

CYTOTAXONOMIC STUDIES OF SOME IRANIAN *VICIA* SPECIES (FABACEAE)

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Abstract

This study concerns the cytotaxonomic investigations on twelve species belonging to three sections from the genus *Vicia* in Iran. A taxonomic background of the genus is given in brief. The previous counts reported for the genus in *Index to plant chromosome number* are summarized. In addition to one new count, the chromosome numbers of four species are reported for the first time. Briefly, the results of this study are discussed and compared with the reported counts.

Introduction

The genus *Vicia* has about 150 species all around the world [5]. The type species of the genus is *V. Sativa* L. [3]. Because of its economic importance, *Vicia* has been on the focus of enormous attention from different points of view.

Since Linnaeus [16], who described 16 species in the genus, the taxonomic situation of *Vicia* has been the matter of several taxonomic treatments (e. g. [2, 6, 5, 21, 20, 7]). The taxonomic delimitation and the size of *Vicia* in Iran have been treated in different ways. Boissier [2] mentioned 24 species for this genus in Iran. Parsa [18] believed that the genus has 34 species and Cheretkova-Zertova [4] reported 51 species for *Vicia* in this country.

The cytotaxonomy of the genus *Vicia* has been the matter of many studies. The genus contains species with $2n=10, 12, 13, 14, 18, 21, 22, 24, 28$ and 42 , of them $2n=12$ and 14 are more common than the others. Stace [19] believes that "the tetraploids with $2n=24$ are derived from ancestors with $2n=12$, and those with $2n=28$ from ancestors with $2n=14$. Maxted et al. [17] reviewed and discussed well the evolutionary trends within the genus regarding the

direction of chromosome changes during its evolution.

Amato [1] reported $2n=16$ (or "16n" as mentioned in the main article) for *V. faba* as the first count: this number was changed later to $2n=12$ and 14 by other authors. Index to plant chromosome numbers [8, 9, 10, 11, 12, 13, 14] has listed all counts belonging to 139 species of *Vicia*. The studies show the genus represents several different basic chromosome numbers, including $X=5, 6, 7$, and 9 .

In spite of many chromosome counts concerning the genus *Vicia*, we found no report on the cytology of *Vicia* from Iran. This study is aimed to determine the chromosome numbers of some taxa from *Vicia* in Iran.

Materials and Methods

Material examined in this study was obtained either from the field or as accessions from the gene bank of Iran; the materials belong to three sections and twelve species (Table 1). The counts reported in this study are from mitotic root tips. All materials were obtained from the seed accessions, which were already grown in the green house. The herbarium specimens prepared from the seed accessions are preserved in the Herbarium of faculty of agriculture, Esfahan University of Technology.

Young, fresh and white roots were collected 10-10.30 a. m. during summer time, and 11-11.30 a. m. during

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Table 1. Chromosome counts of 12 *Vicia* species examined in this study; compared with reported numbers, if present

Section	Species	Number of chromosome reported		Number of chromosome counted	Locality
		(2n)	(n)		
Sect. <i>Ervilia</i>	<i>V. ervilia</i>	14	7	14	Gen Bank, Cha., Sh. Ko., Fer. Sh., Lor.
	<i>V. akhmaganica*</i>	-	-	10	Azar., Urm.
	<i>V. cinerea*</i>	-	-	14	Gen Bank (Zanj.), Esph., Bosh.
Sect. <i>Cracca</i>	<i>V. villosa</i>	12,14, 28	-	14	Gen Bank (Zanj.), Esph., Kord., Lor., Maz.
	<i>V. persica</i>	10	5	10	Gen Bank (Azar.), Maz., Kar.
	<i>V. variegata*</i>	-	-	10	Gen Bank (Azar.), Azar. -Maco, Teh. -Firoz Koh
Sect. <i>Vicia</i>	<i>V. anatolica*</i>	-	-	12	Lor., Esph.
	<i>V. angustifolia</i>	12	6	12	Gen Bank (Lor., Arac, Cha., Ham.), Balu., Esph., Azar.
	<i>V. hyrcanica</i>	12	-	12	Esph., Cha., Kord., Azar., Khor.
	<i>V. michauxii</i>	14	7	10	Esph. Cha., Azar., Kord., Bosh., Ham.
	<i>V. peregrina</i>	12, 14	7	12	Gen Bank (Ilam, Shiraz), Esph., Maz., Ham.
	<i>V. sativa</i>	10, 12, 18	6	10, 12	Gen Bank, Esph., Cha., Maz., Balu., Sh. Ko.

