



RESEARCH PAPER

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***Fessia assadii* (Asparagaceae), a new species from Iran**M. Malekloo^{1*}, T. Nejadiattari¹, S. M. M. Hamdi², I. A. M. Mehregan³¹Department of Biology, Sciences and Researches Branch, Islamic Azad University, Tehran, Iran²Department of Biology, Roudhen branch, Islamic Azad University, Roudhen, Iran³Research Institute of Forests and Rangelands, P.O. Box 13185-116, Tehran, Iran

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Key words: *Fessia*, Asparagaceae, new species, Iran.**Abstract**

Fessia is a genus of bulbous flowering plants in the family Asparagaceae, subfamily Scilloideae (also treated as the family Hyacinthaceae). It is distributed from Iran to Central Asia and Pakistan. A number of species of *Fessia*, often under their earlier names in the genus *Scilla*. It contains eleven species worldwide and about five species in Iran. In This survey a new taxon is seen that was very similar to *Fessia khorasanica* and *Fessia gorganica* but is different from points of view from them. The new species is compared with its closest relatives *Fessia khorasanica* Meikle. is similar to *F. khorasanica* Meikle in number of stem, leaf shape, pedicle length, bract shape and color, anther color, ovary shape, fruit shape, fruit color, seed shape and ornamentation of surface seed cells. But, differs in Bulbs size bigger, stem being taller, leaf taller, inflorescence taller, perianth color is blue-violet, perianth margin is white, anther size taller, style size taller, stalk of stamen taller, capsule longer, seed shape is elliptic. *F. assadii* is similar to *F. gorganica* in leaf number, capsule size, bract size, bulbs length and bulbs shape. But differs in having smaller plant, leaf shape is linear-lanceolate, bract color is scabrid white margin, perianth color is violet-blue, perianth length is smaller, perianth margin is white and smaller stalk of stamen. In the final *Fessia assadii* is described and illustrated as a new species from the subalpine areas in Khorassan province, Iran.

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Introduction

The genus *Scilla* L. includes approximately 50 to 80 species in the family Asparagaceae (WCSP 2011). Which are widely distributed Europe, Africa, and Asia (Steven 2001). This center of diversity is in the southern Africa and mediterranean region (Jesso 1970). In terms of bulb and leaves, *Scilla* consist of perenial species that show variation in habit from wood lands to sub alpine meadow species. most flower in early spring, but a few are autumn-flowering. this genus representead ten species in Iran and about four of them are endemic (Wendelbo 1972). In recent years, Technology improvements in DNA techniques provided new insights to the taxonomical problematic genus *Scilla* (Chase *et al* 2009 , Speta 1998, APG1998). The most comprehensive phylogenetic study to data of *Scilla* was recently done by Speta. (Speta 1998a). Who investigated the phylogenetic relation of *Scilla* species and allies In the scope of this study, the plastid DNA were squenced in *Scilla* species and show that *Scilla* L. is not monophyletic and should be divided into several smaller genera, *Zagrosia* (Hausskn.) Speta , *Prospero* Salisb, *Othocallis* Salisb, *Nectaroscilla* (L) PARL, *Fessia* speta, *Fessia* speta is accepted as segregate genus, (Pfossner, Speta 1999). The genus *Fessia* (Asparagaceae) contains elevent species worldwide and about five species in Iran (Speta 1998b). It is distributed from Iran to Central Asia and Pakistan (WCSP 2013). This small genus in Iran. so the aim of study was to describe a new species indentified as belonging to the genus *Fessia* according to the specified taxonomic research and parameters.

Material and methods

Specimens collection

The sampling method was done by going to nature and collecting plant species in June 2012. After the plant species had been collected, they dried and pressed and sample were sent to herbarium of Sciences and Researches Branch, Islamic Azad University, Tehran. The plant species were identified with using flora of Iranica (Wendelbo, 1972), Flora of Turkey (Davis, 1984).

Morphological studies

This study was mainly based on plant material deposited in TARI herbarium (abbreviation according to Holmgren & al. 1998). Measurements of vegetative and floral parts as well as from the seeds were done under a stereomicroscope (Olympus SZH). The preparates were studied using an optical microscope Nikon model Alphaphot- 2YS2 and photographed with a Canon A630 camera.

Micromorphological studies

seeds of two taxa of the genus *Fessia* were studied by scanning electron microscope (SEM).

Samples were obtained mostly from collected herbarium specimens. For SEM, we used the protocol explained by Barthlott & *et al.* with some modifications (Barthlott & *et al.* 1981, 1984). The specimens were mounted on 12.5 mm diameter stubs and attached with sticky tabs and then coated in a sputter coater with approximately 25 nm of Gold-Paladium. The specimens were examined and photographed by a LEO scanning electron microscope (SEM) model 440I, at an accelerating voltage of 10-15 kv. The terminology used for describing the seed terminology Barthlott & *et al.* (Barthlott & *et al* 1981, 1984).

Results

Taxonomic treatment

Fessia assadii Malekloo & Hamdi, Jouharchi **sp. nov.** (Fig. 1).

Typus. Iran. khorasan; Mashad; Kallat road, sade Kardeh road, toward Mareshk village, toward Karimabad village, toward Hezar masjed protect area, km 12, margin right of road, 2542 m, N:36 54 37.3, E:59 25 . 7.4, 25.04.2012, Hamdi and Jouharchi, (holotypus TARI) *Description of the new species*

Scapus 22-25 mm altus. Folia 4-10 mm lata, linear-lanceolata. Racemus, 20-45 mm longus. Floribus 5-14. Bracteae 1-6 mm longae. Tepala 8-13 mm longa. Capsula 5-6 mm longa, elliptic sphericala

Perennial plant, 110-230 cm high. Bulb ovoid, 25-40×20-25 mm, without bulblets; outer tunics grey; inners silvery, membranous. Scape usually erect, 22-25(-30) cm high, glabrous. Leaves 2-5, linear-lanceolate, glabrous, 110-240 ×4-10 mm, gradually tapering to acute apex, shorter than inflorescence. Inflorescence 20-45 mm, dense, 5-14 flowered; pedicels 4-15 mm in flowering stage, equal perianth segments. Bracts 1-6 mm, linear, mostly shorter than pedicels. Perianth segments 8-13×2-4 mm, violet-blue, white margin, elliptic-oblong. Stalk of stamen 6-7 mm; anthers 1.5-4 mm long, violet dark. Ovary 3×6 mm, elliptic-spherical, shorter than style; style 4-6 mm long. Capsule elliptic. Seeds 3.21×2.42, mm in diameter, black. (Tables 1, Figs. 1,2 & 3)

Distribution and Ecology

F. assadii is a local endemic restricted to Khorassanica province. It is an element belonging to the Irano-Turanian Floristic region. The new species it is from northeast Iran, grows mountain and shady rock crevices.

Discussion

F. assadii belong to *Fessia*, characterized by perennial. ovoid bulb without bulblet, numerous flower, distinctly bracts, opening by four basal valve capsules.

The new species is compared with its closest relatives *Fessia khorasanica* Meikle. is similar to *F. khorasanica* Meikle in number of stem, leaf shape, pedicle length, bract shape and color, anther color, ovary shape, fruit shape, fruit color, seed shape and

ornamentation of surface seed cells. But, differs in Bulbs size bigger (vs. 15-25×15-25 mm long), stem being taller (vs. 55-100 mm long), leaf shape taller (vs. 50-120 mm long), inflorescence taller (vs. 10-25 mm length), perianth color is blue-violet (vs. violet dark), perianth margin is white (vs. violet dark), anther size taller (vs. 2 mm long), style size taller (vs. 4 mm long), stalk of stamen taller (5 mm long), capsule is elliptic (vs. is spherical), capsule longer (vs. 4-5 mm long), seed shape is elliptic (vs. is elliptic-ovate). *F. assadii* is similar to *F. gorganica* in leaf number, capsule size, bract size, bulbs length and bulbs shape. But differs in having smaller plant (vs. 170-400 mm long), leaf shape is linear-lanceolate (vs. is lanceolate-acute), bract color is scabrid white margin (vs. is violet), perianth color is violet-blue (vs. is lilac), perianth length is smaller (vs. 16-17 mm long), perianth margin is white (vs. is lilac), smaller stalk of stamen is 6-7 (vs. is 8 mm long) and cell shape of seed surface is (vs. is rugose). Ghavami *et al*, evaluated of pollen morphology as a taxonomic character for generic delimitation in the 13 *Fessia* species (Ghavami *et al* 2009). Study indicated that micromorphological feature of *Fessia* pollen grains are useful for distinguishing some *Fessia* species (Ghavami *et al* 2009). However there is no any study about the pollen of this new species, but it can easily distinguished from its closest relative *F. khorasanica* and *F. gorganica* by several noticeable morphological characters (table 1). As a result of this study, with the addition of the new species described here, The number of species in the *Fessia* genus is increased to six in Iran.



Fig. 1. *Fessia assadii*. (a) habit; (b) flower; (c) perianth.



Fig. 2. *Fessia khorassanica*. (a) habit; (b) flower; (c) perianth.

Table 1. Comparison of morphological characters of *Fessia khorasanica* , *Fessia assadii* and *Fessia gorganica*.

species Charecters	<i>Fessia assadii</i>	<i>Fessia khorasanica</i>	<i>Fessia gorganica</i>
Bulbs shape	Ovate	Ovate	Ovate
Bulbs colour	grey outer and silvery inner	Dark violet	dark brown
Bulbs length size(mm)	25-40	15-25	20-25
Bulbs wide size(mm)	20-25	15-25	17-20
Plant (height) (mm)	110- 230	55- 100	170- 400
Stem numbers	1-3	1-2(3)	1-5
Leaf number	2-5	1-4	3-4
Leaf Shape	Linear-lanceolat	Lanceolate-linear	Lanceolate-acuate
Leaf length(mm)	110-240	50- 120	170-200
Leaf board(mm)	4- 10	5- 8	10
Pedicle length in flower (mm)	4-15	4-16	12-20
inflorescence length (mm)	20-45	10- 25	30-100
inflorescence flowers number (mm)	5-14	2-7	3-10
Bract size(mm)	1-6	2- 6	2-4
Bract shape	truncate, linear, obdeltoid	linear, acute, obtuse	acute- truncate
Bract color	Scabrid white-violet	Scabrid white-violet	Violet
Prianth color	Violet-blue	Violet dark	Liliac
Prianth length (mm)	8- 13	7-10	16-17
Prianth board(mm)	2-4	2-6	5
Prianth margin	White	Violet dark	Liliac
Prianth shape	elliptic-oblong	elliptic-acute	elliptic-oblong
Anther length (mm)	1/5-4	2	1-3
Anther color	Violet dark	Violet dark	Violet dark
Stalk of stamen (mm)	6-7	5	8
Ovary shape	elliptic- spherical	elliptic -ovoid	elliptic -ovoid
Ovary (mm)	3-6	3-4	5
Style length (mm)	4-6	4	8
Capsule shape	elliptic	spherical	Spherical
Capsule size (mm)	5-6	4-5	5-8
Seed shape	elliptic	elliptic-ovate	Spherical
Seed color	black	black	Black
Seed size (mm)	3.21×2.42	2.67×1.99	2.27×1.95
Cell surface on seed size (µm)	63-65×36-38	41-43×36-37	37- 42×29-32
Cells shape of seed surface	Rugose	Favoale	Rugose
Fruit size (mm)	3-4	3	4

