A new specific plant host for the agave snout weevil, *Scyphophorus acupunctatus* Gyllenhal, 1838 (Coleoptera: Curculionidae) in South Africa: a destructive pest of species of *Agave* L. (Agavaceae)

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Summary: The widely distributed agave snout weevil, *Scyphophorus acupunctatus* Gyllenhal, is for the first time recorded from *Agave salmiana* Otto ex Salm-Dyck subsp. *salmiana* in South Africa. In its native habitat in Mexico, this new host plant species is one of the most important sources of pulque, a fermented alcoholic beverage. With efforts underway at Bothaville in the Free State Province, South Africa, to establish an agave nectar industry, commercial farmers should be made aware of the destruction that the agave weevil can cause, especially in concentrated populations and plantations of *Agave* L. species.

Introduction

Until recently, a tequila-like drink was distilled from the fermented hearts of *Agave americana* L. var. *americana* at Graaff-Reinet in the Eastern Cape (Stiemie, 1997; Biggs, 2004). This fledgling industry seemed to prosper, until the death of its director at the beginning of 2008, which ultimately resulted in its liquidation (Property24, 2008; Anon., 2009). It is anticipated that Karoo-based plants of *Agave* L., targeted previously for the production of this alcoholic beverage, will continue to be harvested for their 'pinas' or central stem cores, from which a fructose-rich syrup is extracted and sold as a low GI food additive (sweetener). This natural sweetener is seen with increasing frequency in health shops in South Africa.

For more than a century Agavaceae species, especially *A. sisalana* Perrine ex Engelm., have also been commercially cultivated in South Africa for their fibres (Sutherland, 1900). As natural products have become increasingly popular, interest in this industry has been renewed...
Figure 1. *Agave salmiana* subsp. *salmiana* is a large growing species of century plant from Mexico. Photo: Gideon F. Smith. Figure 2. The pyramid-shaped inflorescence of *A. salmiana* subsp. *salmiana* is carried on a thick robust pole. Photo: Gideon F. Smith. Figure 3. Lateral (a) and dorsal (b) view of the agave weevil (*Scyphophorus acupunctatus* Gyllenhal, Curculionidae). Voucher specimen [G.F. Smith & E. Figueiredo 10] deposited at the Ditsong: National Museum of Natural History (formerly the Transvaal Museum), Pretoria. Photos: Charlene Janion.
work on pheromones produced by males of S. acupunctatus indicates the potential use of these aggregation-inducing volatiles and also other chemical attractants obtained from agaves in mass-trapping programmes (Altuzar et al., 2007; Ruiz-Montiel et al., 2008).

**The plant host**

*Agave salmiana* Otto ex Salm-Dyck subsp. *salmiana* (Agavaceae) is a slow-growing century plant from Mexico that will in time produce a massive rosette consisting of large, dark green, boat-shaped leaves (Figure 1). It is a monocarpic, multi-annual that usually flowers after between 10 to 15 years. The species suckers freely from the base, but much more slowly than the better known and locally naturalized *Agave americana* L. (Smith & Mössmer, 1996). The inflorescence consists of a thick, robust pole that supports a fairly short, branched inflorescence that is pyramidal in shape (Figure 2). This at once separates it from *A. americana* which has a tall, elongated inflorescence.

Taxonomically, *A. salmiana* is widely regarded as consisting of three subspecies, two of which [the typical one and subspecies *ferox* (K.Koch) Gentry] are cultivated in South Africa. Although not known to be naturalized in southern Africa, this species has invaded elsewhere, for example the Iberian Peninsula, which has a Mediterranean climate similar to that of South Africa’s southwestern Cape (Smith & Figueiredo, 2007).

**The weevil**

The genus *Scyphophorus* Schönherr, 1838 (Coleoptera: Curculionidae) originates from the New World. It has two species that are commonly known as ‘yucca weevil’ (*Scyphophorus yuccae* Horn, 1873) and ‘sisal weevil’, ‘sisal snout weevil’, or ‘agave snout weevil’ (*Scyphophorus acupunctatus* Gyllenhal, 1838) (Vaurie, 1971). The two are distinguished on several characters (see Walker, 2008a, 2008b) of which the most easily observed is the shorter and stouter snout of *S. acupunctatus* (Figure 3) as opposed to the longer, narrower snout of *S. yuccae*. Adult agave snout weevils are large, up to 15 mm long, and black.

*Scyphophorus acupunctatus* is native to the southwestern U.S.A., Mexico, including Baja California, and Central America (Pott, 1975). It has been widely introduced to many parts of the world, including South Africa and eastern Africa, where *Agave sisalana* is grown as a source of natural fibres (Woodruff & Pierce, 1973; Hill, 2008).

