Pelargonium githagineum (Geraniaceae), a new species from the Roggeveld plateau and Matjiesfontein area

Elizabeth M. Marais
Department of Botany, University of Stellenbosch, Private Bag X1, Matieland, 7602 Republic of South Africa
E-mail: emm@land.sun.ac.za

Received 26 June 1998; revised 19 August 1998

Pelargonium githagineum E.M. Marais is described as a new species. It is a tuberous species belonging to the section Hoarea (Sweet) DC. In order to ascertain interrelationships within section Hoarea, macromorphological characters, leaf anatomy and pollen morphology of P. githagineum are compared with those of other species in section Hoarea. An illustration and distribution map of the species, as well as an electron micrograph of the pollen grain is provided.

Keywords: Geraniaceae, Hoarea, new species, Pelargonium, taxonomy.

Introduction

Pelargonium githagineum E.M. Marais is a deciduous geophyte belonging to the section Hoarea (Sweet) DC. and known from only a small number of specimens. The first known collection was made by F.M. Leighton in October 1943 and since the start of the Pelargonium L'Hérit. project at the University of Stellenbosch in 1975, it has been collected by J. Lavranos (without locality) and myself. P. githagineum is one of the early flowering species in section Hoarea and flowers from September to October. It is one of the small number of species in the section where leaves are still present when flowers and even fruits appear.

Materials and Methods

Morphological studies were performed on plants collected in the wild and cultivated in the garden as only one herbarium specimen (Leighton 254) was available. Proper herbarium specimens were prepared from the cultivated plants. Leaf anatomical studies were performed on fresh material from plants growing in the garden for more than one season (Table 1). This ensured that all the material studied was from plants growing for a considerable time under similar conditions. Transverse sections of wax-embedded laminae were cut with a rotary microtome and stained with Alcian Green Safranin (Juel 1983). Sections were made through the middle part of the lamina. Pollen grains of P. githagineum were collected and treated according to the acetolysis method and studied with light and scanning electron microscopes. At least twenty five pollen grains of three different specimens were studied and measured (Table 1).

Pelargonium githagineum E.M. Marais, sp. nov. in sectione Hoarea.

Herba perennis acaulescens tuberosa. Tuber subterraneum, napi-forme vel oblongum, 35–40 mm longum, 20–40 mm in diam. Folia rosulata, viridí, petiolata; lamina elliptica, ovata vel triangulata, crenata, 20–70 mm longa, 10–65 mm lata, adaxiale pilosa et glandulosa, abaxiale velutina; petiolum 15–80 mm longum, prostratus, pilosus et glandulosus; stipulae petiolo adnatas. Inflorescencia: scapus pseudumbelliferis 2–5, utraque 6–27 floribus; pedunculus githagineus. Pedicellum ca. 0.5 mm longum. Hypanthium 9–20 mm longum, githagineum, dense glandulosum. Sepala 5, lanceolata, githaginea, 6–8 mm longa, 1.5–3 mm lata, unum posterum erectum, cetera patentia. Petaló 5, alba, duæ postica ligulata vel spatulata, 8.5–10 mm longa, 2–3 mm lata, tria antica spatulata, 6.5–9 mm longa, 1.5–2.5 mm lata. Stamina fertilia 4, staminodia 6, petalis longiora.

TYPE - Northern Cape Province: S of Sutherland, 3 km on the Ouberg turnoff, Marais 243 (NBG, holo; BOL, K, MO, PRE).

A deciduous geophyte with a regularly shaped subterranean tuber, 120–300 mm tall when in flower. Tuber: a turnip-shaped or elongated root with a short flattened stem, covered with flaking dark brown periderms. 35–40 mm long and 20–40 mm in diameter. Leaves: a dense mass of radical, rosulate, green, petiolar leaves; lamina simple, elliptic, ovate or triangular, base cuneate to truncate, apex rounded, margin deeply crenate, 20–70 x 10–65 mm, adaxially pilose with patent hairs interspersed with very short glandular hairs, abaxially velutinous; petiole 15–80 mm long and 1.5–4 mm in diameter, prostrate, densely pilose with patent hairs interspersed with glandular hairs; stipules triangular to subulate, adnate to petioles for half their length, 7–15 mm long and 1.5–5 mm wide, ciliate. Inflorescence: scape 5–25 mm long, 3–5 mm in diameter, greenish red, branching, bearing 2–5 pseudo-umbelllets with 6–27 flowers each, peduncles 65–260 mm long, 2–5 mm in diameter, greenish red, densely covered with glandular hairs interspersed with patent non-glandular hairs; bracts subulate, reclinate, 3–8 mm long, 1–2 mm wide, hirsute; flower buds, flowers and fruits erect. Pedicel 0.5–2 mm long. Hypanthium 9–20 mm long, 1.5–2.5 times the length of the sepals, greenish red, indumentum as on peduncle. Sepalae 5, lanceolate, apices acute, 6–8 mm long, 1.5–3 mm wide, posterior one erect, others patent, greenish red with white margins, indumentum abaxially as on peduncle. Petalae 5, white; posterior two ligulate to spatulate, 8–11 x 2–3 mm, with a length/width ratio of 3.5–4.5. bases cuneate; apices truncate to emarginate, recurved during anthesis; anterior three connivent, spatulate, bases attenuate, apices rounded, 0.5–9 x 1.5–2.5 mm. Stamenes 10, basally connate, staminal column 1.5–3 mm long, white, smooth; perfect stamens 4, protruding from the flower; 9–12 mm long (longer than the sepals and the petals), free filaments wine-red, staminodes 3–6 mm long; anthers wine-red, ca. 2 mm long, pollen orange. Gynoeceum: ovary superior, oblong-conical, 3–5 lobed, 3.5–6 mm long, densely sericeous; style filiform, 3.7–5.5 mm long, white; stigma with 5 recurved branches, 0.6–1.5 mm long, adaxially pink. Fruit a schizocarp consisting of 5

