Two New Records of Orchid Species for the Flora of Iraq: *Anacamptis papilionacea* (L.) R.M. Bateman, Pridgeon & M.W. Chase and *Dactylorhiza romana* (Sebast.) Soó

Sami M.A. Youssef¹,², Honar S. Mahdi¹, Zerevan A. Mergyé¹, Jihad I. Saleem³, Ahmed M.H.M. Mahmood¹ and Errol Véla²

¹Department of Recreation and Ecotourism, College of Agriculture, University of Duhok, Sumail-Duhok 1063 BD, Kurdistan Region – F.R. Iraq
²Botany and Modelling of Plant Architecture and Vegetation (AMAP), Université de Montpellier (CIRAD/CNRS/INRA/IRD, TA A51/PS2), 34398 Montpellier Cedex 5, France
³Department of Horticulture, Akre Technical College, Duhok Polytechnic University, Akre, Kurdistan Region – F.R. Iraq

Abstract—The *Orchidaceae* family is one of the most cosmopolitan flowering families; however, the national floristic knowledge for Iraqi territories is restricted by the outdated and incomplete status of Flora of Iraq. We already recently add two new records of orchid species for Iraq, and the study objective was to pursue the dynamics on field studies and thus provides new contribution for the Flora of Iraq. Two new orchid species were recorded for the first time in Iraq: (i) *Anacamptis papilionacea* found on Silé waterfall locality (Dostaka mountain, Duhok governorate), and (ii) *Dactylorhiza romana* found in Hariké locality (Gara mountain, Duhok governorate). Field illustrations, infraspecific identification (*A. papilionacea* subsp. *schirwanica* and *D. romana* subsp. *georgica*), environment and geographical distribution, conservation status, and a brief discussion about the new records are provided. This study highlights the importance of floristic surveys and their continuity over time as a first step toward the modern floristic knowledge including open databases.

Index Terms—*Anacamptis papilionacea* subsp. *schirwanica*, Biodiversity, *Dactylorhiza romana* subsp. *georgica*, Flora databases floristic, Kurdistan Region.

I. INTRODUCTION

The *Orchidaceae* family has a wide ecological niche range with a center of diversity on tropical rain forest: Almost all orchids occurring in tropical and subtropical are perennial epiphytes (growing with trees and shrubs), whereas grassland and forest are the favorable habitats for terrestrial orchids in the temperate and Mediterranean regions (Arlott, 1978; Dressler, 1993; Ramírez, et al., 2007). As a consequence, *Orchidaceae* is one of the most cosmopolitan and diversified flowering families (about 800 genera with some 20-30,000 taxa) occurring in all territories except real desert and glaciers (Dressler, 1993; Cozzolino and Widmer, 2005; Christenhusz and Byng, 2016). The orchids flower has specific traits that can be recognized easily from other plant species (for example, spectacular specific petal “labellum” often similar to animal shapes, for example, bees, spiders, lizards, and monkey-like; anthers produce large pollen masses “pollinia”). These specific flowers play an important role in pollination by developing a particular life history strategy in response to evolutionary selective pollinator pressure (Adams and Lawson, 1993; Weston, et al., 2005). In terms of ethnobotany, in Eastern Mediterranean countries called “Levant,” the dried underground tubercles of some *Orchis* species often used as a cooking powder by the local people in a hot beverage named “Saleb” or refreshment ice cream named “dondurma” (Kasparek and Grimm, 1999; Kreutz and Çolak, 2009; Löki, et al., 2015). However, it has been reported (Sezik, 2002; Kreutz, 2004; Löki, et al., 2015) that these tubercles collecting activity became threats to *Orchidaceae* family, especially subtribe Orchidinae (*Ophrys, Orchis, Himantoglossum, and Anacamptis*) in the Levant. In Kurdistan Region, the local people (such as in Amadyia and Barwaraya Bala) collect Orchids’ tubercles and then sell the powder to Turkish traders which they in turn sell it in traditional Turkish markets (Véla, et al., 2013; Youssef, et al., 2015).

