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Capturing Brassica Wild Relatives Diversity in the South-Eastern Europe



Capturing Brassica Wild Relatives Diversity in Ionian coast of Vlorë and Sazan island, Albania

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***Brassica* wild relatives in Ionian coast of Vlora and Sazani island, Albania**

The Exploration and conservation of the genetic diversity is fundamental to food security and the provision of raw materials and it is best preserved within plants' natural habitats.

According to authors (Iriundo J, Maxted N and Dulloo M E, 2008) it is particularly true for wild plants that are directly related to crop species and can play a key role in providing beneficial traits, such as pest or disease resistance and yield improvement.

These CWR are presently threatened due to processes of habitat destruction.



***Brassica* wild relatives in Ionian coast of Vlorë and Sazan island, Albania**

The habitats of *Brassica* wild relatives in Albania, as and in many other countries, are endangered by climatic changes, overgrazing and human activities.

They grow mostly on cliffs by the coast and more or less rocky terrains near the coast and therefore threatened by enlargement of urban area and infrastructure projects particularly for touristic purpose.

Summer fires as a consequence of long drought period are often in these areas.



***Brassica* sp – Species according to the Albanian flora list**

- *Brassica incana* Ten.(Red List VU A1b) Balkan sub - endemic;
- *Brassica cretica* Lam. (Sub – endemic);
- *Brassica oleracea* L.
- *Brassica nigra* (L.)Koch.
- *Brassica rapa* L.
- *Brassica napus* L. var. *oleifera* DC.
- *Brassica juncea* (L.)Czern



***Brassica cretica* Lam**



***Brassica incana* Ten**

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- **The International Union for Conservation of Nature (IUCN) has declared two species of cabbage (*Brassica cretica* Lam and *Brassica incana* Ten) endangered and has included them in the red book (2013).**
- ***Brassica incana* Ten has been assessed with data deficiency**, as there is not enough information for its assessment.
- ***Brassica incana* Ten is listed as critically endangered in Albania** (in the Albanian Red Book it has been declared since 1995 (Vangjeli, et al, 1995).
- Meanwhile, as for the other species, that of ***Brasica cretica* Lam**, in the European Flora: Vegetables; Author: Phillips. R. & Rix. M .; Publisher: Macmillan Reference Books, London, 1995: ***Brasica cretica* Lam**, it is noted that it is a polymorphic species, closely related to wild cabbage, ***Brassica oleracea***. **The above publication quotes that it is located in the coastal regions of Greece, Turkey, Syria and the Greek Islands, but surprisingly in that list is not mentioned whether or not it is located in Albania.**

The aim of the study:

The aim of this contribution is to explore, find, monitor and collect endangered wild relatives of *Brassica* (*Brassica cretica* Lam and *Brassica incana* Ten), which grow in several hearths of the Ionian coastal area and which are endangered by livestock and numerous construction for tourist purposes.

The primary goal was to contribute to the knowledge on the presence, distribution and biodiversity status of *Brassica* wild relatives in Albania, as well as to fill the gaps of wild *Brassica* sp in the National Genetic Bank.



Material and methods:

During 2019-2021, **9 field missions have been undertaken**, in some areas of the Ionian coast of Vlorë and on the island of Sazan (23 polygons surveyed), **for the situation, assessment of vegetation and habitats, and further for collection of seed samples** of: *B. cretica* and *B. incana*.

- For **gathering information about the characters and the location of these species**, we had previously worked with the literature of the country and foreign authors, who have studied these species in the Mediterranean Basin.
- **A good source of information was the "memory bank" of the old inhabitants**, even of much interest was the **memory of the shepherds**.
- **Most of the populations already known were visited and many other possible areas were explored in search for new sites.**



- As the terrain was difficult, **the working group was supported with the necessary tools and equipment**, such as boats, drones, off road cars and professional cameras **by OAA and the Regional Agency of Protected Areas, Vlorë**.
- More details on our sampling strategies and use of exploration tools (e.g. GPS and GIS systems) are reported elsewhere (Hammer et al., 1991; Laghetti et al., 1998; Perrino et al., 1981).
- Samples were identified in the field, **based on morphological characters**;
- During the ripening period, **seed samples were collected from most populations**;
- Mature siliques were collected from individual plants and **kept separately in cotton bags**.
- **The size of the populations was estimated**, distinguishing vegetative and reproductive plants, as well as human and livestock accessibility.

