

## CWR OF GRAIN LEGUMES IN BULGARIA

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### Abstract

This paper presents information from the first phase of Bulgarian and international *in situ* conservation of grain legumes CWR projects. An expedition investigation has been carried out in regions indicated in the flora of Bulgaria as well as other preliminary studies. Description of several species localities has been carried out in Strandzha Mountain and Kaliakra Natural Reserve - North Black Sea region, which during the past years of species, belonging to the group of rare species in Bulgaria: *Pisum elatius* L., *Cicer monbretii*, *Lupinus albus* and *Vicia incisa*. The number of population and concomitant species have been defined. Seed material for *ex situ* collection has also been collected. It has been found, that the main limiting factors for disturbing condition of natural habitat are the invasive plant species and some socio-economic reasons. We consider it is necessary to undertake a profound analysis for the situation of preserving the CWR in Bulgaria and to coordinate this activity with all scientific centers and institutions. It is imperative to prepare an action plan and monitoring.

**Keywords:** Grain legumes, CWR, *in situ* conservation, *ex situ* collection, Action plan, Monitoring.

### Introduction

Crops wild relatives are of particular importance to ensure food security, human health and to preserve the biodiversity in Bulgarian flora. They are impeccable source of diverse genetic material for the breeding process. The wild relatives utilization is especially important today. Due to the introduction of modern and monoculture varieties the diversity of wild relatives decreased considerably. The *in situ* conservation has an important role for the preservation of natural resources common policy. The *in situ* method completes *ex situ* preservation system. This method is effective for all species in their natural habitats.

The lack of capacity, including the absence of effective operational framework and national plan to deal specifically with the conservation of crop wild relatives has been identified as a significant obstacle for their conservation and use.

The purpose of this paper is to develop action plan for *in situ* conservation of grain legumes- *Cicer monbretii*, *Pisum elatius*, *L. albus*.

Routes based on the flora in Bulgaria and preliminary studies carried out by Bulgarian scientists were developed (Mihov *et. al.*, 2001) with the goal to confirm and establish natural habitats of several species grain legumes wild relatives (*The Bulgarian flora, The Red Book of Bulgaria*). The altitude of localities, size of the population and concomitant species is registered. This research is result from the implementation of national and international projects. A number of botanic expeditions are undertaken to the following routes:

*Cicer monbretii*– Strandzha Nature Park

Kosti village

Road to Gramatikovo village– Malko Turnovo– Ahtopol– Brodilovo village

Malko Turnovo– Mishkova niva and Indipaskha localitie

Along Veleka River

*Lupinus albus*– Strandzha Natural Park

Golyam Pazvlak locality situated in Varvara village  
*Pisum elatius*– Northern Black sea coast  
Kaliakra Archaeological Reserve  
Yaylata Archaeological Reserve

### Materials and methods

The research to the above mentioned areas has been conducted in 2006 -2016.

An expedition investigation has been carried out in regions indicated in the flora of Bulgaria as well as other preliminary studies. Description of several species localities has been carried out in Strandzha Mountain and Kaliakra Natural Reserve - North Black Sea region, which during the past years of species, belonging to the group of rare species in Bulgaria: *Pisum elatius* L., *Cicer monbretii*, *Lupinus albus* and *Vicia incisa*. The number of population sand concomitant species have been defined. Seed material for *ex situ* collection has also been collected.

### Results and Discussion

1. *Cicer monbretii* is growing in localities in Strandzha Natural Park in an altitude up to 300 m



**Important morphological features:** A perennial, herbaceous plant with up right stem up to 80 cm high. Compound and non-pinnate leaves. The leaves are broad, elliptical, ovate, sharp toothed. The flowers are from 2 to 5, rarely single, in a loose grape-like in florescences in the axil. The banner is ovate, white. Wings are ovoid elliptic a land white. The keelis white with a purple spot. The pod is smooth, broad, oblong, brown, three-fourseminal. The seeds are round, brown or black. Depending on climatic factors the wild chickpea blossoms in the third ten days of May and ripens at the end of June / early July.

The first confirmed habitat of *Cicer monbretii* is on the road to Gramatikovo village– Malko Turnovo and has been registered by Miho Mihov in 2001. Our team discovered and marked habitats on the road to Ahtopol– Brodilovo village in 2010. The two habitats represent a group of plants or a single plant, situated not far from one another, close to the highway. Larger habitats of wild chickpea have been identified in Mishkova niva and Indipaskha localities during joint expeditions with Belgian colleagues held in 2012 and 2014. The habitats grow in proximity to oak forest on cinnamon forest soil. We observed a bigger plant groups occupying an area of 15 – 20 m<sup>2</sup>. Although the density is not great, the plant condition is good. Predominant are the species of the families *Poacea* and *Vicia ssp*. The species growing along the streets are vulnerable to road reconstruction and expansion, while these situated in proximity to the forests by sanitation cut, timber industry, excessive tourist impact

are less vulnerable. Seeds from *Cicer monbretii* are collected and multiple growing field trials (*ex situ*) are carried out. All of them failed.