In South Africa, *S. acupunctatus* was collected on a cultivated specimen of *Agave salmiana* subsp. *salmiana* in a domestic garden in Pretoria,
Gauteng Province. The garden has about 50 different species of Agave in cultivation, but *S. acupunctatus* was collected on *Agave salmiana* only. The weevil infected suckers of the specimen and not the mother plant, which is about eight years old, with leaves to 1.2 m in length.

The larvae of *S. acupunctatus* burrow into the heart of an agave plant, ingesting plant tissue *en route*. This destructive process is difficult to detect as only small entry holes provide initial evidence of snout weevil presence. These apertures are usually situated towards the base of the spear-like central cluster of unopened leaves in the agave rosette. Adults bore into the fleshy centre of the plant above the crown, where eggs are laid (Waring & Smith, 1986). Detection usually occurs only after the plants lose vigor, by which time the host has been severely mined internally. Secondary fungal or bacterial rots occur in addition to feeding damage (Waring & Smith, 1986; Solís-Aguilar et al., 2001). If such a plant is dissected, infestation is evidenced by galleries made by larval and adult weevils in the fleshy leaves (Figure 4) and bole of the plant (Waring & Smith, 1986). Each female beetle can lay on average between 25 and 50 eggs, with as many as 60 eggs produced during a three month period (Harris, 1936; Hill, 2008). After the eggs hatch, larvae feed on the fleshy inner parts of the plant and when ready to pupate they tunnel down into the roots, within which they construct cocoons using host plant fibers (Pott, 1975). Cocoons are also readily found at the bases of leaves of certain agave species (Waring & Smith, 1986). The next generation of weevil adults eventually exits the plant to infect other plants. When first reported in the fields of blue agave (*Agave tequilana* F.A.C.Weber ‘Azul’), this plague was called ‘gangrene of the blue agave’ (Solís-Aguilar et al., 2001; Valenzuela-Zapata & Nabhan, 2003).


*Agave salmiana* is one of the main sources of the drink pulque (Gonçalves de Lima, 1990). After the emerging inflorescence is removed early on, pulque is obtained from fermenting the juice obtained from the centres of the rosettes of *A. salmiana, A. atrovirens* Karw. ex Salm-Dyck

![Figure 4](image-url). Damage to the basal parts of the leaves of *Agave salmiana* following infestation of *Scyphophorus acupunctatus*. Photo: Gideon F. Smith.
and *A. mapisaga* Trel. *Agave salmiana* hearts are also used for the distillation of mescal, of which the commercially popular and widely consumed tequila is one type (Valenzuela-Zapata, 1994; Aguirre Rivera et al., 2001). It is noteworthy that the maguey ‘worm’ or red ‘worm’ often found at the bottom of bottles of commercially available mescal – tequila never contains a worm – is the caterpillar of *Hypopta agavis* Blázquez (Lepidoptera: Cossidae), another pest of *Agave* species (Quiroz Márquez, 1997).

### Other plant hosts

*Scyphophorus acupunctatus* is known as a pest of several species of Agavaceae and Dracaenaceae (Vaurie, 1971; Solís-Aguilar et al., 2001; Ruiz-Montiel et al., 2003; Aquino Bolaños et al., 2007; Hill, 2008; Valdés et al., 2010). It attacks many useful species of *Agave*, such as those used for fibre production (*A. sisalana*, sisal; *A. fourcroydes* Lem., henequen), beverages (*A. tequilana* F.A.C.Weber, tequila) or ornamental purposes (*A. americana* (EPPO, 2002). It is also found in species of the related genera *Furcraea* Vent., *Yucca* [e.g. *Y. aloifolia* L., *Y. elephantipes* Regel ex Trel., *Y. glauca* Nutt.], *Beaucarnea*, *Dasyliorion* Zucc. (*D. longissimum* Lem.) (EPPO, 2002) and recently on *Polianthes tuberosa* L., which is sometimes treated as a species of *Agave* (Lavin et al., 2002). That it is also known to infest members of *Dracaena* Vand. ex L. [*D. draco* L.] (Vaurie, 1971; EPPO, 2002) is unsurprising, given the quite close affinity of the Dracaenaceae to the Agavaceae (Bogler & Simpson, 1996). To date the weevil has been reported from eastern and South Africa, South America, Europe (including its Mediterranean Basin), northern Asia, south and southeast Asia, Australia, Hawaii, mainland U.S.A. and Canada (Vaurie, 1971; Hill, 2008; Walker, 2008b; Setliff & Anderson, 2011).

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### References


Note added in proof: