

TAXONOMIC REVISION OF THE GENUS VICIA L. (FABACEAE) IN IRAN

N. Jalilian, M. R. Rahiminejad, A. A. Maassoumi & H. Maroofi

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The Iranian materials of the genus *Vicia* were reviewed. A critical study of 500 specimens collected for this study and additional herbarium specimens led to reporting a new subspecies, *V. villosa* Roth. subsp. *dasycarpa* (Ten.) Cav. from Iran. In addition, recollection and identification of two species, *V. mollis* and *V. lathyroides* which were not deposited in any of the Iranian herbaria before. According to the results of this study 15 sections within the Iranian materials of *Vicia* were recognized. Also the following changes were applied: revival of two sections *Crocea* and *Lenticula*; transferring the members of sect. *Cassubicae* to sect. *Vicilla*; *V. koeieana* from sect. *Anatropostyla* to sect. *Ervilia*; *V. hirsuta* from sect. *Ervum* to sect. *Ervilia*; *V. crocea* from sect. *Vicilla* to sect. *Crocea*; recognition of the subgen. *Cracca*. Four new synonymes made: subgen. *Vicilla* as synonym of subgen. *Cracca*; sect. *Cassubicae* as synonym of sect. *Vicilla*; *V. sojakii* as synonym to *V. ciceroidae*; *V. michauxii* var. *stenophylla* as synonym to *V. michauxii*. Furthermore, *V. lutea* var. *lutea* is deleted from the flora of Iran and *V. canescens* is recognized as its *sensu lato* with no infra-specific taxa in. A taxonomic key to the *Vicia* taxa is presented here.

Nastaran Jalilian (Correspondence <najalilian@gmail.com>), Mohammad Reza Rahiminejad, Department of biology, University of Isfahan, Isfahan, Iran. -Ali Asghar Maassoumi, Research Institute of Forests and Rangelands, Tehran, Iran. -Hosein Maroofi, Research Center of Agriculture and Natural resources, Kurdistan, Iran.

Keywords: *Vicia*; Fabaceae; taxonomy; revision; Iran

بازنگری تاکسونومیکی جنس *Vicia* از تیره بقولات در ایران

نسترن جلیلیان، استاد یار مرکز تحقیقات کشاورزی و منابع طبیعی کرمانشاه

محمد رضا رحیمی نژاد، استاد گروه زیست شناسی دانشگاه اصفهان

علی اصغر معصومی، استاد پژوهش مؤسسه تحقیقات جنگلها و مراتع کشور

حسین معروفی، عضو هیئت علمی مرکز تحقیقات کشاورزی و منابع طبیعی کردستان

در این پژوهش، جنس *Vicia* L. در ایران مورد بازنگری تاکسونومیکی قرار گرفت. مطالعه ۵۰۰ نمونه جمع آوری شده و نمونه های هرباریومی دیگر منجر به شناسایی یک زیر گونه جدید برای فلور ایران، *V. villosa* Roth. subsp. *dasycarpa* (Ten.) Cav.، جمع آوری و شناسایی دو گونه *V. mollis* و *V. lathyroides* که تاکنون در هرباریوم های کشور موجود نبود، احیای بخش های *Lenticula* & *Crocea*، انتقال گونه های بخش *Cassubicae* به بخش *Vicilla*، انتقال گونه *V. koeieana* از بخش *Anatropostyla* به بخش *Ervilia*، انتقال گونه *V. hirsuta* از بخش *Ervum* به بخش *Lenticula*، انتقال گونه *V. crocea* از بخش *Vicilla* به بخش *Crocea*، به رسمیت شناختن زیر جنس *Cracca* و همچنین چهار مترادف به این شرح ایجاد شد: زیر جنس *Vicilla* مترادف با *Cracca*، بخش *Cassubicae* مترادف با بخش *Vicilla*، *V. sojakii* مترادف با *V. ciceroidae*، *V. michauxii* var. *stenophylla* مترادف با *V. michauxii* قرار گرفت. *V. canescens* به صورت یک گروه گونه ای بدون ذکر واحدهای زیر گونه ای در نظر گرفته شد. حذف *V. lutea* var. *lutea* از فلور ایران و شناسایی نمونه ها تحت عنوان *V. lutea* var. *hirta* در نهایت کلید شناسایی برای همه تاکسون های متعلق به این جنس در ایران ارائه می گردد.

INTRODUCTION

The genus *Vicia* L. (tribe Fabeae Rchb. = Vicieae Bronn, family Fabaceae) encompasses about 150 (Willis 1973; Kupicha 1976) to 210 (Hanelt & Mettin 1989) species distributed mainly in Europe, Asia, North

America, the temperate regions of South America, and tropical Africa (Maxted 1993a). The most striking species diversity is to be found in the Mediterranean and Caucasus regions. Minor centers are in southern Siberia and South America (Hanelt & Mettin 1989). In

the last monographic treatment of the genus by Kupicha (1976), the genus was divided into two subgenera, *Vicilla* (Schur) Rouy (divided into 17 sections with 100 species) and *Vicia* (divided into 5 sections with 32 species), instead of the three or four subgeneric groups used by earlier authors (Leht 2005). The distinction between the subgenera is based on the relative length of the inflorescence and the presence or absence of nectariferous spots on the stipules. The main differences between the treatment of Kupicha (1976) and those of later taxonomists lie in the number of sections and subgenera recognized (Leht 2005). Variability in other morphological characters among the species (Plitmann 1967; Jaaska & Leht 2007; Hosseinzadeh & al. 2008; Hosseinzadeh & Pakravan 2008; Leht 2009; Jalilian & Rahiminejad 2011) is considerable, reflected in the grouping of species into five (Kupicha 1976), six (Tzvelev 1980) or up to nine (Maxted 1993a) sections. In the genus *Vicia*, the shape of styles and the distribution pattern of indumentum on them have been regarded as important keys in constructing infrageneric systems (Radzhi 1970; Kupicha 1976, 1981; Endo & Ohashi 1997). Kupicha (1976) and Choi & al. (2006) recognized four stylar types: dorsiventrally compressed and evenly hairy all round (De-type), terete and evenly hairy all round (Te-type), laterally compressed and evenly hairy all round (Le-type), dorsiventrally compressed and abaxially tufted (Dabt-type).

The genus has been treated by several authors taxonomically in Iran. Boissier (1872), in his account of *Vicia*, recognized 24 Iranian species; a number that has been increased to 34 by Parsa (1948), 46 by Chrtkova-Zertova (1979) and 39 by Pakravan (2000). In later studies two new species of *Vicia* were described: *Vicia kurdica* Jalilian and *Vicia gariensis* Dehshiri (Jalilian & al. 2010 & Dehshiri & al. 2011). Furthermore in a molecular study nrDNA ITS & cpDNA *trnL* segments were sequenced (Jalilian 2011). Here we summarize the results of the recent findings on the genus and review the Iranian materials of *Vicia* taxonomically considering the nomenclatural issues.

