

## ***Kalanchoe winteri* Gideon F.Sm., N.R.Crouch & Mich.Walters (Crassulaceae), a new species from the Wolkberg Centre of Endemism, South Africa**

Neil R. Crouch<sup>1,2</sup>, Gideon F. Smith<sup>3,4</sup>, Michele Walters<sup>5,6</sup>  
& Estrela Figueiredo<sup>3,4</sup>

1. Biodiversity Research, Assessment and Monitoring, South African National Biodiversity Institute, P.O. Box 52099, Berea Road, 4007 South Africa (email: N.Crouch@sanbi.org.za).

2. School of Chemistry and Physics, University of KwaZulu-Natal, Durban 4041, South Africa.

3. Department of Botany, P.O. Box 77000, Nelson Mandela Metropolitan University, Port Elizabeth, 6031 South Africa (email: smithgideon1@gmail.com; epnfigueiredo@gmail.com).

4. Centre for Functional Ecology, Departamento de Ciências da Vida, Universidade de Coimbra, 3001-455 Coimbra, Portugal.

5. Natural Resources and Environment, Council for Scientific and Industrial Research, P.O. Box 395, Pretoria, 0001 South Africa (email: mwalters@csir.co.za).

6. Centre for Wildlife Management, University of Pretoria, Pretoria 0002, South Africa.

**Summary:** A new *Kalanchoe* species, *K. winteri* Gideon F.Sm., N.R.Crouch & Mich.Walters, is described from rocky grasslands of the Wolkberg region of Limpopo province, South Africa. The species is closely allied to both *K. thyrsoiflora* Harv. and *K. luciae* Raym.-Hamet, from which it is readily separable on vegetative and reproductive characteristics.

**Zusammenfassung:** Eine neue *Kalanchoe*-Art, *K. winteri* Gideon F. Sm., N. R. Crouch & Mich. Walters, wird aus felsigen Grasländern der Wolkberg-Region in der Provinz Limpopo, Südafrika, beschrieben. Die Art ist nah mit *K. thyrsoiflora* Harv. und *K. luciae* Raym.-Hamet verwandt, von denen sie leicht durch vegetative und generative Merkmale unterschieden werden kann.

### **Introduction**

In southern Africa the essentially Old World genus *Kalanchoe* Adans. occurs primarily in the summer-rainfall savanna region, being largely absent from the succulent-rich winter-rainfall and arid karroid districts (Smith *et al.*, 2003). *Kalanchoe* is included in Crassulaceae tribe Kalanchoeae t'Hart (1995: 167) along with *Cotyledon* L. and *Bryophyllum* Salisb. The split of *Bryophyllum* from *Kalanchoe sensu stricto* is still under debate and a detailed study is required to understand *Kalanchoe* as a whole, and resolve fully the boundaries of these two genera

(Eggl *et al.*, 1995; Descouings, 2003). Most recently, Thiede & Eggl (2007) treated *Bryophyllum* as a section of *Kalanchoe*. Chernetsky (2012) argued that the existence of “intermediate” species makes it impossible to distinguish separate genera, a notion earlier supported by Mort *et al.* (2001) who had recommended that *Bryophyllum* be included in *Kalanchoe*, based on strong support from *matK* sequence analyses. Whereas *Bryophyllum* taxa occur in Madagascar only, representatives of *Kalanchoe sensu stricto* occur throughout Africa, Madagascar, Arabia, and Asia, with particularly high species diversity in south-central and eastern Africa.