Table 1 Specimens of P. githagineum studied for pollen morphology and leaf anatomy

<table>
<thead>
<tr>
<th>Specimen</th>
<th>STEU number</th>
<th>Pollen measurements</th>
<th>Min.</th>
<th>Max.</th>
<th>μm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lavranos 20785a</td>
<td>3220a</td>
<td>67</td>
<td>77</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Marais 143</td>
<td>3482</td>
<td>60</td>
<td>79</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Marais 243</td>
<td>3678</td>
<td>58</td>
<td>77</td>
<td>69</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1  Pelargonium githagineum. A. Flowering plant × 1; B. Androecium × 3; C. Gynoecium × 3; D. Petals × 2.
mericarps, bases of mericarps 5–6 mm long, without glandular hairs, tails 28–35 mm long. (Figure 1).

Diagnostic features and affinities

*P. githagineum* is a geophyte with a dense mass of simple prostrate, pilose leaves and very small white flowers. The flowers have only four fertile stamens with long, protruding, wine-red filaments. The specific epithet *githagineum* refers to the greenish red colour of the scape, peduncles and the hypanthia. On morphological characters alone, it is difficult to determine the position of *P. githagineum* within section *Hoarea*. The rosette growth form as well as the structure of the leaf resemble those of *P. punctatum* (Andr.) Willd., *P. triandrum* E.M. Marais, *P. curviflorum* E.M. Marais and *P. oblongatum* Harv. (Marais 1994b), but the flowers of these four species are much larger and morphologically different from those of *P. githagineum*. The scape in *P. githagineum* is very short and the scape and peduncles are relatively thick in comparison with other species of section *Hoarea*. In this *P. githagineum* resembles *P. caroli-henrici* B. Nord., another species with only four fertile stamens, but with no further resemblance in the floral structure. The small white flowers of *P. githagineum*, with the stamens longer than the sepal and the petals, resemble those of *P. parvipetalum* E.M. Marais. In *P. githagineum*, however, the staminal column is smooth and the number of stamens four, whereas in *P. parvipetalum* the column is papillate and the number of stamens five, although I do not regard the number of fertile stamens as an indication of interrelationships between species. The majority of the species in section *Hoarea* have five fertile stamens, although 11 species of the section show a reduction in the number of fertile stamens (Marais 1994a). Comparing the differences in the structure of the flowers of these species, the reduction in the number of fertile stamens does not reveal any interrelationships between species but rather a case of convergent evolution, may be a response to a specific pollination syndrome. However, the number of fertile stamens could be used as a character to distinguish between species.

Although the flowers of *P. githagineum* are protandrous, closed stigma branches protrude from the flower buds (Figure 1). During anthesis the filaments lengthen more than the style and when the anthers open, the closed stigma branches are concealed within the androecium. Eventually, when the anthers are dropped, the stigma branches open to take the position previously occupied by the anthers.

Figure 2 Polar view of the pollen grain of *Pelargonium githagineum* (Lavranos 20785a STEU).

The anatomy of the lamina of *P. githagineum* resembles that of other *Hoarea* species with simple prostrate leaves (*P. neprophyllum* E.M. Marais (Marais 1992), *P. punctatum*, *P. triandrum*, *P. curviflorum* and *P. oblongatum* (Marais 1994b) and *P. aestivale* E.M. Marais (Marais 1995)). The lamina is dorsiventral with adaxially two layers of short but broad palisade-like cells and abaxially a loosely arranged spongy tissue. *P. githagineum*, however, shows no resemblance with the floral structures of any of these species.

The morphology of the pollen grains corresponds with that of the rest of the genus *Pelargonium*, in that the grains are spherical and tricolporate. The structure of the wall of the pollen grain is semitectate (Verhoeven & Marais 1990) and the tectum can be described as striate-reticulate (Bortenschlager 1967) because the main muri are on a higher level and are more or less parallel to one another. These muri are also thicker and more prominent than the lower connecting ones (Figure 2). A similar striate-reticulate structure of the tectum occurs in nearly half the species of section *Hoarea* (Marais 1994a). The pollen grains of *P. githagineum* are (58–68–79) μm in diameter (Table 1).

Although the leaf morphology, leaf anatomy, pollen morphology and chromosome number (F. Albers, personal communication) of *P. githagineum* fit in well with the majority of species of section *Hoarea*, the floral structure is different from all the species mentioned above. On morphological characters alone, it remains difficult to determine the closest relatives of the species or its position within section *Hoarea*.

Geographical distribution and ecology

*P. githagineum* occurs on the Roggeveld plateau and around Matjesfontein (Figure 3), an area with an annual rainfall of 100–200 mm during the winter months. Plants grow on sandstone ridges under bushes, and are locally abundant. It is an early flowering species of section *Hoarea* and flowers from September to October, before the leaves wither.

Material studied

- 3220 (Sutherland): S of Sutherland, 3 km on the Ouberg turnoff (–BC), Marais 247 (BOL, K, MO, NBG, PRE); Komsberg, farm Dc Korn (–DA), Marais 143 (STEU).
- 3320 (Montagu): Whitehill Ridge, Lainsburg (–BA), Leighton 254 (BOL): 4 km from Matjesfontein on Sutherland road (–BA), Marais 211 (STEU).
- Without locality: Lavranos 20785a (STEU).
Acknowledgements
I thank Mr E.G.H. Oliver for translating the diagnosis into Latin, the Brenthurst Library for permission to reproduce the water colour painting done by the late Ellaphie Ward-Hilhorst.

References