SPECIMENS STUDIED

A total of 500 specimens of the genus *Vicia* collected from all around Iran and herbarium sheets from TARI (Research Institute of Forests and Rangelands Herbarium), IRAN (Iranian Research Institute of Plant Protection Herbarium), and the other specimens from herbaria in Research centers of agriculture and natural resources centers in Iran were studied. All vouchers and type specimens are deposited in the herbarium of the University of Isfahan (HUI) and herbarium of Agriculture and Natural Resources

Research Center of Kermanshah (RANK) and Kurdistan (HKS).

RESULTS AND DISCUSSION

Taxonomic treatment

Based on the results of the present study the following characters are of taxonomic values: stipule margin and size; tendrils; leaflets pairs per leaf; leaflet apex shape; leaflet size; length of flowers and peduncles; presence/absence of nectary of stipules; length and shape of upper calyx teeth; presence/absence of hairs on the legume and ovary; shape and size of the legume and ovary. We also concluded that the genus *Vicia* occurs in Iran with a total of 40 species, two subspecies and four varieties in 15 sections; a diagnostic key to these taxa is provided and presented below.

Key to the sections

1. Stipules with nectariferous spot on abaxial surface; inflorescence much shorter than the subtending leaves (Subgen. *Vicia*) 2
- Stipules without nectariferous spot; inflorescence usually equaling or exceeding the subtending leaves (Subgen. *Cracca*) 7
2. Calyx mouth truncate Sect. *Vicia* 3
- Calyx mouth oblique 3
3. Lens positioned opposite to hilum Sect. *Hypechusa* 4
- Lens positioned near hilum 4
4. Perennial. Hilum more than half of the seed circumference Sect. *Atossa* 5
- Annual. Hilum less than quarter of the seed circumference 5
5. Leaf rachis ending in a tendril 6
- Leaf rachis ending in a mucro Sect. *Faba* 6
6. Peduncle absent. Leaves with 4-8 pair of leaflets. Calyx base gibbous. Legume hairs simple and in margin not dentate Sect. *Peregrinae* 6
- Peduncle present (3-4 mm). Leaves with (1-) 2-3 pair of leaflets. Calyx base not gibbous. Legume hairs tuberculate and in margin dentate Sect. *Narbonensis* 6
7. Perennial, biennial or rarely annual 11
- Annual 8
8. Legumes subtorulose. Style pubescent adaxially Sect. *Ervilia* 8
- Legume not subtorulose. Style pubescent abaxially or all around 9
9. Style dorsally compressed 10
- Style terete Sect. *Lenticula* 10
10. Style pubescent all around Sect. *Ervum* 10
- Style tufted on abaxial part Sect. *Panduratae* 10
11. Style dorsally compressed, evenly pubescent all round. Leaves imparipinnate Sect. *Subvillosae* 11

- Style dorsally or laterally compressed, leaves paripinnate 12
- 12. Perennial. Style dorsally compressed. Limb of standard broader than claw (Stenonychioid) 13
- Annual, biennial or perennial. Style laterally compressed. Limb of standard equal to claw (Platynychoid) Sect. Cracca 14
- 13. Style pubescent all round 14
 - Style pubescent on abaxial, glabrous adaxially Sect. Variegatae
- 14. Style dorsally compressed. Stipules monomorphic Sect. Vicilla
 - Style terete. Stipules dimorphic and unequal Sect. Crocea

Key to the species

1. Stipules with nectariferous spot on abaxial surface; inflorescence much shorter than the subtending leaf 2
 - Stipules without nectariferous spot; inflorescence usually equaling or exceeding the subtending leaf 21
2. Annual 3
 - Annual or perennial 5
3. Peduncle at least as long as pedicle with 2-4 flowers; flowers 18-21 mm, yellow or cream. Legume appressed sericeous hairy *V. pannonica*
- Peduncle short or absent with 1 (-2) flowers; flowers 15-35 mm, yellow. Legume hairy 4
4. Flowers 18-35 mm, standard yellow, limb broader than claw (Stenonychioid) *V. hybrida*
- Flowers 15-18 mm, standard yellow-green with dark brown apex, limb width equal to claw (Platynychoid) *V. anatolica*
5. Peduncle absent. Pedicle 2-7 mm 6
 - Peduncle present up to 1 mm or absent, Pedicle 1-2 mm. 8
6. Standard cream. No teeth on stipule proximal edge 7
 - Standard purple. No teeth or with 1-2 teeth on stipule proximal edge *V. peregrina*
7. Leaflets linear to filiform, 5-40 mm. Calyx teeth lanceolate. -Legume cross sectional shape oblong and flat with adpressed hairs. Seeds oblong *V. michauxii*
- Leaflets triangular to linear- cunate, 5-15 mm. Calyx teeth triangular. Legume cross sectional shape rounded. Seeds spherical to cubic *V. aintabensis*
8. Annual. Calyx mouth truncate, teeth subequal 9
 - Annual or perennial. Calyx mouth oblique, Lower teeth longer than upper 13
9. Leaves with simple tendrils. Seeds sculptured 10
 - Leaves with simple or branched tendrils. Seeds smooth 11
10. Leaves with 3-4 pair of leaflets. Flowers 8-15 mm. Legume oblong, 30-35mm long and 4-5mm wide, falcate (curved) *V. cuspidata*
- Leaves with (1-) 2 (-4) pair of leaflets. Flowers 5-9 mm. Legume linear, 15-22 mm long and 2-4 mm wide *V. lathyroides*
11. Standard purple 12
 - Standard pale yellow to cream *V. grandiflora*
12. Leaves with 4-8 pair of leaflets. Flowers (10-) 14-27 mm. Stipules 2-8 mm and with 2-5 teeth in margin. Legume 40-60 (-70) mm long and 4-7 (-10) mm wide *V. sativa*
- Leaves mostly 3, or 2-4 pair of leaflets. Flowers 6-8 mm. Stipules up to 4 mm and with 1-3 teeth in margin. Legume 19-25 mm long and 5-6.5 mm wide *V. kurdica*
13. Leaves with 1-3 pair of leaflets 14
 - Leaves with 3-13 pair of leaflets 15
14. Leaf rachis ending in a mucro. Flowers white. Legume hairs simple. Plants cultivated *V. faba*
- Leaf rachis ending in a branched tendril. Flowers purple. Legume hairs tuberculate *V. narbonensis*
15. Legume and ovary hairy. Peduncle up to 1 mm 16
 - Legume and ovary glabrous. Peduncle 2.5-6 mm 18
16. Pedicle up to 2 mm. Corolla whitish-yellow with violet nerves in fresh or cream-brown in dried. Legume with tubercular hairs *V. lutea*
- Pedicle 2-5 mm. Corolla yellow. Legume densely villous or sericeous 17
17. Plant villous. Tendrills simple, flowers 12-18 mm, 1-3. Wing apex with different colour. Legume densely villous. Calyx mouth subregular. Corolla 1.5 as long as calyx tube *V. mollis*
- Plant adpressed sericeous. Tendrills mostly branched. Flowers (15-)18-29 mm, mostly solitary. Wing apex concolour. Legume adpressed sericeous. Calyx mouth oblique. Corolla 2-3 times as long as tube calyx *V. sericocarpa*
18. Leaf rachis without tendril, ending in a mucro or rarely leaflet *V. truncatula*
- Leaf rachis ending in a tendril 19
19. Perennial. Stem stout, 40-100 cm long. Leaflets 8-13 pairs *V. balansaie*
- Annual. Stem slender, 20-80 cm long. Leaflets 5-8 pairs 20
20. Leaflets 6-20 mm long and 2-6 mm wide. Calyx pilose and strongly gibbous. Limb of standard longer than claw. Legume 25-28 mm long and 7-8 mm wide, in lower sutures with sparse hairs *V. assyriaca*
- Leaflets 15-33 mm long and 6-8 mm wide. Calyx glabrous or scarcely hairy. Limb of standard shorter than claw. Legume glabrous, 26-38 mm long and 8-10 mm wide *V. hyrcanica*
21. Leaf rachis ending in a mucro or leaflet 22
 - Leaf rachis ending in a tendril 25
22. Leaf rachis ending in a leaflet 23
 - Leaf rachis ending in a mucro 24

