Pelargonium quarcitico/a (Geraniaceae), a new species from the Knersvlakte

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Pelargonium quarcitico/a Meve & E.M. Marais is described as a new species. It is a deciduous geophyte belonging to the section Hoarea (Sweet) DC. and is endemic to the quartz fields of the Knersvlakte in the northern part of the Western Cape. The species is characterized by small glandular, slightly sticky, almost red, pinnately compound or coralliform leaves with a leaf type not typical for Pelargonium section Hoarea. P. quarcitico/a flowers in August when the leaves are still alive. Illustrations of the species, the glandular hairs, a pollen grain, and a distribution map are provided.

Keywords: Geraniaceae, Hoarea, Knersvlakte, Pelargonium, quartz fields, South Africa.

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Introduction

Pelargonium quarcitico/a Meve & E.M. Marais is a deciduous geophyte belonging to the section Hoarea (Sweet) DC. It has a small head and a rather short growing season and presents its flowers in August when leaves are still alive. It was first collected by B. Nordenstam north-east of Bitterfontein in 1974 and is so far known from only three collections in the vicinity of Bitterfontein in the northern part of the Western Cape Province.

Material and Methods

Chromosome counts

Chromosome numbers were established from adventitious root tip squashing preparations. The root tips were pretreated in 0.002 M hydroxyquinoline for 4 h at 20°C (Tjio & Levan 1950), fixed in Carnoy’s solution for 24 h at 20°C and stained with carmine for 24 h at 60°C (Snow 1963) Voucher: Schmiedel 109738, in cultivation at Department of Plant Systematics, University of Bayreuth.

Palynology

Unacetolysed pollen grains were studied with the LM and measurements were taken with the LM. Specimen studied: Nordenstam & Lundgren 1415 (NBG).

Pelargonium quarcitico/a Meve & E.M. Marais, sp. nov. in section Hoarea distinctions propter folia coralliformia et glandulifera. Geophyton folis parvis glanduliferis viscidus subrubis pinnati-sectis vel coralliformibus, pinnis subsecucentibus et floribus ali­quantum magni albis cremeis vel pallide roseis, petalis obovatis patinibus et stramineus longis protrusis.


A deciduous geophyte, 50-100 mm tall when in flower. Tubers subterranean, regular tuber, turnip-shaped or elongated, 15–50 mm long and 5–15 mm in diameter, covered with dark brown blaking periderms. Leaves radical, erect, petiulate, slightly succulent, green, turning red to reddish brown when exposed to sunlight, slightly sticky, covered with short glandular hairs (ca. 0.07 mm long) with small obliquely spherical heads, interspersed with longer glandular hairs (ca. 0.3 mm long) with elipsoid heads; lamina ovate to elliptic in outline, 10–25 × 10–20 mm, regularly pinnately compound, pin­næ obsolete, irregularly incised (coralliform), segments obtuse: petiole 10–30 mm long, adaxially canalicate; stipules subulate, membranous, 4 × 1 mm, adnate to petioles, apices free, covered with glandular hairs. Inflorescence: scape 10–40 mm long, 2–3 mm in diameter, green to reddish brown, indumentum as on leaves, branched, bearing 2–3 pseudo-ambelletes with 2–9 flowers each; peduncles 30–60 mm long, ca. 1.5 mm in diameter, indumentum as on leaves, reddish brown; bracts lanceolate-ovate, 3–4 × 1–2 mm, erect, abaxially glandular, margins ciliate with soft hairs. Flower buds curved downwards, flowers and fruits erect. Pedicel 1–3 mm long. Hypanthium 8–12 mm long, ca. 1.5 times the length of the sepals, reddish brown, indumentum as on leaves. Sepals 5, broadly lanceolate, apices acute, 4–7 mm × 1–2 mm, recurved, abaxially covered with glandular hairs, green. Petals 5, white, cream-coloured or pale pink, patent during anthesis; posterior two with red feather-like markings, broadly obvolute, slightly convex, 12–16 × 5–7 mm, length/width ratio smaller than 4, apices round or emarginate, short claw-shaped bases: anterior three obvolute, slightly convex, bases attenuate, apices rounded, 10–13 × 3–4 mm. Stamens 10, basally connate, staminal column smooth, white; perfect stamens 5, posterior one 7–8 mm long, lateral two 9 mm long, anterior two 10 mm long, ca. 1.5 times the length of the sepals, protruding from the flower, white: anthers yellow, 1.5–2 mm long, pollen yellow. Gyne­oeicum: ovary superior, oblong-conical, 5-lobed, 3–6 mm long, densely sericous, green; style 4.5–6 mm long, white; stigma with 5 recurved branches. 1.5–2 mm long, white. Fruit: a schizocarp consisting of 5 mericarps, bases of mericarps 4.5 mm long, tails, ca. 13 mm long. (Figures 1 and 2). Chromosome number: 2n = 22 (Voucher: Schmiedel 109738).

