THE GENUS KNIPHOFIA Moench (ALOEACEAE) IN AUSTRALIA

by

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ABSTRACT†

Conran, J.G. The genus *Kniphofia* Moench (Aloeaceae) in Australia. *Muelleria* 6(5): 307-310 (1987). — The South African species *Kniphofia uvaria* (L.) Hook. f. is reported and described for Australia from Phillip Island in Victoria as a naturalised garden escape. This population consists of 61 mature plants that in 1985 produced an estimated 550,000 seeds with a potential germination of 82%. This large reproductive potential, coupled with large numbers of seedlings, suggests that *K. uvaria* has potential to spread to other sites.

INTRODUCTION

Kniphofia Moench is included by Cronquist (1981) in the Aloeaceae, and by Dahlgren *et al.* (1985) in the Asphodelaceae subfam. Asphodeloideae. The genus is usually considered to be closely related to *Aloë* L. (Cronquist, 1981), but Baijnath (1980) and Dahlgren *et al.* (1985) argued that *Kniphofia* was sufficiently different from *Aloë* (Asphodelaceae subfam. Alooideae) to warrant its removal to the Asphodelaceae subfam. Asphodeloideae.

Forster and Clifford (1986) list three genera of the Aloeaceae *sensu* Cronquist (1981), namely *Aloë, Gasteria* Duval and *Haworthia* Duval, as naturalised in Australia or persisting in old, abandoned gardens. Subsequent to that treatment, examination of material at MEL and field observations by myself revealed a population of *Kniphofia uvaria* (L.) Hook. f., a common garden ornamental, naturalised as a garden escape in Victoria. This account is intended partly as an addendum to the treatment by Forster and Clifford (1986), and also examines the fecundity and potential for spread of this population.

Although probably better placed in the Asphodelaceae subfam. Asphodeloideae, *Kniphofia* is retained here in the Aloeaceae to conform to Cronquist's (1981) classification followed in the 'Flora of Australia'.

TAXONOMY

Kniphofia is readily distinguished from other Aloeaceae in Australia by the lack of succulent leaves, the presence of a terminal inflorescence of shortly pedicellate flowers with the perianth fused for almost the entire length, and by the stamens equal to or exserted from the perianth tube. The following couplet should be added to the generic key on p. 67 of Forster and Clifford (1986):

3 Inflorescence axillary; leaves succulent, fleshy..... *Aloë*
3: Inflorescence terminal; leaves chartaceous, thin ..... *Kniphofia*

Kniphofia Moensch, Meth. 631 (1794); named for Johannes Hieronymus Kniphof (1704-63), Professor of Medicine, Erfurt University, Germany. TYPE: *K. uvaria* (L.) Hook.f.

Perennial herbs with a thick, branched rhizome (simple in some extra-Australian species), and fleshy, fibrous roots. *Leaves* simple, alternate, sessile, in dense rosettes,

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† Since this manuscript went to press a healthy colony of *K. uvaria* has been located and voucher specimens collected from New South Wales, 8 km south of Berrima on the Hume Highway, 34° 31′ S., 150° 18′ E., 29.xii.1986, *J.G. Conran* (MEL, NSW). The colony consisted of about ten flowering clumps, plus seedlings, in roadside verge.

linear, chartaceous; margins entire (fine toothed in some extra-Australian species). *Inflorescence* a simple, terminal, condensed to long-cylindrical, sub-spicate raceme. *Flowers* zygomorphic, pedicellate, pendulous to spreading, protandrous. *Tepals* connate into a tube; apices shortly free, subequal, obtuse, spreading. *Stamens* exserted or equalling perianth tube. *Style* filiform, subequal to stamens at anthesis, later exserted; ovary 3-locular; ovules axile, in two rows per loculus. *Fruit* a loculicidal capsule. *Seeds* numerous, irregularly triquetrous to flattened, dark brown.

An African, Madagascan and Arabian genus of c. 70 species; in Australia, a single introduced species naturalised in Victoria.

Kniphofia uvaria (L.) Hook.f. Bot. Mag. t. 4816 (1854). — *Aloë uvaria* L. Sp. Pl. 1: 323 (1753). TYPE: Specimen in Herb. Hort. Cliff. (BM *n.v., fide* Codd (1968)).

Stemless herb to c. 1.5m tall with thick branched rhizome. *Leaves* linear, tapering, acute, with a prominent, keeled, scabrid midrib, 35-80 cm long, 0.5-2 cm wide; sessile. *Inflorescence* a dense, pedunculate, subspicate raceme, 7-11 cm long, with numerous flowers, elongating to c. 30 cm in fruit; peduncle 60-120 cm long; pedicels 2-5 mm long, elongating to c. 8 mm in fruit. *Perianth* orange-red to yellow-green in bud, turning paler at anthesis, 35-40 mm long, 5-6 mm wide; apical 2 mm free, spreading. *Stamens* 40-45 mm long; anthers 2 mm long, yellow, turning black. *Ovary* glabrous, ovoid, 4-5 mm long; style single, filiform, minutely capitate, 40-45 mm long, exserted after anthesis and exceeding stamens. *Capsule* elongate-ovoid, trigonal, 7-14 mm long. *Seeds* numerous, 3 mm long. Red Hot Poker.

Chromosome Number: 2n = 12 *fide* Fedorov (1969).

