



ISSN: 2319-6505

Available Online at <http://journalijcar.org>

International Journal of Current Advanced Research  
Vol 5, Issue 6, pp 970-972, June 2016

International Journal  
of Current Advanced  
Research

ISSN: 2319 - 6475

RESEARCH ARTICLE

THREE NEW SPECIFIC RECORDS OF PHELIPANCHE (OROBANCHACEAE) TO THE FLORA OF IRAQ

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ARTICLE INFO

Article History:

Received 26<sup>th</sup> March, 2016

Received in revised form 17<sup>th</sup> April, 2016

Accepted 25<sup>th</sup> May, 2016

Published online 28<sup>th</sup> June, 2016

Key words:

Orobanchaceae, Phelipanche, Broomrape,  
Iraq, Parasitic Plant

ABSTRACT

Three species of Phelipanche Pomel, *P. nana* (Noë ex Rechb.) Soják, *P. ramosa* (L.) Pomel and *P. schultzii* (Mutel) Pomel were recorded for the first time to the flora of Iraq. *P. nana* was found only in Khadhar al-Mai in the southern desert (DSD), it was parasitized on Cruciferae, *P. schultzii* was found in two districts, Amadyia district (MAM) and Sulaimanyia district (MSU) of the Mountain Region, it was parasitized on *Galium* sp. (Rubiaceae). While *P. ramosa* was widely distributed in almost all Mountain Regions and the Persian Foothills (FPF) and parasitized on Tomatos, chickpea and wild bean. Key to the species, habitat and distribution were given and diagnostic characters with photographs of species were illustrated.

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INTRODUCTION

Taxonomical studies on the genus *Orobanche* in Iraq is very scanty. Al-Rawi, 1964 provided a checklist for plant species occurred in Iraq reporting ten species of *Orobanche* and one species of *Cistanche*, without any referring to the genus *Phelipanche*. Rechinger, 1964a in his Flora of lowland Iraq described two species of *Cistanche* and five species of *Orobanche* s.l. (in its broad sense) but he neither divided the genus into sections or groups nor he mentioned the *Phelipanche* as a separate genus. Few papers published on the taxonomy of *Orobanche* species of Iraq. Salah, 2002 studied the *Orobanche* s.l. in 3 provinces Duhok, Arbil and Sulaimanyia of Kurdistan of Iraq, mentioning 11 species. Salh, 2013, recorded *Orobanche oxyloba* as a new record to Kurdistan of Iraq. All floras in our regions such as Flora of Turkey by Davis, 1982, Flora Iranica by Rechinger, 1964b, Flora of Kuwait by Daoud, 1982 and Flora of Saudi Arabia by Migahid, 1978 treated *Orobanche* as one genus (in its broad sense) but Gilli in Davis, 1982 divided the genus into 2 sections, *Trionychon* (with 2 bracteoles) and *Orobanche* without bracteoles. Recently researchers admit recognizing the genus *Phelipanche* on the basis of DNA sequences to coincide with section *Trionychon* of *Orobanche*. Holub, 1990, Joel, 2009, Banfi *et al.*, 2011 and Aksoy *et al.*, 2013. A detailed taxonomic study for a PhD project on the Orobanchaceae of Iraq is being undertaken, based on extensive field surveys as well as herbarium studies. This paper reports some of our results on some new records of *Phelipanche* species with their diagnostic characters and geographical distribution.

MATERIALS AND METHODS

Several scientific field trips to almost all physiographic district of Iraq were achieved during the years 2014-2016 to collect plant materials for the PhD project of the author of this

paper Widad M. Taher on the family Orobanchaceae. Specimens were examined, photographed in the field, collected and then taken to the lab. Specimens were dried and herbarium specimens were prepared and deposited in Basrah University Herbarium (BSRA). Duplicates were sent to several herbaria (BAG, BUH and BUNH). Specimens' examination and identification were made on both fresh materials and herbarium specimens, deposited at Baghdad University Herbarium (BUH), National Herbarium of Iraq (BAG) and (BSRA). Species determination and characterization were based on Beck, 1930; Novopokrovskij and Tzvelev, 1958; Rechinger, 1964a, b; Tutin *et al.*, 1972; Davis, 1982; Joel, 2009 and Zare and Dönmez, 2016.