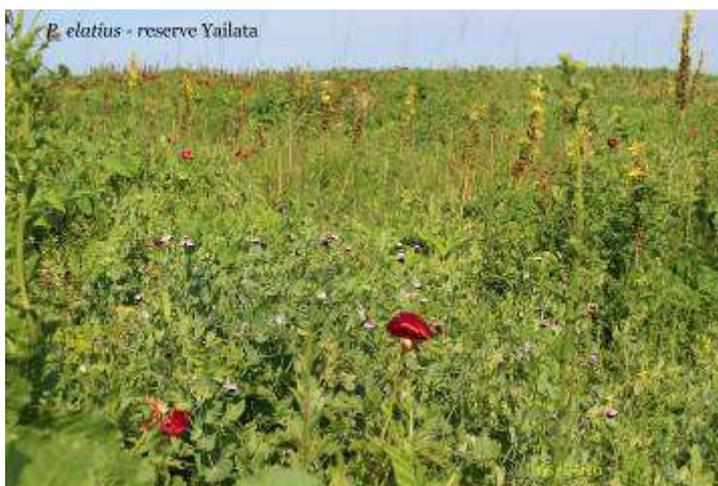
2. *Lupinus albus*. According to preliminary data of Strandzha Nature Park. Management Plan, the species is determined in Golyam Pazvlak locality at an altitude of 70 m-80 m. The locality is rocky with a slight slope.



Important morphological features: The stem is high, stright, branched, covered with white hairs. The leaves are palmated. The petals are pointed, back ovoid et the top, blunted. The stipules are long, soft, partially grown with the handle. The flowers are consistently located, with white color. The pods are oblong, fibrous, pinched with 4-6 seeds. The seeds are flattened, white or lightye llow, smooth, matt.

During the several investigations carried out by our team was discovered that the condition of *white lupin* population is good and it is not threatened by human activity. Natural disasters and erosion are considered as hazards. *Lupinus albus* is represented by single and small group of plants occupying an area of 1000 m<sup>2</sup> at distance varying from 10 m. to 15 m. As concomitant species is determined only *Aegilops*, because the research period coincided with the ripening phase of *white lupin*, while the other species have completed this phase. The habitat of *Lupinus albus* is markedfor *in situ* conservationand is a subject to deeper study to include it in *ex situ* collection.

3 *Pisum elatius*. During participation in within a project for Development of Management Plan for Kaliakra cape (situated in an altitude of 56 m.) the team has identified the species in 2000 – 2002. A joint expedition with French scientists and our registered organization for conservation of crop wild relatives and old indigenous varieties in 2016 confirmed that *Pisum elatius* grow in Kaliakra cape and is identified in Yaylata Archaeological Reserve (at altitude of 25 m).



Important morphological features: The stems are semi-upright or semi-lodged, slightly branchy, nude. The stipules are ovate and elliptical. Compound leaf with three double leaves, elliptic terminal flower with tendrils. The inflorescence has one –two petals. The small glass is nude. The corolla is purple, elliptic prolong. Wings are elliptic, round. The pod is wide, linear, yellow or brown. The seeds are round, black or dark brown.

The habitat of wild pea growing in Kaliakra cape consists of single plants spread on several areas, while the one on Yailata Archaeological Reserve the wild pea population is bigger, situated on an area with a length of 210 m. - 215 m and grown on larger areas. The condition of the populations is good. Concomitant species are from the family of *Poacea*, *Vicia ssp*, *Lathyrus ssp*. There is nearby large habitat of red *Paeonia peregrina*. We consider as danger of species destruction the climate, erosion as well as incorrect mowing forecast against invasive plants in the Reserve. We collected seeds and conducted multiple growing field experiments (*ex situ*). All of them failed. The long term conservation of crop wild relatives should be national policy supported by the European Union institutions.

### Conclusion

The conservation of grain legumes CWR has largely been neglected, due to the exclusion of the agencies responsible for the conservation of plant genetic resources for food and agriculture and those responsible for the conservation of wild plant populations in general or the habitats they grow. The annual monitoring performed at suitable vegetation periods and as well as the support from national bodies will allow long-term *in situ* conservation.

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