23. Stipules with 2-5 deep teeth. Leaflets linear-lanceolate or linear-oblong *V. subvillosa*
 - Stipules with 5-7 shallow teeth. Leaflets elliptic or oblong-linear, *V. iranica*
24. Annual. Stipules monomorphic. Calyx teeth equal. Flowers 7-12 mm. Legume 14-22 mm, constricted between the seeds *V. ervilia*
 - Perennial., Stipules dimorphic and unequal. Calyx teeth unequal. Flowers 18-22 mm. Legume 32-35 mm, not constricted between the seeds *V. crocea*
25. Annual. Flowers small, 3-8 mm. 26
 - Biennial or perennial or rarely annual. Flowers larger than above 27
26. Legume 7-11 mm, with 2-3 seeds. Leaflets 6-9 pairs *V. hirsuta*
 - Legume 10-13 mm with 4 seeds. Leaflets 3-4 pairs *V. tetrasperma*
27. Leaves without leaflets or with reduced leaflets up to 10 mm, 1-4 or rarely to 5 pair of leaflets. Flowers 4-10, (8-) 11-15 mm. Stipe of ovary 3 mm long. Legume pubescent *V. ciceroides*
 - Leaves with developed leaflets 28
28. Leaflets small (not more than 12 mm long), elliptic to globose, 29
 - Leaflets oblong-lanceolate to elliptic (not less than 12 mm) 31
29. Legume glabrous *V. alpestris*
 - Legume pubescent 30
30. Stem slender. Stipules 2-3 toothed. Leaflets 5 pairs, elliptical, 6-12 mm long. Flowers 6-12 mm. Stipe of ovary 1-1.5 mm long. Seeds elliptical, 13-17 mm long, 4-6.5 mm wide. *V. gariensis*
 - Stem stout. Stipules 1 toothed. Leaflets more than 5 pairs, ovoid-elliptic, 2-7 mm long. Flowers 12-20 mm. Stipe of ovary 4-5 mm. Seeds orbiculate, 25-30 mm long, 5-7 mm wide. *V. multijuga*
31. Stipules entire or semi sagittate (without marginal teeth) 32
 - At least lower or middle stipules with marginal teeth, split or semi sagittate 36
32. Legume pubescent or at least in sutures. Rachis terminating in leaflet (lower leaves) or simple or branched tendril *V. canescens*
 - Legume more or less glabrous. Rachis terminating in simple or branched tendril 33
33. Leaves with 11-17 pair of leaflets. Legume 1-2 seeded *V. cassubica*
 - Leaves with 2-12 pair of leaflets. Legume 2-8 seeded 34
34. Lower calyx teeth longer than or as long as tube. Limb of standard shorter than claw *V. villosa*
 - Lower calyx teeth shorter than tube. Limb of standard more or less as long as claw 35
35. Flowers violet or lilac (rarely white), 15-17 mm;

- standard longer than wing; stipe of ovary 3-5 mm. Legume pyramidal, cuneate at the base *V. variabilis*
 - Flowers violet or lilac, 8-14 mm; standard subequal, longer or shorter than wing; stipe of ovary 1-2 (-3) mm. Legume oblong, attenuate at the base *V. cracca*
36. Leaflets 4-10 mm wide, oblong, coriaceous, lucid 37
 - Leaflets 1-5 mm wide, linear-lanceolate, opaque 38
37. Leaflets with 7-13 paired nerves. Flowers white, drying cream-brown *V. venulosa*
 - Leaflets with 4-5 pairs of nerves. Flowers violet *V. kotschyana*
38. Flowers yellow. Stipules long laciniate. Legume membranous, prominently veined *V. koeieana*
 - Flowers violet to blue, reddish purple. Stipules bipartite, incised -dentate or sparsely dentate. Legume neither membraneous nor prominently veined 39
39. Stipules bi-partite or slightly dentate. Leaves with 4-8 pair of leaflets, entire in margin *V. monantha*
 - Stipules incised-dentate. Leaves with 2-4 (-5) pair of leaflets, dentate in margin. *V. cappadocica*

Vicia Subgenus Vicia L., Sp. Pl., 734 (1753). Kupicha, Notes Roy. Bot. Gard. Edin., 34: 320 (1976).

Type: *V. sativa* L., Sp. Pl. 736 (1753).

Section Vicia L., Sp. Pl. 736 (1753).

Syn.: *Vicia* sect. *subsessiles* Rouy in Rouy & Fouc., Fl. Fr. 5: 208 (1899).

Type: *V. sativa* L. Sp. Pl. 736 (1753).

V. grandiflora Scop., Fl. Carn. Ed. 2 (2): 65 (1772).

V. lathyroides L., Sp. Pl. 1: 736 (1753).

V. cuspidata Boiss., Diagn. Pl. Or. Nov. Ser. 1 (2): 104 (1843).

V. kurdica Jalilian, Feddes Repertorium. 121 (1-2): 81-84 (2010).

V. sativa L., Sp. Pl. 736 (1753).

Syn.: *V. incisa* M. B., Fl. Taur.-Cauc. 3: 47 (1819); *V. sativa* L. var. *incisa* (M. B.) Boiss., Fl. Or. 2: 574 (1872).