RESULTS AND DISCUSSION

*Phelipanche nana* (Noe ex Rechb.) Sojak, *P. ramosa* (L.) Pomel and *P. schultzii* (Mutel) Pomel were recorded for the first time to the Flora of Iraq. *P. nana* is collected from Khadhar al-Mai (Fig.1 and 3) about 130km S.W. of Basrah in the Southern Desert of Iraq (DSD). It is a rare species grows sporadically on sandy desert soil and parasitize on Cruciferae. The species is distinguished by its small flowers (up to 17mm long), bluish corolla with acute lobes of lower lip of corolla.

*P. schultzii* is collected from 3 localities, 2 of which were in Sulaimaniya District (SUM), the first one was in Pera-Magron Mountain and the second was in Dara Tari in Sanaralwa Mountain. The 3<sup>rd</sup> locality was in Amadiya District towards Turkish border. The species is frequent, grows on mountainous soils and parasitized on *Galium* (Rubiaceae). The species is clearly distinguishable by its long subulate-filiform calyx teeth and distinctly elliptec- acute lobes of lower lip of corolla (Fig.3). *P. ramosa* is collected from one locality in Sulaimaniya District (MSU) in Hasa Golla, on the road to Qala-Chawlan. In addition, several herbarium specimens wrongly identified as *Orobanche aegyptiaca* Pers. was found to be *P. ramosa*. These specimens were collected from Rawandoz District (MRO) in Rania,

MSU, in Darbandikhan and in Tawela, MJS, in Karsi and Jabal Sinjar and FPF, near Talwast (Nasr) police post, N.N.W. Mandli. The species is widely distributed in the mountain Regions of Kurdistan. It grows on various types of soils between rocks, on stony hillside or mountain slopes or clay soil, it parasitized on various crops especially Tomatos, Chickpea and wild bean.

The main characteristics of the 3 records species are summarized in the table 1. From the data listed in table 1, and our field observation it seems that *P. nana* and *P. ramosa* are closely related species to the degree that sometimes they cannot be easily separated from each other specially when dried, but both are clearly separable from *P. schultzii* by their calyx teeth which are much shorter than that in *P. schultzii* but the SEM micrographs of the pollen surface showed a clear difference between them. Pollen ornamentation was reticulate in *P. ramosa*, scabrate in *P. nana* and Psillate in *P. schultzii* (Fig.2). However the following key can be used to separate the three species.

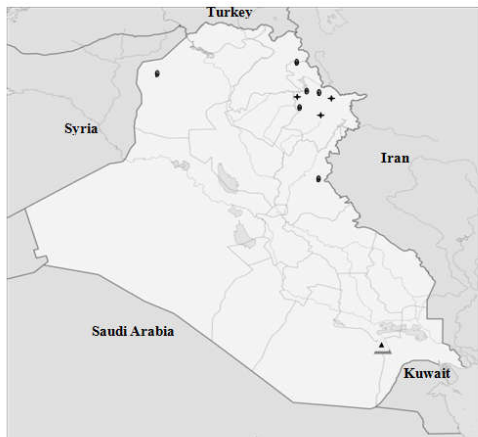


Fig.1: Distribution in Iraq of *P. nana*; (▲) *P. ramosa*; (●) *P. schultzii* (■)

Table 1 Characters of the recorded Phelipanche species

	<i>P. nana</i>	<i>P. ramosa</i>	<i>P. schultzii</i>
Height plant (cm)	7-14	10.5-15	7-31
Stem (cm)	4-9	5-7	2-15.5
Inflorescence (cm)	3-5	5-9	3-24
Bracteoles	4.5-6	5.5-8	8-10
Bract (mm)	6.5-9	5.5-7	8.5-12
Calyx (mm)	5-7	5.5-7	9.5-14
Calyx teeth(mm)	2.5-4	2.5-3	6.5-9
Calyx tube (mm)	2.5-3	3-4	4-5
Corolla (mm)	10-15	10-15	15-20
Lower limp of corolla	Acute	Rounded	Acuminate
Filament (mm)	6-9.25	6-8	9-13
Pollen ornamentation	Scabrate	Reticulate	Psillate
Style (mm)	6-8	6-8	8-13