Results:

A precise evaluation of whether our explorations have been sufficiently exhaustive to cover the intended coastal areas **is not easy**, but it seems obvious that the overall picture of the geographical distribution of wild *Brassica* sp in Ionian coast of Vlora is now rather satisfactory. Though it is believed that some additional populations could certainly be found in the future, this is not very likely.

A complete list of known wild *Brassica* populations at the end of our fieldwork is shown in Table 1.

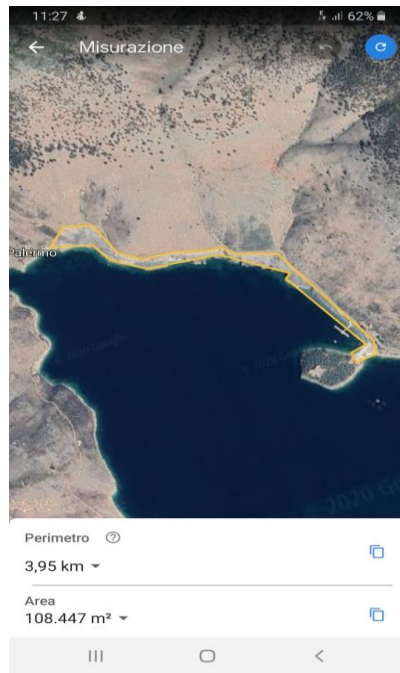
Previously recorded populations are referred to the literature below the table (Paparisto & Qosja 1976; Barina, Pifkó & Pintér, 2011), while newly found populations (Jani et al 2019-2021) are marked “new”. Table 1 also includes data on the position, estimated number of plants and their accessibility.

Their geographic position is shown in the maps of Figures below.

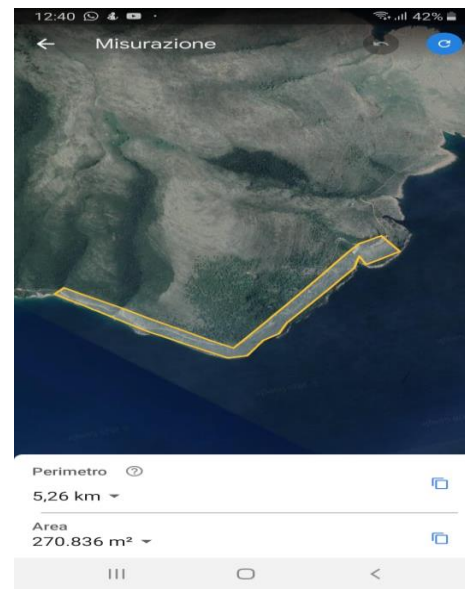
The travel target areas were the Ionian coast of Vlora and Himarë, and the Sazan island; 2019-2021