Although the terrestrial Orchid family is well represented in the Kurdistan Region, as a part of the Flora of Iraq,
due to its Mediterranean and/or Eurasian biogeographical affinities (Wood, 1985; Véla, et al., 2013; Youssef, et al., 2015), the diversity and taxonomical status of these Orchid taxa still far from being updated and achieved: For example, in the recent field guide work of European and Middle-East orchids (Baumann, et al., 2006), only the 13 regional endemism taxa are accurately cited for Kurdistan Region and/or all Northern Iraq but without any explicit geographical distribution mention for each country. At a starting point, in the previous documented works such as Flora of Iranica (Renz, 1978) and Flora of Iraq (Wood, 1985), 20 and 25 taxa are respectively recorded in the Northern Iraq territories. Whereas, according to Govaerts, et al., (2017) which is the recent world checklist, there are 28 orchids species mentioned for Iraq, but deleted or added taxa are not justified due to lacking of bibliographic data. Therefore, this partial floristic knowledge highlights the importance of the continuity of field surveys to update the Flora of Iraq. It demonstrates also the importance of the new floristic paradigm (Heywood, 2002; 2004) as opportunity to provide precise data such as photo-illustrations, ecological niche information, and accurate recording of geographical coordinates for each locality and checking the accepted name. In this context, we have initiated since 2013 a botanical research project mainly based on field surveying to spotlight on the Orchids’ diversity and distribution in Kurdistan Region. In the first floristic survey on Orchidaceae, 10 orchids species had been found in Duhok province including one new record “Ophrys ciliaris” for the Flora of Iraq (Véla, et al., 2013); in the second phase of this project in 2014-2015, another new record “Orchis spitzelii” subsp. latiflora” has been added to the Flora of Iraq, and 8 new orchids taxa have been recorded for Duhok province for the first time which majority of records were new localities and/or rare taxa (Youssef, et al., 2015). Most of these Orchid species are found on the middle mountain zone with a climatic transition between Mediterranean and Irano-Anatolian, confirming the status of Kurdistan Region as a part of the global hotspots for biodiversity (Mittermeier, et al., 2004) but coldspot for floristic knowledge. Although many efforts have been spent in the past years, especially on orchids species, it still needs contributions to enrich the Flora of Iraq. Therefore, the present study aims to fill the gap of floristic field studies about the Flora of Iraq.

II. Materials and Methods

The botanical field surveys were conducted during spring 2016 in diverse locations of Duhok governorate, Kurdistan Region of Iraq. The main botanical field exploration area focused on a tetragon Duhok–Zaxo–Barzan–Kani Massi (former “Ain Nuni” according to the Flora of Iraq) situated on the northern part of Kurdistan Region of Iraq. The diversity landscape’s features of this study area are characterized by a mixture of hills, cultivated plains, deep valleys, and mountain chains which are generally extending from West to East. The two fundamental areas deeply investigated are those in Hariké locality on Gara Mountain, Diralok province, and Silé waterfall locality on Dostaka Mountain, Akré province (Fig. 1).

The taxonomical identification of Orchid species was carried out by the help of illustration photos. Initially, the identification process followed Wood (1985) and then was systematically verified according to Flora of Iran (Renz, 1978) and Turkey (Renz and Taubenheim, 1984); The Orchid works of Kreutz (1998), Kreutz and Çolak (2009), and Baumann, et al. (2006) have been used for systematic verification species/subspecies status. For the genus Anacamptis, the recent monograph of Kretzschmar, et al. (2007) was used, and for the group of Dactylorhiza romana, the revision of Pedersen (2006) utilized.

III. Results

The present study deals with two new records of Orchid species for the Flora of Iraq, found in two different sites thanks to the botanical field survey season in 2016. The first one is A. papilionacea discovered on Silé waterfall locality (Dinarta area, Dostaka mountain, Duhok governorate), and the second is D. romana found on Hariké locality (Gara mountain, Duhok governorate). These two species are considered new records for the Flora of Iraq because of they were never mentioned under any of their synonyms in any previous floristic literatures, that is, Renz (1978), Wood (1985), Kretzschmar, et al. (2007), Baumann, et al. (2006), and Govaerts, et al. (2017).

To accommodate a complete vision about the actual status of these two newly recorded species, we have provided and discussed in details our field data and all recent published researches about these two species : Taxonomical, nomenclatural, biological and ecological data (i.e. accepted scientific name, synonyms, infraspecific identification, ecological niche, population size, geographical distribution, and conservation status) thanks to our field data and also all recent published researches about these two Orchid species.