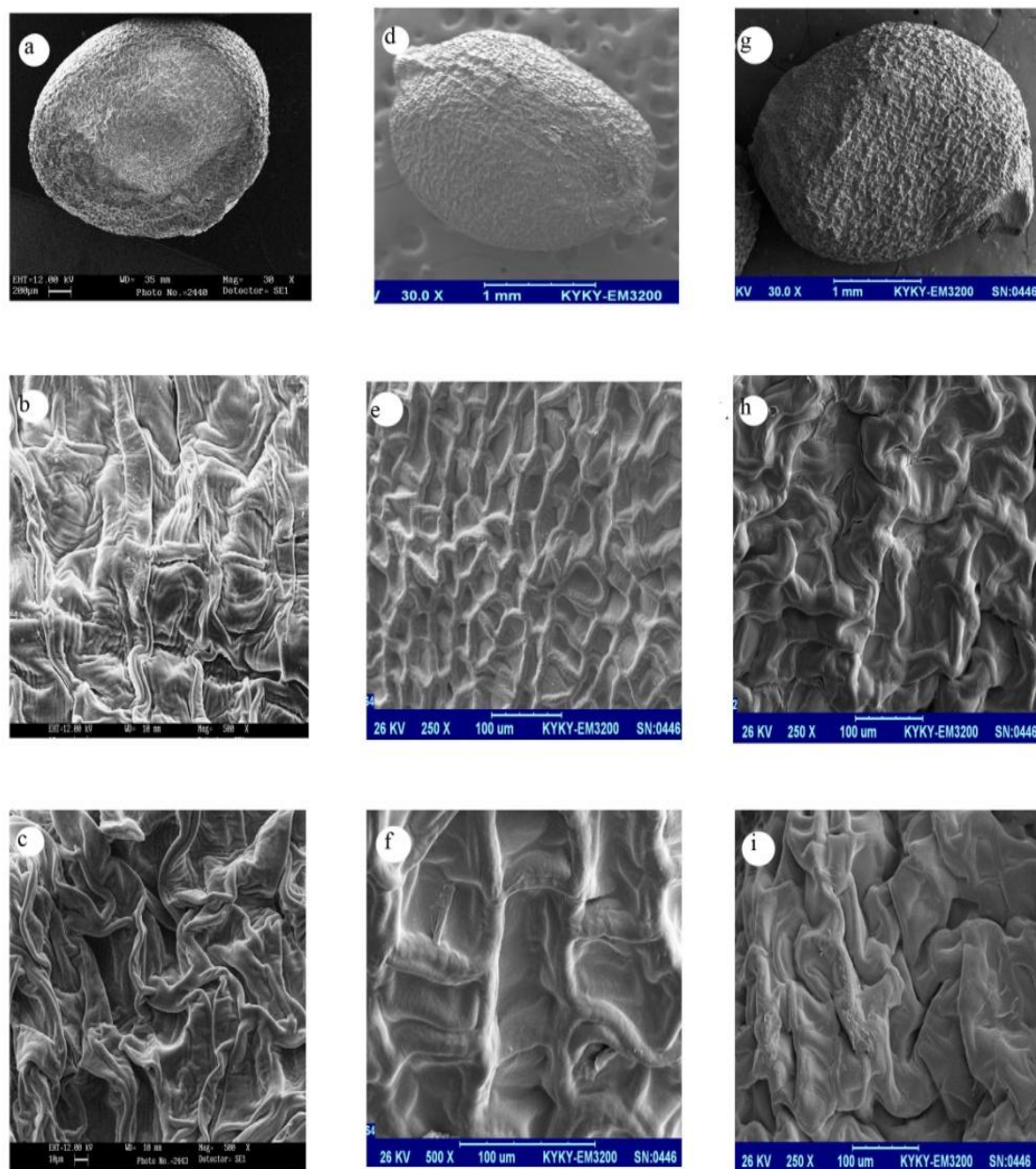


Fig. 3. Scanning electron micrographs of seeds of *Fessia*. (a-c): *F. gorganica*, view of seed (a), ornamentation of seed (b), ornamentation of hillum (c); (d-f): *F. khorassanica*, view of seed (d), ornamentation of seed (e), ornamentation of hillum (f); (g-i): *F. assadii*, view of seed (g), ornamentation of seed (h), ornamentation of hillum (i). Scale bar b,c,e,f,h,i= 100μm, a 200 μm, d,g = 1mm.

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