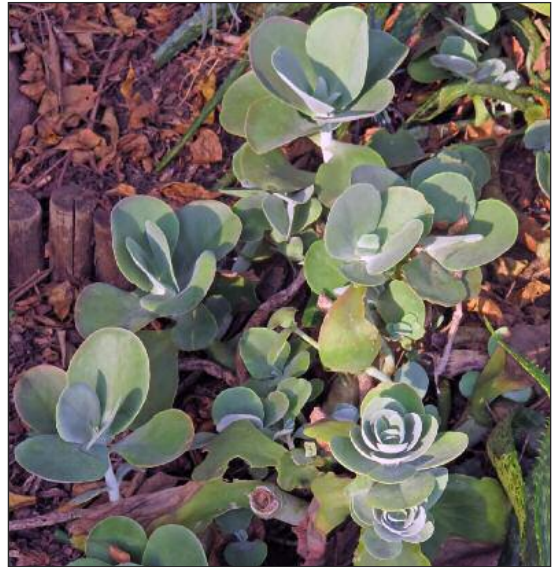
There are approximately 15 *Kalanchoe* species indigenous to southern Africa. The last upheld *Kalanchoe* species described from the Flora of Southern Africa (FSA) region was *K. neglecta* Toelken from Maputaland (Tölken, 1978). Inexplicably, Raymond-Hamet, renowned specialist of Crassulaceae, especially of the genera *Kalanchoe* and *Sedum* L., had not validly published a number of the names for his concepts by the time of his death in 1972. Accordingly, Tölken (1978) re-evaluated these, formalising some and conferring subspecies status on *K. montana* Compton, as *K. luciae* subsp. *montana* (Compton) Toelken. Subsequently, a further species has been discovered by Pieter Winter, who gathered it whilst botanising the Wolkberg to the south of Haenerstburg in South Africa's Limpopo



**Figure 1.** *Kalanchoe winteri* flowers with spreading to reflexed yellow corolla lobes that are characteristically much longer than broad and have inrolled margins and a truncate apex. Both lower and upper anther ranks are exserted.  
 Photograph: Neil R. Crouch.



**Figure 3.** The 4-angled corolla tubes of *Kalanchoe winteri* are subtended by relatively short calyx lobes.  
 Photograph: Neil R. Crouch.



**Figure 2.** The leaves of *Kalanchoe winteri* spread more widely than in both *K. thyrsiflora* and *K. luciae*, and are less densely packed towards the base. All plant parts are covered in a highly-scented powdery bloom that is resinous to the touch, and persists even on old leaves. Plants are not monocarpic, rather resprouting from the base annually. Leaf margins are occasionally red-infused, but never the entire lamina.

Photograph: Neil R. Crouch.



**Figure 4.** Lateral shooting is a commonly observed in *Kalanchoe winteri*, particularly after release from apical dominance.

Photograph: Neil R. Crouch.



**Figure 5.** Northern Escarpment Quartzite Sourveld habitat of *Kalanchoe winteri*, Wolkberg, Limpopo province, South Africa. Photograph: Mervyn Lötter.

province. We here describe and illustrate this new species (Figures 1–4), as *Kalanchoe winteri* Gideon F.Sm., N.R.Crouch & Mich.Walters.

#### Taxonomy

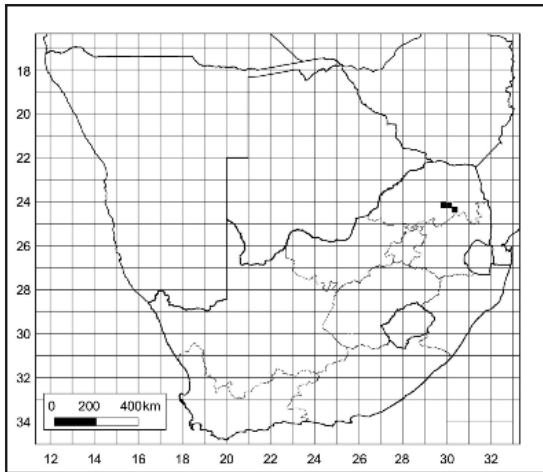
***Kalanchoe winteri*** Gideon F.Sm., N.R.Crouch & Mich.Walters **sp. nov.**

**Type:** South Africa. Wolkberg, Limpopo province, Thabakgolo Escarpment, Sedibeng sa Lebeso Mountain, West of Strasburg. *P.J.D. Winter 4430*, 10 September 2000. (holo- PRE; iso- BNRH, PRU).

**Diagnosis:** *Kalanchoe winteri* differs from *K. luciae* in consistently having golden yellow instead of whitish, pale yellowish-green, or pale pink corolla lobes, ellipsoid rather than urceolate corolla tubes, and leaf blades that are occasionally red-infused on their margins rather than frequently throughout. It differs from *K. thyrsoiflora* in having ellipsoid corolla tubes instead of cylindrical ones, a corolla lobe length-to-breadth ratio of 2 rather than 1, filaments inserted lower in the corolla tube, and all eight anthers exerted instead of only four. *K. winteri* differs from both *K. luciae* and *K. thyrsoiflora* in presenting sometimes

distinctly auriculate, mainly wide-spreading rather than erect leaves, and ovaries that are broadest above their middle rather than at this mid-locus.