V. sativa L. var. *sativa*

V. sativa L. var. *amphicarpa* Boiss., Voy. Bot. Midi Esp. 2: 193 (1839).

Syn.: *V. amphicarpa* Lam., Encyst. Meth. Bot. 2: 711 (1789); *V. subteranea* Ger. ex Dorthes, Obs. Phys. Hist. Nat. 35: 131 (1789); *V. angustifolia* L. var. *amphicarpa* Alef., Bot. Zeit. 20: 362 (1862); Fl. Orient. 2: 575 (1872); *V. sativa* L. subsp. *amphicarpa* (Boiss.) Aschers. & Graebn., Syn. Fl. Mitteleur. 6 (2): 974 (1990).

V. sativa L. var. *angustifolia* L., Fl. Suec. Ed 2: 255 (1755).

Syn.: *V. angustifolia* L., Amoen. Acad. 4: 105 (1759); *V. sativa* L. var. *nigra* L., Sp. Pl. ed. 2: 1037 (1763); *V. segetalis* Thuill., Fl. Paris. Ed. 2: 367 (1791); *V. bobartii* Forst., Trans. Linn. Soc. 16: 442 (1830); *V.*

angustifolia L. var. *segetalis* (Thuill) W. Koch, Syn. Fl. Germ. Helv. 197 (1835).

V. sativa L. var. *cordata* (Wulf. ex Hoppe) Arcangeli, Comp. Fl. Ital. ed. 2: 524 (1894).

Syn.: *V. cordata* Wulf. Ex Hoppe. In Sturm, Deutschl. Fl. 32: 1 (1812); *V. angustifolia* L. var. *Cordata* (Wulf.) Boiss. Fl. Or. 2: 575 (1872).

The rank of the taxa belonging to the *Vicia sativa* aggregate is a source of disagreement among taxonomists. Some authors consider the group of taxa belonging to the *Vicia sativa* aggregate to be distinct species, which are then further divided into subspecies or varieties (Fedchenko 1948; Mettin & Hanelt 1964; Potokina 1997 Zohary 1979). Others take a different view and argue that the overlap between the taxa is considerable and the aggregates should be considered as one species (*Vicia sativa*) divided into several subspecific taxa (Davis & Plitmann 1970; Zohary & Plitmann 1979; Macted 1995).

Regarding to some overlapping characters in their morphological characteristics, in this study four key characters were found which contributed most to the distinction of the taxa in the *V. sativa* aggregates, i.e. flower length, seed size, constriction between seeds and leaflets width.

Key to *Vicia sativa* taxa

1. Plants forming underground stems with flowers and legumes. Calyx teeth shorter than tube

V. sativa var. *amphicarpa*

- Plants without underground stems 2

2. Flowers 10-18 mm long. Leaflets oblong-rhomboid, less than 4 mm wide. Mature legume black; seeds 1.5-2.5 mm in diam. *V. sativa* var. *angustifolia*

- Flowers 14-27 mm long. Leaflets varied in shape, more than 4 mm wide. Legume yellow or brown 3

3. Flowers 12-24 mm long. Legumes distinctly laterally flattened in cross section and distinct constriction between seeds. Legume yellow or brown. Seeds 4.5-6 mm in diam. *V. sativa* var. *sativa*

- Flowers 15-20 mm long. Legumes rounded in cross section, constriction between seeds are absent. Seeds 3-5 mm in diam. *V. sativa* var. *cordata*

Section *Atossa* (Alef.) Aschers. & Graebner, Syn. Mitteleur. Fl., 6, 2: 949 (1909).

Syn.: *Vicioides* Moench, Meth. 135 (1794); *Atossa* Alef. In Bomplandia 9: 100

(1861); *Vicia* sect. *Sepium* Radzhi in Novit. Syst. Pl. Vasc. (Leningrad) 7: 235 (1971).

Lectotype (Gunn, 1969): *V. sepium* L., Sp. Pl. 737 (1753).

Vicia balansae Boiss. Fl. Or. 2: 569 (1872).

Vicia truncatula Fischer. ex M. B. Fl. Taur.-Cauc. 3: 473 (1819).

Syn.: *Orobus anomalus* C. Koch. In Linnaeae 29: 94 (1859).

Section *Hypechusa* (Alef.) Aschers. & Graebner, Syn. Mitteleur. Fl., 6, 2: 957 (1909).

Lectotype (Gunn, 1969): *V. lutea* L. Sp. Pl. 736 (1753).

V. assyriaca Boiss., Diag. Pl. Or. Nov. Ser. 1 (9): 123 (1849).

V. hyrcanica Fisch. & C. A. Mey., Ind. Sem. Hort. Petrop. 2153 (1835).

V. anatolica Turill, Kew Bull. 1: 8 (1927).

Syn.: *V. hajastana* Grossh., Beih. Bot. Centrbl. 44 (2): 22-4 9 (1928).

V. mollis Boiss. & Hausskn. In Boiss., Fl. Or. 2: 57 (1872).

V. pannonica Crantz., Strip. Austr. Ed. 2, 2: 393 (1769).

V. hybrida L., Sp. Pl. 737 (1753).

V. sericocarpa Fenzl, Pugillus Plant. Nov. Syriae et Tauri Occ. 4 (1842).

V. lutea L. var. *hirta* (Balbis) Loisel, Fl. Gall. 462 (1807).

Chrtkova-Zertova (1979) and Pakravan (2000) accepted two species including *V. hirta* Balb. ex Pers. (with cream-white to red corolla and pressed hairy legumes) and *V. lutea* L. (with yellow corolla and in many direction hairy legumes) for the flora of Iran. But our results showed flowers color in fresh and herbarium specimens are different (in fresh material flowers are whitish-yellow with violet nerves and in herbarium specimens flowers are cream-brown). So based on molecular analysis (Potokina & al. 1999; Jalilian 2011) and compare of our materials with gene bank of New Zealand, we found Iranian taxon is *V. lutea* L. var. *hirta* (Balbis) Loisel, Fl. Gall. 462 (1807) and *V. lutea* var. *lutea* does not occur in the flora of Iran. Our result is in agreement with Boissier (1872), Parsa (1948) and Davis & Plitmann (1970) classification.

Section *Peregrinae* Kupicha, Notes R. B. G. Edinburgh 34: 323 (1976).

Type: *V. peregrina* L. Sp. Pl. 737 (1753).

V. aintabensis Boiss. & Hausskn. ex Boiss. Fl. Or. 2: 577 (1872).

V. peregrina L., Sp. Pl. 737 (1753).

V. michauxii Spreng., Fl. Halens. Mant. 48 (1807).

Syn.: *V. persepolitana* Boiss., Diagn. Pl. Or. Nov. Ser. 1 (6): 48 (1845); *V. michauxii* Spreng. var. *stenophylla* Boiss., Fl. Or. 2: 577 (1872).