Diagnostic features and affinities

P. quarcitico/a is well defined by its slightly sticky, coralliform and slightly succulent leaves and the rather large white, cream-coloured or pale pink flowers with ovobate patent petals and the protruding stamens. Another distinct character is the indumentum of all the different parts of the plant consisting of only two different types of glandular hairs (Figure 2) and no simple, non-glandular hairs at all. Subsucculent leaves as in P. quarcitico/a are rare in section Hoarea. Although more than 50% of the species in Hoarea grow in arid areas with an annual rainfall of less than 300 mm, the geophytic growth form, where leaves are present only during the favourable season, obviates the need for leaf succulence.

The petal petals and long protruding, slightly patent stamens resemble those of P. tripalatinum E.M. Marais (Marais 1996), P. aridicola E.M. Marais, P. liriptetalum E.M. Marais, P. pubipetalum
Figure 1 Pelargonium quarcitico/a. A. Flowering plant at Blesberg. (Schmiedel 109738; Photos: U. Schmiedel. 20 Aug. 1997).

E.M. Marais (Marais 1997a) and P. reflexipetalum E.M. Marais (Marais 1997b). The habit and the shape of the leaves resemble those of P. caroli-henrici B. Nord. (Nordenstam 1987), although a subsucculent texture of the leaves is lacking in the latter.

Figure 2 Pelargonium quarcitico/a. A. Leaf. B. Short glandular hair from leaf surface. C. Long glandular hair from leaf surface (scale bar of C valid for B and C).

Pollen morphology
The morphology of the pollen grains corresponds to that of the rest of the genus Pelargonium L'Hérit. in that the grains are spherical and tricolporate. The tectum of the pollen grains of P. quarcitico/a can be described as striate- reticulate (Figure 3; Bortenschlager 1967). A similar structure of the tectum occurs in nearly half the species of section Hoarea (Marais 1994), including P. aridicola, P. hirtipetalum, P. pubipetalum (Marais

Figure 3 Almost polar view of a pollen grain of Pelargonium quarcitico/a with one colporate pore visible (SEM: Nordenstam & Lundgren 1415, NBG).
studies, the dominance of dwarf growth for ms has been inter­
ende mi c species. Sc hm iedel (un publ. data) co unt ed 58 taxa , here ,
fields of the Kn ersv lak te are kn own for the large number of
con stituti ng 41% of th ose 142 plant species, whic h are entirely
stone content and, therefore , l ow ability to store wa ter (Sc hm iedel
endemic fl ora of the sout h ern Af ri can quartz fields (St ruck 1995;
salinity( <
fields wi th sha ll ow , sa nd y- loamy, poorly d eve loped soi l of low
4) . This is m ainly a wi nt er rainf a ll region w ith an an nu al precipita­
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Geographical distribution and ec olog y
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1 994; Schmiedel &
Mitotic metaphases in root tips of
Karyology
Mitotic metaphases in root tips of 
P. quer­
citocola showed a chro­
mosome number of 2n = 22. This corresponds to the most wide­
spread situation in the genus (Albers 1990) as well as in section
Hoarea, where more than 60% of the species investigated are
known to be diploids possessing the basic chromosome number of
x = 11 (Gibby et al. 1996). With an average length of 1.4 µm, the
chromosomes fall within the group of small-sized chromosomes.