[Image 359x97 to 520x273]

Fig. 1. Location of Orchid sites: Silé waterfall on Dostaka Mountain, Diralok province for Anacamptis papilionacea subsp. schirwanica (lozenge); and Hariké on Gara Mountain, Akré province for Dactylorhiza romana subsp. georgica (star), Kurdistan Region of Iraq.
Fig. 2. Anacamptis papilionacea subsp. schirwanica; (a) Habitat, Silé waterfall locality, south aspect of Dostaka mountain, Akré province (Duhok governorate) Pseudosteppe grassland habitats in middle open Gall oak forest. (b) Habit. (c) Inflorescence. 09 April, 2016. (photos Sami Youssef).
F. Conservation Status

In Silé waterfall locality, the researchers found only one small population with a few disperses individuals (<20) occupied a small surface area (<1 hectare). This location is threatened by high anthropogenic activities: It is frequented by a high number of tourists due to its famous and wonderful waterfall. Furthermore, this region is internationally well known by the over-collecting of the “Zebaria sumac fruit” (R. coriaria var. zebaria) used in divers traditional Kurdish dishes (Shahbaz, et al., 2015). The over-harvesting of the others wild edible plants (such as Gundelia sp., Allium sp., Arum sp., Echium sp., and Rheum sp.) leads to the degradation of many natural habitats. Consequently, this rare species needs an urgent planning strategy for biological conservation by regional Kurdish authorities.


A. Type


B. General Specific Description

It is a robust tuberous plant (15-40 cm high). With Basal leaves lanceolate or narrowly obovate, up to 18 cm long; Inflorescence cylindrical densely flowered; bracts clear bright green, lanceolate, exceeding the flowers; Flowers mainly or only yellow color, rather small; labellum usually longer than broad, to 8 mm broad, shortly 3-lobed toward the apex; Spur narrowly cylindrical, horizontal, or slightly turned upward, slightly ascending, usually shorter than the ovary, around 1.5 longer than the lip.

C. Infraspecific Identification (Fig. 3)

D. romana with both subspecies georgica and romana has been highlighted their occurrence in Turkey territories (Renz and Taubenheim, 1984), whereas only D. romana subsp. georgica had been reported for Iranian territories (Renz, 1978). These two subspecies have never been reported in Kurdistan Region and Iraqi territories (Renz, 1978; Renz and Taubenheim, 1984; Wood, 1985; Kreutz, 1998; Delforge, 2005; Govaerts, et al., 2017). During our botanical field survey in 2016, the researchers found some specimen of D. romana for the first time in Hariké locality (Gara Mountain). About the taxonomical identification, we it can be confirm the D. romana subsp. georgica characterized by its rather small flowers mainly or only yellow color, and its shorter spur around 1.5 longer than the lip (Renz and Taubenheim, 1984; Delforge, 2005). Thus, it is a new record for the Flora of Iraq. Its occurrence in Kurdistan Region of Iraq is not really surprising because already known from Golistan and Azerbaijan provinces in Northwest and North of Iran (Renz, 1978) and even more from Siirt and Bitlis provinces in Southeast of Turkey (Renz and Taubenheim, 1984; Kreutz, 1998) not far from Kurdistan Region border.

D. Material Examined

Four individuals were collected directly from field (Hariké locality, Diarlok province), and one of them was cultivated in Montpellier (South-Eastern France). Date of collection 16/04/2016; Collector Mr. Zerevan Mergye and Dr. Sami Youssef.

E. Environment and Geographical Distribution

This species has been found at Hariké locality (37°01'20.97” N, 43°40'59.21” E) northern slope of Gara Mountain, Diarlok province, Kurdistan Region of Iraq. It has been found in open habitat at more or less 969 m a.s.l. dominated by herbaceous vegetation community marked frequently by the occurrence of diverse dwarf shrub (for example, Daphne acuminata, Lonicera arborea, and Astragalus sp.). It is just situated on the margin of Lebanon Oak (Quercus libani) forest zone on a secondary crest with northern exposure. It grows on relatively deep soil with a sufficient water supply in spring. The local climate is globally the same than previously described, but the topoecology is
characterized by a shadow winter with a persistent snow (at least 1 or 2 months) and a cooler spring and summer.