Boissier (1872), Davis & Plitmann (1970), Chrtkova-Zertova (1979), Pakravan (2000) accepted *V. michauxii* including two varieties (*V. michauxii* var. *michauxii*, *V. michauxii* var. *stenophylla*) for the flora of Iran. There are overlapping characters (legume length, number of seeds, leaflets apex, corolla color and leaflets shape and size) used by previous authors. Our

specimens that were collected from the type localities of the two varieties were in accordance with the description of *V. michauxii* which are in accordance with the Maxted (1993b, 1995) classification.

Section *Faba* (Miller) Ledeb., Fl. Ross. 1: 664 (1842).

Type: *V. faba* L., Sp. Pl. 2: 737 (1753).

V. faba L., Sp. Pl. 2: 737 (1753).

Syn.: *Faba vulgaris* Moench, Meth. Pl. Hort. Bot. Marburgensis, 150 (1794).

Section *Narbonensis* (Radzhi) Maxted, Kew Bull. 47(1): 129-130 (1991c).

Basionym: *Vicia* subsect. *Narbonensis* Radzhi, Novit. Syst. Pl. Vasc. 7: 239(1971).

Type: *V. narbonensis* L., Sp. Pl. 737 (1753).

V. narbonensis L., Sp. Pl. 737 (1753).

- var. *narbonensis*

Syn.: *V. latifolia* Moench, Melh. 149 (1794).

Subgenus *Cracca* Peterm., Deutschland Flora:152 (1847).

Syn.: *Vicilla* Schur, Enum. Pl. Trans. 170 (1866); *Vicia* subgenus *Vicilla* (Schur) Rouy in Rouy & Fouc., Fl. Fr. 5: 205 (1899); *Vicia* subgen. *Cracca* (Dum.) Gams in Hegi, Ill. Fl. Mitteleur. 4,3: 1499 (1924).

Type: *V. cracca* L. Sp. Pl. 735 (1753).

Sect. *Cracca* S. F. Gray, Nat. Arr. Brit. Pl. 2: 614 (1821).

Syn.: *Cracca* Medik. in Vorles. Churpf. Phys. Ges. 2: 359 (1787), non L. (1753); *Cracca* Sect. *Ervoides* Gordon in Gren. & Gordon, Fl. Fr. 1: 471 (1848), pro parte excl. typ.; *Vicia* Subgen. *Pseudervoidea* Rouy in Rouy & Fouc., Fl. Fr. 5: 232 (1899).

Type: *V. cracca* L. Sp. Pl. 735 (1753).

V. cracca L., Sp. Pl. 735 (1753).

Syn.: *V. cracca* L. subsp. *tenuifolia* (Roth) Gundin, Fl. Helv. 4: 507 (1889); *V. cracca* L. subsp., *stenophylla* Vel., Fl. Bulg. 163 (1891).

V. kotschyana Boiss., Diagn. Pl. Or. Nov. ser. 1 (6): 47 (1845).

V. alpestris Stev., Mem: Soc. Nat. Mosc. 4: 93 (1813).

Syn.: *V. anisodonta* Boiss. Diag. Pl. Or. Nov. ser. 2 (2): 41 (1856).

V. alpestris Stev. **subsp. *hypoleuca*** (Boiss.) Davis, Fl. Turkey 3: 289 (1970).

Syn.: *V. hypoleuca* Boiss., Diagn. Pl. or. Nov. ser. 2 (5): 92 (1850); *V. alpestris* Stev. var. *hypoleuca* (Boiss.), Fl. Or. 2: 584 (1872).

V. multijuga (Boiss.) Rech. f. Englers Bot. Jahrb. 75: 340 (1951).

Syn.: *V. ciceroidae* Boiss. var. *multijuga* Boiss., Fl. Or. 2: 585 (1872).

V. ciceroidae Boiss., Diagn. Pl. Or. Nov. Ser. 1(6): 47 (1845).

Syn.: *V. sojakii* Chrtkova-Zertova, Folia Geobot.

Phytotax. 12: 206 (1977).

V. variabilis Freyn & Sint., Osterr. Bot. Zeit. 42: 82 (1892).

V. villosa Roth., Tent. Fl. Germ. 2 (2): 182 (1793).

- **subsp. *villosa***

- **subsp. *dasycarpa*** (Ten.) Cav.

V. monantha Retz. Obs. Bot. 3: 30 (1783).

Syn.: *V. cinerea* M. B., Fl. Taur.-Cauc. 3: 470 (1813);

V. calcarata Desf. var. *cinerea* (M. B.) Boiss., Fl. Or. 2: 590 (1872); *V. griffithii* Baker, Fl. Br. Ind. 2: 178 (1876); *V. monantha* Retz. subsp. *cinerea* (M. B.)

Maire., Bull. Soc. Hist. Nat. Afr. Nord. 31: 17 (1940); *V. monantha* Retz. var. *cinerea* (M.B.) Dinsm., Fl. Syr.

Pal. Sin. Ed.2, 2: 424 (1932).

*V. garei*ensis Dehshiri. Annales Botanici Fennici 48 (2011).

Chrtkova-Zertova (1979) and Pakravan (2000) accepted *V. ciceroidae* and *V. sojakii* for the flora of Iran. Considering the more or less overlapping characters (inflorescence and flower length, flower and ovule number) used by Chrtkova-Zertova (1979) and Pakravan (2000), there is no clear cut feature between them. We found overlapping characters in herbarium sheets (TARI 51707 Assadi & Massoumi, TARI 9043 Riazi, TARI 15328 Dini & Azarm, RANK 7630 Naderi, TARI 49168 Mozafarian & Mohammadi). Our results based on morphological character and molecular study showed that *V. sojakii* is within the range of *V. ciceroidae*

In this section, *V. villosa* Roth. subsp. *dasycarpa* (Ten.) Cav. is reported for the flora of Iran for the first time.

Vicia villosa Roth. subsp. *dasycarpa* (Ten.) Cav. was previously reported from Europe, Turkey, Caucasus, Iraq, Palaestina. In the course of this study it was identified from Gilan province of Iran (fig. 1).

Specimen studied: Gilan: Rasht, Maroofi 8495 (HKS).

The morphological characteristics of *V. villosa* subsp. *dasycarpa* is compared with the *V. villosa* subsp. *villosa* in table 1.

Sect. *Crocea* Radzhi, Novit. Syst. Pl. Vasc. 7: 230 (1971).

V. crocea (Desf.) B. Fedtsch., Fl. USSR. 13: 425 (1948).

Syn.: *Orobis croceus* Desf., Choix Pl. Coroll. Tournef. 85, tab. 63 (1808); *O. auranticus* Stev. in M. B. Fl. Taur.-Cauc. 3: 462 (1819); *V. aurantiaca* (Stev.) Boiss., Fl. Or. 2: 578 (1872).

