with *Lippia chevalieri* and *Senna occidentalis* is taken as a remedy against malaria (Neuwinger, 2000).

A recent survey undertaken in five towns in Amazonas, Brazil, which has a high incidence of tuberculosis and resistant strains of *Mycobacterium tuberculosis*, looked at the plants used by the lay population to treat this disease. Results showed that the majority of patients in the sample had used medicinal plants either before or after diagnosis. *Spilanthes acmella* D.C. [sic!], or Jambu, was among the top three plants used. A handful of the fresh leaves and flowers 'taken *ad libetum* in 500 ml of water, juice or condensed milk' (Storey, 1997). However, the study did not include any tests or information on the effectiveness of the plant.

IMPORTANT NOTE. This is where a stern warning must be issued! **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**. Several, but not all, web sites with this species offered as seeds, plants or simply offering herbal advice, provide a warning about possible problems that may arise with any herbal remedy or medicinal plant used. Some sites even say there are 'no toxic effects' or that the plant has 'No reported toxicity or reactions.': it is clear that these are both untrue. One anecdotal question to a web site called this species the 'novocaine plant': this plant is not a source of novocaine and should not be considered as such. Until much additional research is done, the insecticidal properties alone should suggest caution.

False synonymy. It is very clear that there are many names that this plant is potentially masquerading under in the trade, and certainly on the www. Some sites appear authoritative and in this there lies an inherent problem with people relying upon the information provided.

Several sites provide the 'accepted' 'scientific name' as '*Spilanthes acmella* (L.) Murr.' and then proceeded to list several 'synonyms, most referring to species in other genera! However, without exception all those sites that illustrate the plant clearly show *Acmella oleracea*. The following list provides the 'web name' followed by the currently accepted name (by NH).

Bidens acmella (L.) Lam. = *Blainvillea acmella* (L.) Philipson
Bidens ocymifolia Lam. = *Acmella alba* (l'Hér.) R.K. Jansen var. *alba*
Pyrethrum acmella (L.) Medik. = *Blainvillea acmella* (L.) Philipson
Spilanthes acmella (L.) Murr. = *Blainvillea acmella* (L.) Philipson
Spilanthes ocymifolia (Lam.) A.H. Moore = *Acmella alba* (l'Hér.) R.K. Jansen var. *alba*
Verbesina acmella L. = *Blainvillea acmella* (L.) Philipson

Acmella alba is clearly closely related to *A. oleracea* and may have much the same properties, but *Blainvillea acmella* is a somewhat unrelated plant. The work of one of us (NH) on the latter species, whilst assisting with the *Compositae* account for the forthcoming volume of the *Flora of Egypt* written by Professor Loutfy Boulos, has shown that it has been the source of much confusion wherever it occurs – there are about one and a half to two pages of synonyms! No similar medicinal or remedial attributes have been assigned to *Blainvillea*!

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