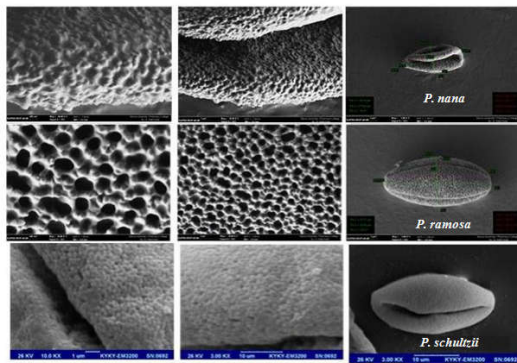


Figure 2 SEM micrographs of the pollen grains of the 3 newly recorded Phelipanche species

1- Calyx teeth distinctly longer than tube, 1.5-2 times as long as tube .....*P. schultzii*

1- Calyx teeth shorter, equaling or slightly longer than tube ..... 2

2- Calyx teeth almost shorter than tube. Lobes of lower lip of corolla rounded, pollen surface ornamentation reticulate ..... *P. ramosa*

2- Calyx teeth equaling or longer than tube. Lobes of lower lip of corolla often acute, pollen surface ornamentation scabrate ..... *P. nana*

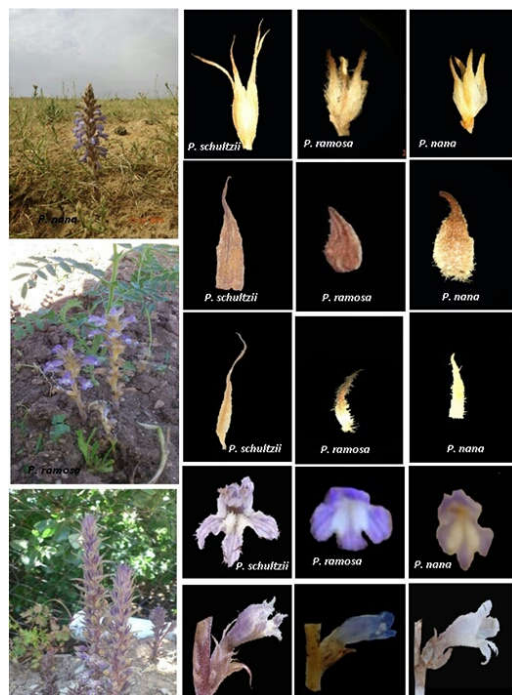


Figure 3 Habitat and floral characters of the 3 newly recorded Phelipanche species. Characters from top to bottom: calyx, Bract, bracteole, corolla front view, corolla side view

*Orobanche mutelii* Shultz that mentioned by Rechinger, 1964 to be occur in Hafriyah near Baghdad is also very closely related to *P. ramosa*, it has the same size, colour and shape of lobes of lower lip of corolla. However it is better to keep them as a separate species until more taxonomical evidence from palynological, ultrastructural and molecular studies be available.

The presence of the 3 Phelipanche species recorded here in Iraq (Fig.1) is not something peculiar since the 3 species together with *O. mutelii* are widely distributed in the neighboring countries, Turkey and Iran; it is very natural for the species to extend their distribution in a similar habitat inside Iraq. Salih, 2002 (unpublished MSc thesis) reported that he collected *O. ramosa* in one locality in Zakho in Amadiya District in Kurdistan but he did not show a photograph for the species in the field. Although he showed a photograph for a herbarium specimens, but we have not found it in any of the Kurdistan Herbaria he mentioned. In addition, we have not seen any specimen of *O. ramosa* collected from the same district deposited in the National herbarium of Iraq (BAG). He also said in his key for identifying his *O. ramosa* that, plant usually unbranched, while the herbarium specimen he showed is distinctly branched, therefor his specimen may be misidentified.

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