Fedtschenko (1948) and Chrtkova-Zertova (1979) placed *V. crocea* in sect. *Cracca*, but Kupicha (1976) and Pakravan (2000) agreed with the placement of *V. crocea* in sect. *Vicilla*. *Vicia crocea* with oblong

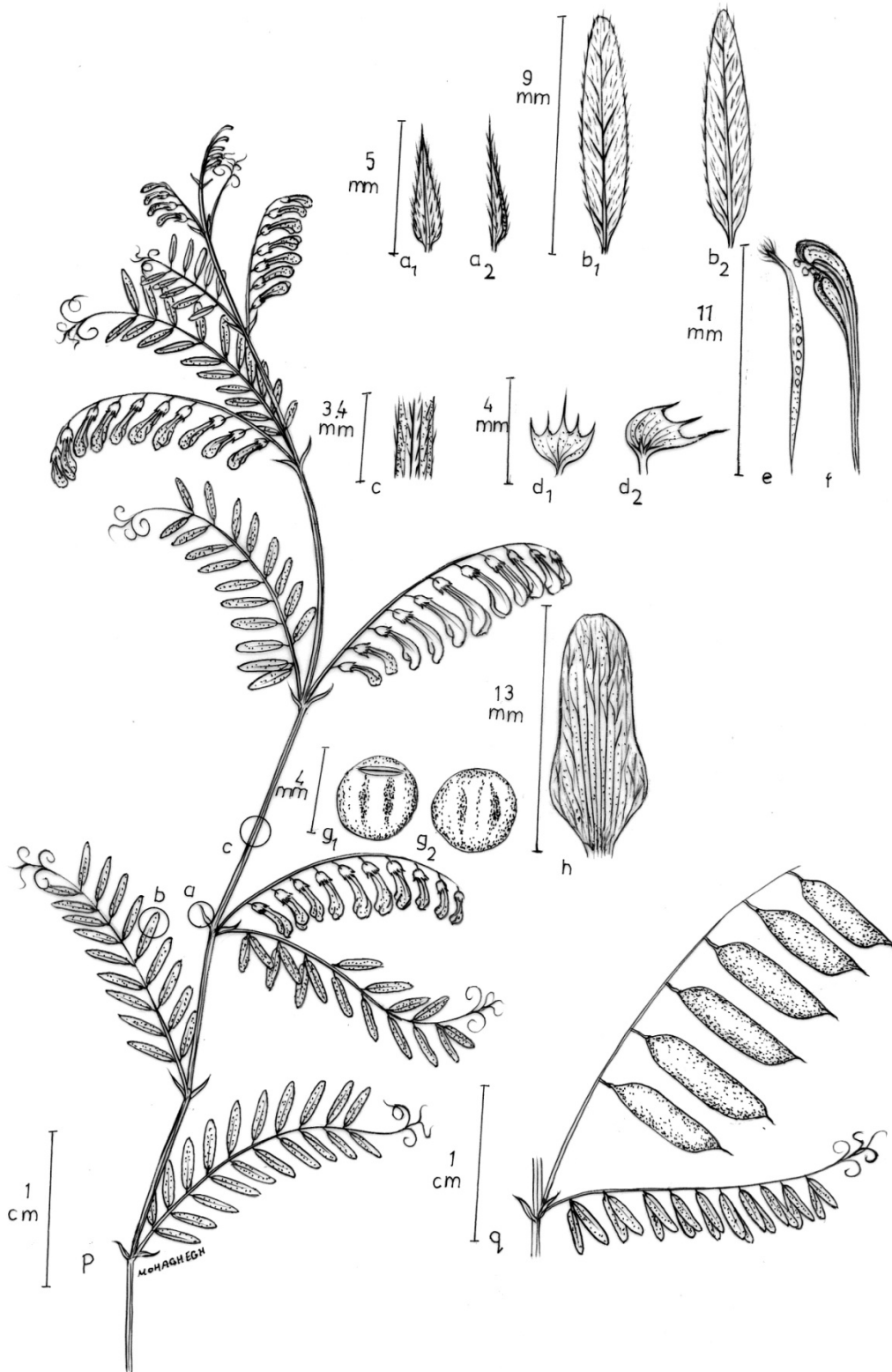


Fig. 1. *Vicia villosa* subsp. *dasycarpa*. a, stipule; b, leaflet; c, stem; d, calyx; e ovary; f, claw; h, vexillum; p, plant; q, legume bearing branch.

Table 1. morphological comparison of *Vicia villosa* subsp. *villosa* and *V. villosa* subsp. *dasycarpa*.

Characters	Species	<i>V. villosa</i> subsp. <i>dasycarpa</i>	<i>V. villosa</i> subsp. <i>villosa</i>
Stem indumentum		Adressed sparse pilose	Villous
Number of flowers		5-15	10-30
Ratio of tooth to tube in calyx		Lower calyx tooth shorter than tube	Lower calyx tooth as long as tube
Calyx length (mm)		3-4	5-8
Calyx indumentum		glabrous	Pilose
Legume size (mm)		20-30 × 6-7	20-30 × 7-10
Ratio of limb of standard to claw		Limb of standard 1/2-2/3 claw	Limb of standard at least as long as claw

standard and terete style (Te-type), has etendrillous leaves with very large, broad papery coriaceous and reticulate veined leaflets. The inflorescence is paniculate, that is different from the members of sect. *Cracca* (platonychoid standard and laterally style (Le-type) and sect. *Vicilla* (oblong standard and dorsally compressed style) (De-type). Therefore in this study we revived sect. *Crocea* Radzhi and transferred *V. crocea* (Desf.) B. Fedtsch from sect. *Vicilla* (Schur) Aschers. & Graebner to sect. *Crocea* Radzhi in Radzhi's sense (1970).

Sect. *Vicilla* (Schur) Aschers. & Graebner, Syn. Mitteleur. Fl. 6, 2: 916 (1909)

Syn.: *Vicilla* Schur, Enum. Pl. Trans. 170 (1866); *Swantia* Alef., Oesterr. Bot. Z. 9: 365 (1865); *Vicia* sect. *Cassubicae* Radzhi, Novit. Syst. Pl. Vasc. (Leningrad) 7: 230 (1971).

Lectotype (Gunn, 1969): *V. pisiformis* L. Sp. Pl. 734 (1753).

V. venulosa Boiss. & Hohen. in Boiss., Diagn. Pl. Or. Nov. Ser. 1 (19): 123 (1849).

V. cassubica L., Sp. Pl. 735 (1753).

Schur (1866) included *V. cassubica*, *V. orobus*, *V. sylvatica* and *V. pisiformis* in *Vicilla* due to the style characters. Then, Aschers and Graebner (1909) used *Vicilla* as a section. Based on similarities of floral characters of sections *Cassubicae* and *Vicilla* (number of flowers and seeds, the shape of vexillum and style). Therefore in this study we transferred *V. cassubica* from sect. *Cassubicae* to sect. *Vicilla*

Sect. *Variegata* Radzhi in Novit. Syst. Pl. Vasc. (Leningrad) 7:230 (1971).