**Description:** Perennial, many-leaved, 1–3 rosettes, sparsely to profusely branched from near the base and higher up, smooth, waxy, robust succulent, 0.5(–0.9)m tall in bloom. *Stems* erect to leaning and curved upwards, smooth, waxy especially at internodes, light green. *Leaves* opposite, erect to mostly spreading to variously floppy, succulent, sessile, flattened above and below, glabrous, waxy, light green to bluish-green; *petiole* absent; *blade* 140–160 × 80–140cm, obovate to somewhat oblong, not folded lengthwise, occasionally light red-infused; *axils* often carrying small leafy shoots and short branches that produce flowers in season; base narrow, sometimes distinctly auriculate; *apex* rounded-obtuse or truncate, usually indented at the tip; *margins* smooth, slightly lighter green than blade, sometimes infused with red. *Inflorescence* a slender, erect, densely flowered, cylindrical thyrse consisting of several dichasia terminating in monocha-



**Figure 6.** Known geographical distribution range of *Kalanchoe winteri* in South Africa.

sia, 0.5(–0.9)m tall. *Flowers* 13–15mm long, erect to slanted horizontally, pale yellowish-green to greenish-white (tube) and yellow (lobes), all parts excepting tepal lobes above covered with a substantial white waxy bloom, highly scented, resinous to the touch; *pedicels* 9–10mm long. *Calyx* mid-green, contrasting against lighter green corolla tube; *sepals* 4, 3–4mm long, elongated-triangular, acute (sharp-tipped). *Corolla* light greenish-yellow, tube 11–12mm long, more or less quadrangular, ellipsoid (cigar-shaped, enlarged in the middle), distinctly 4-angled, *lobes* 6–8 × 3.5–4.0mm, triangular, margins slightly to distinctly inrolled, truncated, bright yellow. *Stamens* 8, inserted just below or in the middle of the corolla tube, 1–2mm exserted; *filaments* 3.0–5.5mm long, thin, light greenish-white; *anthers* 1.4–1.6mm long, yellow. *Pistil* pyriform, consisting of 4 carpels; *ovaries* 9–10mm long, light green; *styles* ± 4mm long; *stigmas* very slightly capitate, light yellow, exserted as far as or slightly less than anthers; *scales* 2.3–2.5 × 1.8–2.1mm, narrowing at the base, truncate, repand. *Follicles* not seen. *Seeds* not seen. *Chromosome number*: unknown.

**Eponymy:** This species is named for the collector of the type, Pieter Jacobus de la Rey Winter (1964–), a South African botanist working in Cape Town at the Compton Herbarium of the South African National Biodiversity Institute. Previously he was the Curator of the L.C. Leach Herbarium of the University of Limpopo, in Polokwane, South Africa.

**Flowering time:** May–September, peaking in July.



**Figure 7.** The axillary cymes comprising the thyrses of *Kalanchoe luciae* subsp. *luciae* are often well spaced to produce interrupted inflorescences.

Photograph: Neil R. Crouch.

**Distribution and ecology:** *Kalanchoe winteri* occurs in the Limpopo Province of South Africa where it has been observed growing at three different localities over a 50km range. It occurs in Northern Escarpment Quartzite Sourveld (Mucina *et al.*, 2006) (Figure 5), growing on quartzite in grassland vegetation, always in fire protected microhabitats on or near rocks. It may be encountered at altitudes of 1370–1750m above sea level on north, northeastern, eastern, and southwestern aspects, usually in full sun, although at times in the partial shade of shrubs. This species is largely restricted to the Wolkberg (Figure 6), part of the mountain chain that forms the northern Drakensberg escarpment, and located to the immediate southwest of the town of Haenertsburg. The Wolkberg range is included in a broader area that has been recognised as the Wolkberg Centre of Endemism; the new species occurs in the Serala Subcentre of this Centre (A.E. [Braam] van Wyk, personal communication). More than 130 endemic or near-endemic taxa of



**Figure 8.** Flowers of *Kalanchoe luciae* subsp. *luciae* have corolla lobes longer than broad but which are whitish to greyish-green, never bright yellow as in *K. winteri* and *K. thyrsiflora*. The corolla tubes of *K. luciae* are urceolate, and both anther ranks and stigmas are exserted.