Native to southern Africa; naturalised in Australia only at one Victorian locality (see Specimens Examined).

SPECIMENS EXAMINED:

Victoria — Flynn Reef, Phillip Island, 38° 30′S., 145° 09′E., 5. vii. 1984, *D.E. Albrecht 572* (MEL 673996); Flynn Reef, Phillip Island, 38° 30′S., 145° 09′E., 17. v. 1986, *J.G. Conran 373* (MUCV).

FECUNDITY AND POTENTIAL FOR SPREAD

Materials and Methods

Plants of *K. uvaria* growing at Flynn Reef, Phillip Island, (30° 30′S., 145° 09′E.) were measured in the field. The total number of mature (fruiting or flowering) plants at the colony was recorded. To determine the potential and realised fecundity of individuals for 1985-6, the average numbers of mature shoots and inflorescences per plant from the 1986 flowering season were determined from a sample of 30 plants. Ten infructescences produced during the 1985 flowering season were collected, and the number of fruits and flower scars counted to determine the total flower and fruit numbers. To determine potential and actual seed set, ten flowers and 10 unopened capsules from the 1986 season were also collected, and the numbers of ovules and seeds respectively, recorded. These data were all converted to averages, and estimates of potential fecundity (PF) and actual fecundity (SF) seed set per plant were calculated using the following formulae:

$$PF = I/P \times F/I \times O/F$$
$$SF = I/P \times C/I \times S/C$$

where I/P = av. no. of inflorescences per plant; F/I = av. no. of flowers per inflorescence; O/F = av. no. of ovules per flower; C/I = av. no. of capsules per inflorescence; S/C = av. no. of seeds per capsule. Percentage fertility was then estimated from the PF and SF. Seed from ten plants was collected, and 100 seeds of each were planted on moist filter paper in petri dishes under c. 3500 lux (8 hours day length) at c. 20°C to determine percentage germination.

Results

The population contained 61 mature plants. Results of the fecundity study show that the plants have fruit sets of 90% and seed sets of 25%, with the colony producing an estimated 550,000 seeds for the 1985-6 season, with 82.1% germination at 14 days, after which no further germination was seen to occur (Table 1).

Table 1. Data for fecundity and seed germination in *Kniphofia uvaria* at Flynn Reef, Phillip Island.

Attribute	Mean (±SD)	Sample Size
Sh/P (Shoots per plant)	8.4 (±7.1)	30
I/P (Inforescences per plant)	3.1 (±3.4)	30
F/I (Flowers per inflorescence)	254.3 (±75.2)	10
C/I (Capsules per inflorescence)	230.9 (±74.2)	10
% Fruit Set	90.0 (±4.2)	10
O/F (Ovules per flower)	45.1 (±7.3)	10
S/C (Seeds per capsule)	12.6 (±3.8)	10
PF/P (Est. potential fecundity per plant)	36,000	—
SF/P (Est. actual fecundity per plant)	9,000	—
Estimated % SF	25.0	—
Total SF estimated for population	550,000	—
% Seed germination	82.1 (±15.0)	1,000
Estimated potential seedlings per annum	450,000	—

DISCUSSION

Apparently naturalised plants, agreeing with the description of *K. uvaria sensu* Codd (1968) had, until recently, been observed at two locations in Victoria, namely the Flynn Reef site, and on the Bellarine Peninsula, 6 kilometres north of Ocean Grove (38° 16′S., 144° 31′E). At the latter location, a single plant of about 6 shoots was observed flowering in December 1985, but was subsequently destroyed by land development before a collection could be made.

The colony at Flynn Reef occupies an area of about 500 m^2 (50 x 10 m) of back dune swale, growing with *Isolepis nodosa* (Rottb.) R. Br and *Paspalum dilatatum* Poir. All of the plants bore evidence of both flowering and heavy fruit set, and the flowers produce copious quantities of nectar. Syrphid flies, Ichneumonid wasps and ants (*Iridomyrmex* sp.) were observed to visit the flowers. Visiting ants were covered in *Kniphofia* pollen, but the form of the inflorescences and flowers of *K. uvaria* suggest birds as the likely pollinators (Pijl, 1982). The levels of both fruit and seed set indicate that either efficient animal pollination or else self pollination is occurring. The fecundity of the colony is reflected in the large numbers of seedlings and immature plants (15-20 per m^2) which occur on bare ground close to mature plants.

Codd (1968) lists two main flowering periods, October-December and April-May, for *K. uvaria* in South Africa, with occasional plants flowering at almost any time of the year. Flowering in the African *Kniphofia* spp. is apparently enhanced by fire (Codd, 1968). The population at Phillip Island flowers from at least May to September, with the main flowering period apparently from July to August. Codd (1968) mentions that many cultivated *Kniphofia* plants were of hybrid origins, and this may possibly explain the difference in flowering peaks, although most *Kniphofia* species are dormant during June-July. The plants grow in a back dune swale which is probably similar to the moist sites which are the natural habitat of *Kniphofia* in South Africa (Codd, 1968).

While *Kniphofia uvaria* is not usually regarded as a serious (or even potential) pest species, the Flynn Reef population occurs partly within a State Conservation Area and Penguin Fauna Reserve. It would be advisable, given the high reproductive potential of the population (an estimated 450,000 seedlings per annum) for the local management authorities to monitor the population in case the plants spread further into the dune swales, to the possible detriment of the native vegetation.

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