Type: *V. variegata* Willd., Sp. Pl. 3: 1096 (1802).

V. canescens Labill. Icon. Pl. Syr. 1: 17, t. 7 (1791).

Syn.: *V. persica* Boiss. var. *stenophylla* Boiss., Fl. Or. 2: 583 (1872); *V. persica* Boiss., Diag. Pl. Or. Nov. Ser. 1(9): 121 (1894); *V. akhmaganica* Kaz., Feddes Repert. 36: 389 (1934); *V. canescens* subsp. *gregaria* (Boiss. & Heldr.) Davis, Fl. Turkey 3: 287 (1969); *V. canescens* subsp. *variegata* (Willd.) Davis, Fl. Turkey. 3: 287 (1969); *V. rechingeri* Chrtkova-Zertova, Folia Geobot.

Phytotax 12: 101 (1977).

Chrtkova-Zertova (1979) considered eight species belonging to the sect. *Variegata* Radzhi: *V. persica* Boiss., *V. armena* Boiss., *V. variegata* Willd., *V. akhmaganica* Kazar., *V. gregaria* Boiss. et Heldr., *V. aucheri* Jaub. et Spach, *V. rechingeri* Chrtkova-Zertova and *V. afghanica* Chrtkova-Zertova while Davis & Plitmann (1970), Townsend (1974) and Pakravan (2000) accepted *V. variegata* species group as *V. canescens* Labill. treated as a polytypic species including 2 subspecies in Iranian materials. We studied many herbarium sheets and fresh specimens. Taking into account the more or less overlapping characters (upper and lower leaflets, leaflets apex, tendril, stipule length, indumentum of legumes) used by Davis & Plitmann (1970) and Pakravan (2000), we recognized *V. canescens* as its *sensu lato* with no infra-specific taxa in.

Sect. *Subvillosae* Kupicha, Notes R. B. G. Edinburgh, 34: 323 (1976).

Type: *V. subvillosa* (Ledeb.) Trautv., Acta Horti Petrop. 3: 42 (1875).

V. subvillosa (Ledeb.) Boiss., Fl. Or. 2:580 (1872).

Syn.: *Orobis subvillosus* Ledeb., Fl. Alt. 3: 359 (1831); *Lathyrus subvillosus* (Ledeb.) Aitch. & Hemsl., Trans. Linn. Soc. Ser. 2 (3): 59 (1888); *Orobis riflorus* Beck in Stapf, Denschr. Akad. Wien 2: 76 (1886).

V. iranica Boiss., Fl. Or. 2: 581 (1872).

Syn.: *Orobis persicus* Boiss., Diagn. Pl. Or. Nov. ser. 1 (2): 107 (1843).

Sect. *Panduratae* Kupicha, Notes R. B. G. Edinburgh, 34: 323 (1976).

Type: *V. cappadocica* Boiss. & Bal. in Boiss., Diagn. Pl. Or. Nov. Ser. 2 (6): 68 (1859).

V. cappadocica Boiss. & Bal. in Boiss., Diagn. Pl. Or. Nov. ser. 2 (6): 68 (1859).

Syn.: *Ervum paucijugum* Trautr., Acta. Horti Petrop. 3: 76 (1875); *Lathyrus trijugus* Bornm., Beih. Botanisches Centralblatt. 19 (2): 250 (1910); *L. paucijugus* (Trautv.) Schischkin Izv. Univ. tomsk 81: 488 (19280); *Vicia paucijuga* (Trautv.) B. Fedtsch., Sborn. Akad. Nauk. V.

L. Komarova 745 (1939).

Sect. *Ervilia* (Link) W. Koch, Syn. Fl. Germ. Ed. 1:191 (1836).

Syn.: *Ervilia* Link, Enum. Hort. Berol. 2:240 (1822). *Ervum* sect. *Ervilia* (Link) Ser. in DC., Prodr. 2:236 (1825); *Vicia* subgen. *Ervilia* (Link) Rouy in Rouy & Fouc., Fl. Fr. 5:248 (1899); *Vicia* sect. *Anatropostylia* Plitmann in Davis, Fl. Turkey 3: 598 (1970); *Anatropostylia* (Plitmann) Kupicha, Notes. Roy. Bot. Gard. Edinb. 32 (2) 247 (1973).

Type: *V. ervilia* (L.) Willd., Sp. Pl. ed. 413; 1103 (1802).

V. *koeieana* Rech. f., Dansk. Bot. Ark. 15 (4): 37 (1955).

Syn.: *V. Singarensis* Boiss. & Hausskn. var. *aristata* Nab., Paul. Fac. Sci. Univ. Masaryk. (Brno) 35: 100 (1923); *V. aristata* (Nab.) Scischkin, Ber. Tomsker. Staats. Univ. 80: 487 (1929), non (Lapeyr.) Dulac (1867); *V. blakelockiana* Townsend, Kew Bull. 21: 452 (1968); *Anatropostylia koeieana* (Rech. f.) Kupicha, Notes Roy. Bot. Gard. Edinb. 32 (2): 247 (1973).

V. *ervilia* (L.) Willd., Sp. Pl. Ed. 413; 1103 (1802).

Syn.: *Ervum ervilia* L., Sp. Pl. 738 (1753).

Sect. *Lenticula* Aschers. et Graebn., Synops. 2: 905 (1906).

Type: *V. hirsuta* (L.) S. F. Gray, Nat. Arr., Britt. Pl. 614 (1821).

V. *hirsuta* (L.) S. F. Gray, Nat. Arr., Britt. Pl. 614 (1821).

Sect. *Ervum* S. F. Gray, Nat. arr. Pl. 2: 614 (1821).

Syn.: *Ervum* L., Sp. Pl. 738 (1753); *Vicia* subgen. *Ervum* (L.) Rouy in Rouy & Fouc., Fl. Fr. 5: 245(1899).