Photograph: Neil R. Crouch.



**Figure 9.** The basal leaf rosettes of *Kalanchoe luciae* present suberect leaves that bear attractive red-margins. The older outer leaves of these rosettes have lost much of their white mealy bloom.

Photograph: Neil R. Crouch.

which almost 20% are succulents (Van Wyk & Smith, 2001) have been recorded for the Wolkberg Centre. Amongst these are *Aloe nubigena* Groenew., *Brachystelma stellatum* E.A.Bruce & R.A.Dyer, and *Euphorbia excelsa* A.C.White, R.A.Dyer & B.Sloane. Other plant associates include *Protea caffra* Meisn., *Rapanea melanophloeos* (L.) Mez, and *Aloe cf. affinis* A.Berger. A colony of *Leucospermum saxosum* S.Moore is in close proximity to the type locality. Whilst neither *K. luciae* (Figures 7–9) nor *K. thyrsiflora* (Figures 10 & 11) were observed growing in the immediate vicinity, they are known to grow on dolomite about 5km distant from a *K. winteri* location. Flowering periods for these taxa overlap.

In a Pretoria garden the flowers are visited regularly by carpenter bees, *Xylocopa cf. caffra*, and in a Durban garden occasionally by *Apis mellifera*, the African honey bee. Plants in habitat attain a height of  $\pm 0.5$ m when flowering, but are usually taller when cultivated under optimum conditions; this may be attributable to edaphic factors as soils of the Northern Escarpment Quartzite Sourveld are reported to be nutrient-poor (Mucina *et al.*, 2006).

**Discussion:** Among the southern African *Kalanchoe* taxa that bear densely-flowered, near-cylindrical thyrses, *K. winteri* is the only species with pyriform pistils (Figure 12). This species may be confused with *K. thyrsiflora* and *K. luciae*. However, by its golden yellow corolla lobes and ellipsoid corolla (Figures 1 & 3) it may be separated from *K. luciae* (Table 1) (Figure 8). From *K. thyrsiflora* (Figure 11) it differs in having a less cylindrical and more 4-angled tube, oblong rather than square corolla lobes, the lower filament rank inserted deeper in the corolla tube (corresponding to  $\pm \frac{3}{4}$  way up the tube), and scales broader. The leaves of *K. winteri* are much less red-infused than those of *K. thyrsiflora*, and particularly less so than *K. luciae* (Figure 13). In this group within *Kalanchoe* the outer corolla colour appearance varies with the extent to which a whitish bloom is present; in *K. luciae* subsp. *montana* this is frequently absent or obsolescent, whereas in *K. thyrsiflora*, *K. winteri*, and *K. luciae* subsp. *luciae* the corolla may appear greyish-white when the bloom is intense.

The key to southern African species of *Kalanchoe* that produce an elongated, dense, more or less cylindrical thyrses (species 12 and 13 of Tölken, 1985: 61) now becomes:

Corolla lobes whitish, pale pinkish or pale yellowish-green, rarely yellow;  
 Plants glabrous; calyx lobes 2.5–4.0mm long .....*K. luciae* subsp. *luciae*  
 Plants hairy; calyx lobes 5–7mm long .....*K. luciae* subsp. *montana*

Corolla lobes bright golden yellow;  
 Corolla lobes squarish, to 3mm long; corolla tube cylindrical, not contracted below mouth; 4 anthers exserted .....*K. thyrsiflora*  
 Corolla lobes triangular, >6mm long; corolla tube ellipsoid (cigar-shaped), slightly contracted below mouth; 8 anthers exserted .....  
 .....*K. winteri*

**Table 1.** Main diagnostic characters separating *Kalanchoe winteri* from close relatives in the FSA region (cf. Wood & Evans, 1899; Compton, 1967; Fernandes, 1983; Tölken, 1985).