Reproductive system
P. quer­
citocola is allogamous; it has been proven to be self­sterile.

Geographical distribution and ecology
So far P. quer­
citocola is known from a small distribution area in the
Knersvlakte northeast and southeast of Bitterfontein (Figure 4).
This is mainly a winter rainfall region with an annual precipita­
tion of 100–200 mm. P. quer­
citocola flowers in August when the leaves are still alive. It grows in Succulent Karoo vegetation on
gentle slopes or plains, which are more or less completely covered
with white and angular quartz stones. Quartz fields in southern
Africa form an edaphically extremely arid habitat. This is caused
either by high salinity in the soil or by shallow soils with a high
stone content and, therefore, low ability to store water (Schmiedel
1994; Schmiedel & Jürgens 1999). P. quer­
citocola inhabits quartz
fields with shallow, sandy-loamy, poorly developed soil of low
salinity (< 1 mScm) and slight acidity (pH 6.5).

Dwarf growth forms are typical for the vegetation and
endemic flora of the southern African quartz fields (Struck 1995;
Schmiedel & Jürgens 1999). According to vegetation ecological
studies, the dominance of dwarf growth forms has been inter­
preted as an adaptation to edaphic aridity and particular microcli­
tmic conditions (Schmiedel & Jürgens 1999). The quartz
fields of the Knersvlakte are known for the large number of
endemic species. Schmiedel (unpubl. data) counted 38 taxa, here,
constituting 41% of those 142 plant species, which are entirely
restricted to quartz fields of southern Africa (Schmiedel &
Jürgens 1999). P. quer­
citocola, along with at least Dicrocaulon
sp. nov. (Aizoaceae; Halchenfeld, pers. comm.), Phyllolobus digi­tatus (Ait.) Gerbaulet ssp. littellwoodii (L. Bolus) Gerbaulet
(Aizoaceae) and Pentzia peduncularis B. Nord. (Asteraceae)
are restricted to the northwestern part of the Knersvlakte. Other
species of Pelargonium section Hoarea occurring in the vicinity
of Bitterfontein are P. moniliforme Harv., P. incrassatum (Andr.)
Sims and P. caroli-henrici, of which only the latter is confined to
the quartz fields of the Knersvlakte.

Figure 4 Distribution of Pelargonium quer­
citocola.

Material studied
—3018 (Kamiesberg): 12 km NE of Bitterfontein, 8 km on the
Kliprand road (CD), Nordenstam & Lundgren 1415 (NBG; S):
Toontjeskop (CD), Schmiedel 104357 (UBT).
—311B (Vanrhynsdorp): Blesberg, SE of Bitterfontein (AB),
Schmiedel 109738 (NBG, PRE, UBT).

Conclusion
The systematic position of P. quer­
citocola is unresolved. The
floral structure of P. quer­
citocola is very similar to that of P. aridicola, 
P. hirtipetalum, P. pubipetalum, P. trilipetalum and 
P. reflexipetalum. All the species have 7–20 mm short hypanthia
(up to 34 mm in P. aridicola), long protruding, almost patent
stamens, with apices slightly curved upwards during anthesis.
They also share a similar pollen grain structure, but with the pol­
en grains slightly bigger in P. quer­
citocola. (cf. Marais 1996;
Marais 1997a). Most significant, however, P. quer­
citocola differs
in having a chromosome number of 2n = 22, whereas the five
above named species have 2n = 20 (Gibby et al. 1996). The only
other species of Pelargonium sect. Hoarea endemic to the
Knersvlakte, P. caroli-henrici, also appears to be closely related
since it has 2n = 22 chromosomes (Nordenstam 1987) and a leaf­
shape similar rather to that of P. quer­
citocola. It also shows the
closest ecological and biogeographical affinities to P. quer­
citocola. However, P. caroli-henrici differs markedly in leaf texture
and flower structure (4 stamens in P. caroli-henrici).

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