V. *hirsuta* (L.) S. F. Gray, Spic. Fl. Lips. 26 (1771).

Syn.: *Ervum tetrasperma* L. Sp. 738 (1753)

REFERENCES

- Ascherson, P. & Graebner, P. 1909: Synopsis der Mittel-Europäischen Flora no. 6, part 2.- Wilhelm Engelmann, Leipzig.
- Boissier, E. 1872: *Vicia*. In Fl. Orientalis no. 2: 565-597.- Genevae & Basileae.
- Choi, B. H., Seok, D. I., Endo, Y. & Ohashi, H. 2006: Phylogenetic significance of styler features in genus *Vicia* (Leguminosae), an analysis with molecular phylogeny. – Journal of Plant Research 119: 513–523.
- Chrtkova – Zertova, A. 1979: Papilionaceae 1- *Vicia*. In. Rechinger, K. H. (ed.), Flora Iranica 140: 16-57.- Akademische Druck-u., Verlagsanstalt, Graz.
- Davis, P.H. & Plitmann, U. 1970: *Vicia* In: Davis, P.H. (ed.), Flora of Turkey 3: 274-325.-Edinburgh university press Edinburgh.
- Dehshiri, M.M., Zarini, M. & Jalilian, N. 2011: *Vicia garinensis* (Fabaceae, Viciaeae), a new species from Hamadan province, west of Iran.-Annales Botanici Fennici 48 (3): 280-283.
- Endo, Y., Ohashi, H. 1997: The morphology and anatomy of styles in Viciaeae (Leguminosae).- The Journal of Japanese Botany 72: 9-18.
- Fedchenko, B.A. 1948: *Vicia* L. In: Schischkin, B. & Bobrov, E. (eds.). Flora of the U.S.S.R. (Flora S.S.S.R.).-Academiae scientiarum U.R.S.S., Moscow 13: 406- 475. (Russian page)
- Fedoronchuk, M.M. 1996: A revision of species of the genus *Vicia* Fabaceae) in the florae of Ukraine.- Ukrainian Botanical Journal 53: 587-597.
- Hanelt, P. & Mettin, D. 1989: Biosystematics of the genus *Vicia* L. (Leguminosae).- Annual Review of Ecology, Evolution and Systematics 20: 199-223.
- Hosseinzadeh, Z. & Pakravan, M., 2008: Anatomical study of petiole and systematic approach in the genus *Vicia* L. (subgen. *Vicilla*) in Iran- .Iranian Journal of science 22(2) :55-65. (in persian)
- Hosseinzadeh, Z., Pakravan, M., Tavassoli, A. 2008: Micromorphology of seed in some *Vicia* species from Iran.- Rostaniha 9: 96-107.
- Jaaska, V. & Leht, M. 2007: Phylogenetic relationships and within sections *Hypechusa*, *Narbonensis* and *Peregrinae* of genus *Vicia* (Fabaceae) based on evidence from isozyme and morphology.-Versita 2(1): 137-155.
- Jalilian, N. 2011: Taxonomic revision and interspecific relationships of the genus *Vicia* L. in Iran. Ph.D. Thesis, University of Isfahan, Isfahan.
- Jalilian, N., Rahiminejad, M.R., Saeidi, H., Maassomi, A.A. & Maroofi, H. 2010: *Vicia kurdica* (papilionaceae), a new species from Iran. Feddes Repertorium.- 121 (1-2): 81-84.
- Jalilian, N., Rahiminejad, M.R. 2012a: Determination of *Vicia* species based on seed shape in Iran. Journal of Seed Science and Technology.- 1: 71-76. (in persian)
- Jalilian, N., & Rahiminejad, M.R. 2012b: Karyotype analysis and new chromosome number reports for nine species in Iran.- Rostaniha 13(2): 215-220.
- Kupicha , F.K. 1976: The infrageneric structure of *Vicia*.- Notes R. B. G. Edinburgh 34: 287-326.
- Leht, M. 2005: Cladistic and phenetic analysis of relationships in *Vicia* subgenus *Cracca* (Fabaceae) based on morphological data.-Taxon- 54(4): 1023-1032.
- Leht, M. 2009: Phylogenetics of *Vicia* (Fabaceae) based on morphological data Feddes Repertorium-120: 379–393.
- Maxted, N. 1993a: A phenetic investigation of *Vicia* L. subgenus *Vicia* (Leguminosae, Viciaeae).- Botanical Journal of the Linnean Society- 111, 155-182.

- Maxted, N. 1993b: A phenetic investigation of *Vicia* L. section *Peregrinae* Kupicha (Leguminosae-Vicieae).-Botanical Journal of the Linnean Society. -51 (1): 1-23.
- Maxted, N. 1995: An ecogeographical study of *Vicia* subgenus *Vicia*.. Systematic and ecogeographic studies on crop gene pools. International Plant Genetic Resources Institute, Rome.
- Mettin, D. & Hanelt, P. 1964: Cytosystematische Untersuchungen in der Artengruppe um *Vicia sativa* L.- Kulturpflanze- 12: 163-225.
- Nikiforova, O.D. 1988: Wild Vetches of Siberia.- Nauka, Novosibirsk. (in Russian)
- Pakravan, M. 2000: *Vicia*. In: Fl. of Iran no. 33: 24-104. - Tehran.
- Parsa, A. 1948: Flora de l'Iran no. 2: 439-455.-Tehran.
- Plitmann, U. 1967: Biosystematical study in the annual species of *Vicia* of the Middle East. The Hebrew University of Jerusalem.
- Potokina, E. K. 1997: *Vicia sativa* L. aggregate (Fabaceae) in the flora of former USSR. **Genetic Resources and Crop Evolution** 44:199-209.
- Potokina, E.; Tomooka, N.; Vaughan, D. A.; Alexandrova, T & Xu, R.-Q. 1999: Phylogeny of *Vicia* subgenus *Vicia* (Fabaceae) based on analysis of RAPDs and RELP of PCR-amplified chloroplast genes. – **Genetic Resources and Crop Evolution** 46: 149 – 161.
- Radzhi, A. D. 1970: *Conspectus systematis specierum Caucasicarum Generis Vicia L.- Novitates Systematicae Plantarum Vascularium* 7: 228-240. (in Russian)
- Stankevich, A.K. 1982: On taxonomic position of some sections in the genus *Vicia* L.- **Bulletin of Applied Botany, Genetics and Plant Breeding**-43: 110-125. (in Russian)
- Stankevich, A.K. 1983a: Remarks on *Vicia subvillosa* (Ledeb.) Boiss. and its relation to genus *Orobus* L. - **Bulletin of Applied Botany, Genetics and Plant Breeding**- 72: 21-27. (in Russian)
- Stankevich, A.K. 1983b: The genus *Vicia* L. and its position in the tribe Fabeae (Fabaceae).- **Bulletin of Applied Botany, Genetics and Plant Breeding**- 79: 3-10. (in Russian)
- Townsend, C.C. 1974: *Vicia*. In. Fl. of Iraq no. 3: 512-544.- Baghdad.
- Tzvelev, N.N. 1980: *Systema specierum generis Vicia L. in parte Europaea URSS.- Novitates Systematicae Plantarum Vascularium* 17: 200-208. (in Russian)
- Willis, J.C. 1973: *A dictionary of the flowering plants and ferns.* 8nd ed. (Revised by Airy Shaw. H. K.). Cambridge. Cambridge university press.
- Zohary, D. & Plitmann, U. 1979: Chromosome polymorphism, hybridization and colonization in the *Vicia sativa* group (Fabaceae).- **Pl. Syst. and Evol.**-131: 143-156.