#	Character	<i>Kalanchoe luciae</i>	<i>Kalanchoe winteri</i>	<i>Kalanchoe thyrsiflora</i>
1	Bloom on mature leaves	Absent	Persists	Sometimes persists
2	Leaf vestiture	Glabrous or hairy	Glabrous	Glabrous
3	Calyx lobe length (mm)	4–6(–7)	3–4	2.5–4.0
4	Corolla tube length (mm)	6–10(–12) (diam. in middle about 8)	11–12 (diam. in middle about 6.5)	12–16(–20) (diam. in middle about 6.5)
5	Corolla tube shape	Urceolate (urn-shaped)	Ellipsoid (cigar-shaped)	Cylindrical
6	Corolla tube contraction at mouth	Very contracted	Slightly contracted	Slightly contracted or not so
7	Corolla lobe colour above	Whitish, pale yellowish-green, pale pink, yellowish-green	Bright yellow	Bright yellow to orange-yellow
8	Corolla lobe length (mm)	4–6(–7)	6–8	2–3
9	Corolla lobe length/width ratio	± 2	± 2	± 1, lobe almost square
10	Corolla lobe apex	Acute to obtuse, sometimes apiculate	Acute, truncated	Obtuse to rounded
11	Filament length (mm)	4–5	± 3.0–5.5	≤ 2
12	Filament insertion position in corolla tube	± ¼ way up	± ¼ way up	Just below mouth
13	Anther exertion	All 8	All 8	Only 4
14	Pistil shape	Prolate (rugby ball-shaped)	Pyriform (pear-shaped)	Narrowly barrel-shaped
15	Ovary form	Broadest ½ way up	Broadest ⅓ way up	Broadest ½ way up
16	Style length (mm)	2.75–3.50	± 4	(1.5–)2.5–3.0

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Anonymous referees are thanked for their constructive comments.

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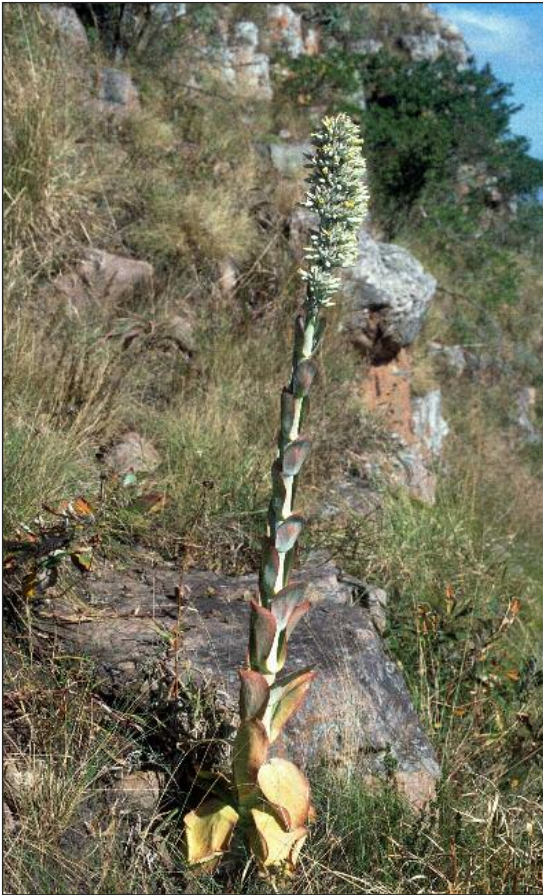
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**Figure 10.** Flowering plant of *Kalanchoe thyrsiflora* with a single stem arising from the basal rosette of the previous year.

Photograph: Neil R. Crouch.



**Figure 12.** Pistils of *Kalanchoe winteri* (A) and *K. luciae* subsp. *luciae* (B), pyriform and prolate respectively. Scale bar: 10mm.

Photograph: Neil R. Crouch.



**Figure 11.** Section of the tight packed inflorescence of *Kalanchoe thyrsiflora* revealing flowers with characteristic cylindrical corolla tubes and yellow, short, squarish corolla lobes. Only the upper anther rank is exserted.

Photograph: Neil R. Crouch.



**Figure 13.** Under high stress growing conditions the leaves of *K. luciae* turn almost uniformly red.

Photograph: Neil R. Crouch.

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