Azar. =Azarbayejan, Balu. =Baluchestan, Bosh. =Boshehr, Cha. =Chaharmahal-o-Bkhtiari, Esph. =Esphahan, Fer. Sh. =Fereidon Shahr, Ham=Hamadan Kar. =Karaj, Khor. =Khorasan, Kord. =Kordestan, Lor. =Lorestan, Lord. =Lordegan, Maz. =Mazandaran, Sem. =Semrom, Sh. Ko. =Shahrekord, Teh. =Tehran, Urm. =Uromieh, Zanj. =Zanjan. The Asterisked counts are reported for the first time.

winter. Pretreatment was performed in 0.002M 8-hydroxyquinoline for 20-22 hours in the fridge at 4c. After 24 hours the pretreatment was replaced by fixative using absolute ethanole: glacial acetic acid (3: 1). Hydrolysis was performed using 5NHCl for 7 min at room temperature, then the roots were placed in 70% IMS. Roots were placed

in 45% acetic acid before preparing slides. Aceto-orcein or Hematoxylin were used as stain in this study. Slides were heated to hand hot approximately for 30 sec and inverted on a pieceof filter paper and squashed. Slides were examined under the microscope. For each seed accession 1-3 root tips were studied.

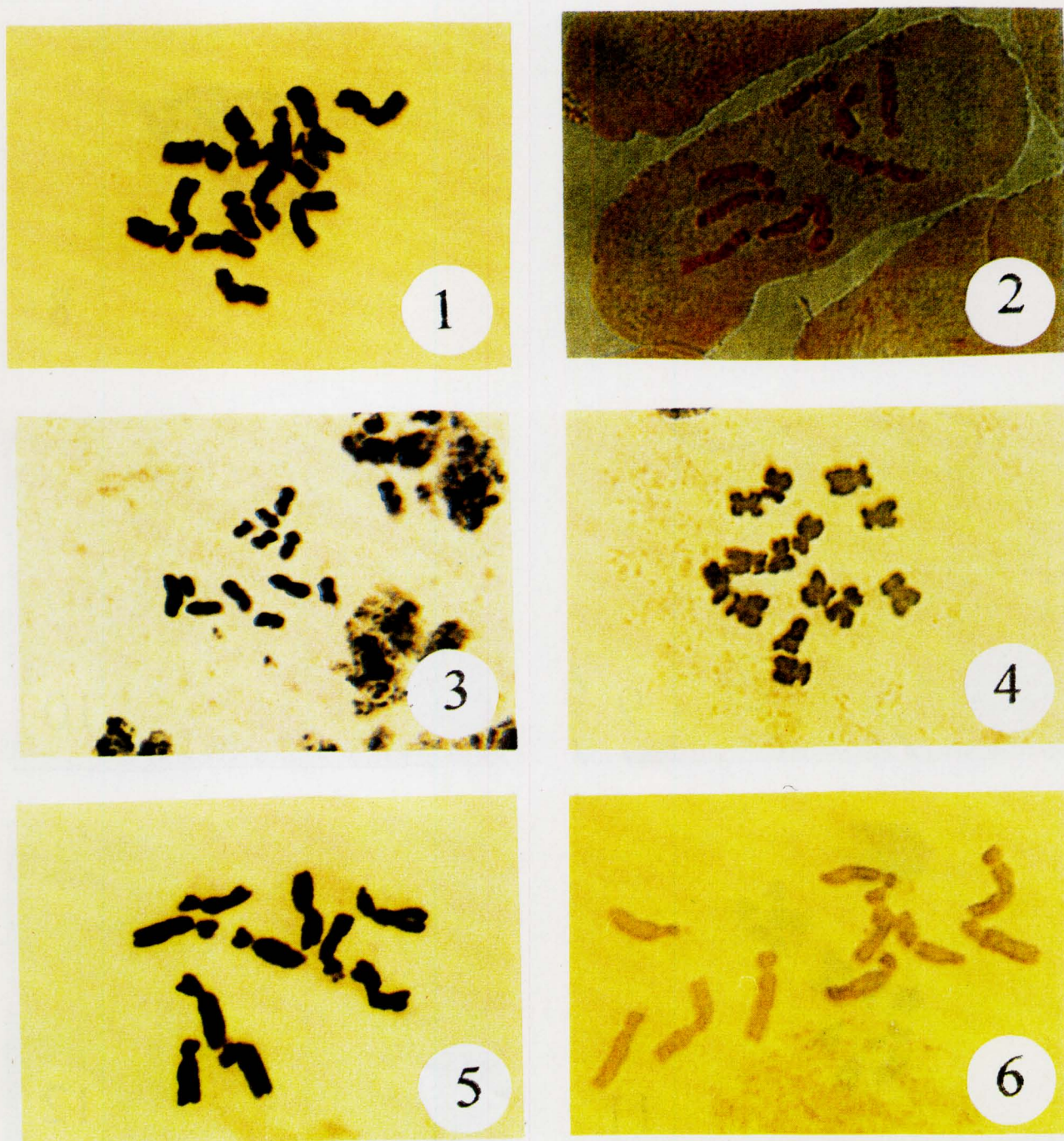


Figure 1. Root-tip mitotic karyotypes of 12 *Vicia* species: 1, *Vicia ervilia* $2n=14$; 2, *V. akhmaganica* $2n=10$; 3, *V. cinerea* $2n=14$; 4, *V. villosa* $2n=14$; 5, *V. persica* $2n=10$; 6, *V. variegata* $2n=10$; 7, *V. anatolica* $2n=12$; 8, *V. hyrcanica* $2n=12$; 9, *V. angustifolia* $2n=12$; 10, *V. michauxii* $2n=10$; 11, *V. peregrina* $2n=12$; 12, *V. sativa* $2n=12$. The species are arranged according to their sections. The chromosome numbers of *V. cinera*, *V. akhmaganica*, *V. anatolica* and *V. variegata* are reported for the first time; and the number $2n=10$ is a new count for *V. michauxii*. Scale bar= $1\mu\text{m}$