F. Conservation Status

The observed population comprises only few individuals (<20) in a small surface of much less than one hectare. Consequently, the study can confirm that D. romana subsp. Georgica is a rare species in locations (only one at Iraq level), occupied surface area and size of population. Furthermore, this location could be potentially threatened by traditional harvesting of the edible plants. Particularly, the real threat is concerning collecting of the tuberous testicles of Orchid species (for example, Orchis mascula and Orchis anatolica) by local people to sell it on traditional markets that will be used after made “Saleb” and ice cream “dondurma” in Turkey. By chance, as far as researchers know, this yellow-flowered Dactylorhiza is not collected probably because ignoring their identical properties.

IV. DISCUSSION

A. Flowers Field Surveys as a Proxy Toward the New Floristic Paradigm

The floristic surveys as an old scientific concept remain the basic foundation for describing the plant biodiversity of an area and our ability to communicate about them (Heywood, 2001; 2002). It has always received considerable attention from botanists and evolutionary systematists. However, the “new floristic paradigm” emerged in the recent year is characterized by satisfaction of a wide range of users “taxonomists,” high quality outputs data, and accessibility and consistent in its methods and procedures (Heywood, 2002; 2004). This revolution development has actively participated to identify the biological conservation priorities in the megadiverse countries (Heywood, 2004; Victor, et al., 2015). From this new paradigm standpoint, the necessity of completing floristic inventories has become an evident key player to update permanently the existent floras. In this context, the Flora of Iraq, thus far, remains the basic foundation for the plant biodiversity description and to communicate about it. Despite the formidable floristic inventories of the past century (Townsend and Guest, 1966-1985), the status of the Flora of Iraq is outdated and incomplete, and it can be designated as a hotspot of biodiversity but coldspot of knowledge. The main reason for the nonachievement of this flora could be resumed by the chronic instability of the political situation. This has been aggravated by some scientific-personal interest changes in Iraq allowed to unaccomplished the mission of publication the remaining parts (volumes 6 and 7) of the Flora of Iraq (Ghazanfar and McDaniel, 2016). The strong lack in taxonomists and/or naturalists or they lack of autonomy on the field cannot allow filling the gaps of floristic data on unexplored area such as lot of the local mountains (Barzan area, Barwarya Bala, and Nerwayé areas near Turkish border). However, some important advances have been made in the past decade insight of new contribution to the Flora of Iraq. For example, divers botanical field surveys carried out and reported several new taxa and new records for Iraq (National Report on Biodiversity in Iraq, 2010; Ahmad, 2013; Véla, et al., 2013; Shahbaz, et al., 2015; Youssef, et al., 2015; Ahmad, 2016; Youssef, et al., 2017). Meanwhile, a lot of taxa remain to be discovered, which is not surprising in view of its geographical situation as a part of Irano-Anatolian hotspot of biodiversity. In regard to this particular situation, the Flora of Iraq needs an urgent completing floristic inventories to provide adequate continual updating data, and gigantic efforts should be realized to modernize the flora toward the new paradigm. In this context, the present study attributes these new data as a continuity of the updating floristic works on Orchid species list occurring in Kurdistan Region (Véla, et al., 2013; Youssef, et al., 2015) and also updating their nomenclature status (accepted names, synonyms…). In contrast, this floristic field surveys contribute to highlight the urgent need to a national program strategies for biodiversity conservation, which will play an important role to find a suitable balance between biodiversity management and decreasing the influence of the increasing anthropogenic activities (for example, over-collecting edible plants).

In this botanical field survey on Orchid species, there were two new records of Orchid species for the Flora of Iraq, which was not highlighted previously (Véla, et al., 2013; Youssef, et al., 2015). In this study, both taxa are considered as very rare species, and their localities are under real or potential threat by the increasing anthropogenic activities. To take advantage of this situation thus, the researchers could organize themselves effectively to play a key role in influencing the decision-making “governments” about the urgent biological conservation priorities.

ACKNOWLEDGMENT

The authors would like to express their deepest gratitude to the University of Duhok for supporting the botanical exploration.

REFERENCES