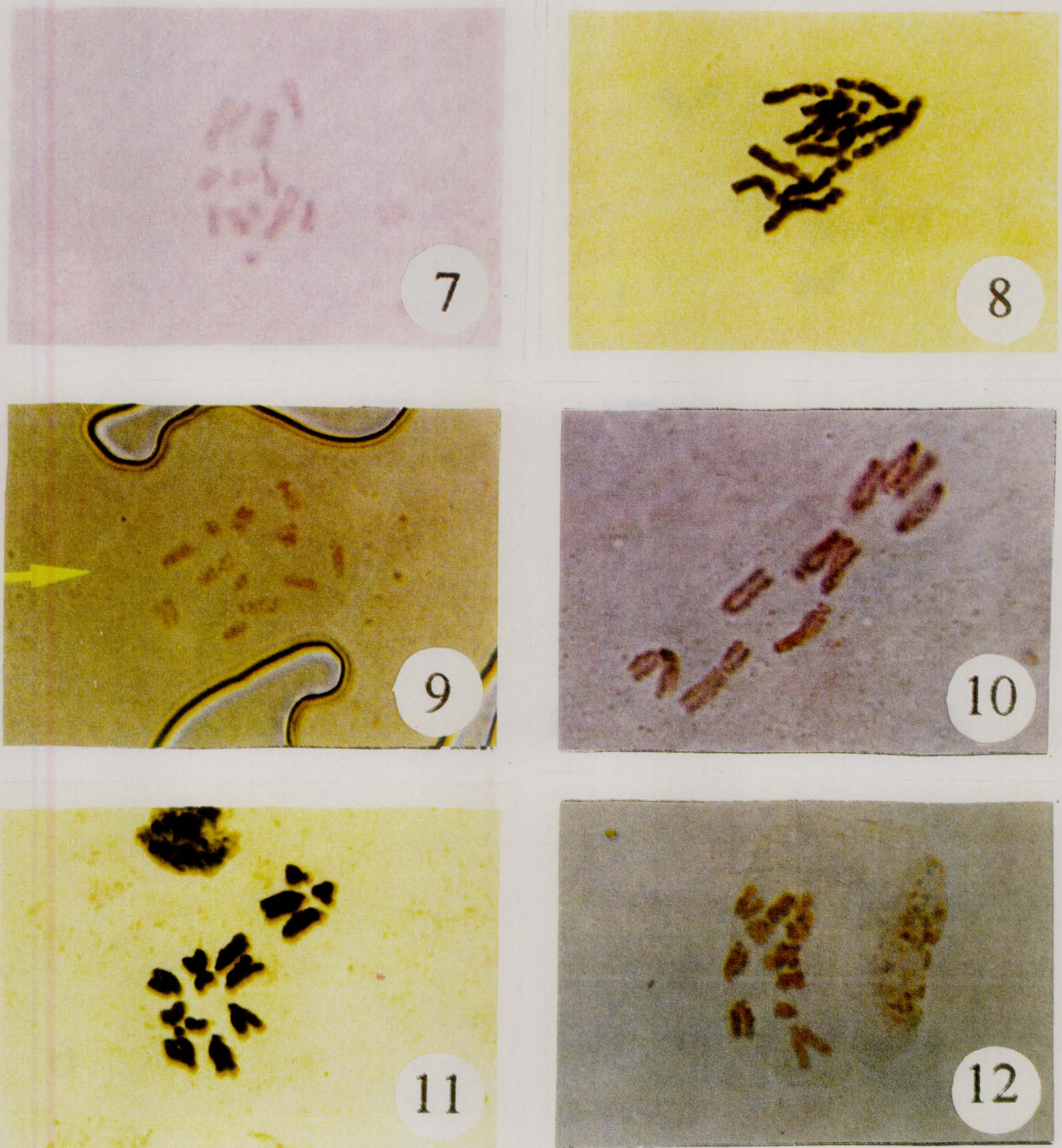


Figure 1. Continued

Results

Table 1 lists the counted chromosome number in this study. Figure 1 shows 12 photographs of karyotypes belonging to the root-tip mitosis counted in this study. The results of this study are presented and compared with the reported counts in Table 1. Species are arranged according to their sections.

Discussion

The results of this study show all our counts belong to the diploid level (Table 1). These results are mostly in accordance with the literature [8, 9, 10, 11, 13, 14]. Chromosome counts of four species (*V. akhmaganica*, *V. cinerea* and *V. variegata* from the section *Cracca*; and *V. anatolica* from the section *Vicia*) are reported for the first