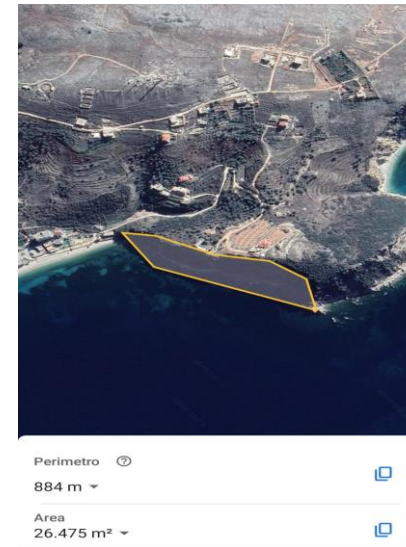
Karaburun



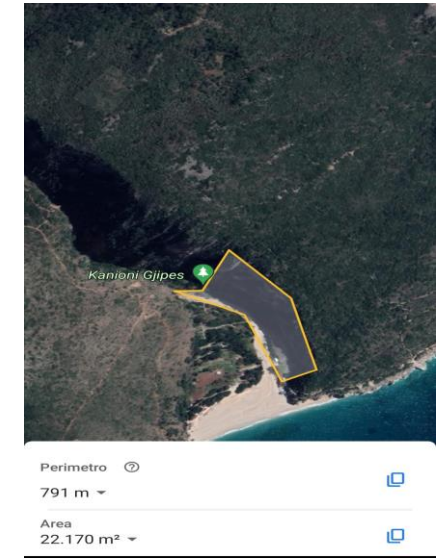
Porto Palermo



Karaburun



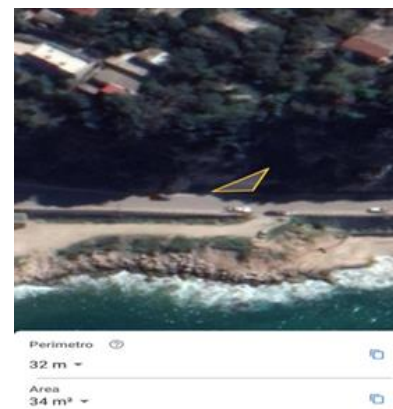
Himare



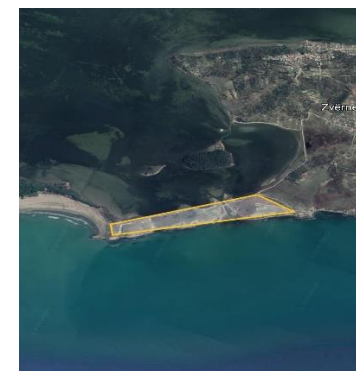
Gjipe



Gjiri i Vlores



Uji I Ftohte



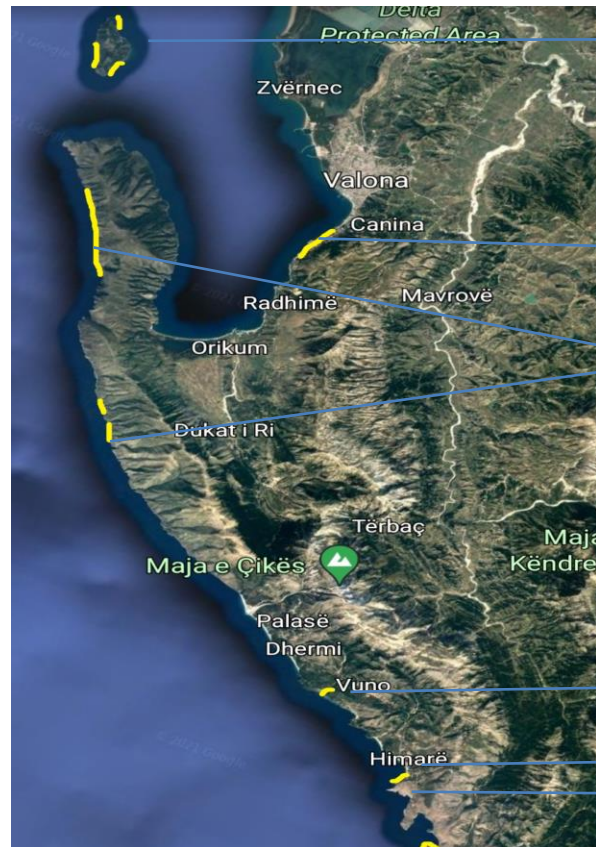
Kodrat e Zvernecit



Sazan Island

Brassica wild relatives in Ionian coast of Vlora and Sazani island, Albania

Map of sites we found *Brassica* species :



Island of Sazani - *B. cretica*

Vlore (Tunnel- Kala) - *B. cretica*

Karaburun Peninsula - *B. cretica*

Kanion i Gjipese - *B. incana*,

Seaport of Himara – *B. juncea* (L.) Czern.

Potam Himare - *B. incana*

Porto Palermo - *B. cretica*

Table 1. Observed polygons and those where *Brassica* sp. plants were found, and seed samples collected

Sites / Polygons and its local name	Coordinates	Altitude(H), m / msl	Surface of polygon, m ²	Years and No. of plants found			Accessibility
				1975 (*)	2010 (**)	New-2019-2021 (***)	
South Zver nec/ Kodrat molasike	40.300237; 19.213032	0-40	6160			No	
North Zver nec / Portonove	40.311642; 19.231126	0-40	8260			No	
Homegarden, Skele, Vlorë	40.272965; 19.293034	3,5	12			10 plants (to be identified)	A
Vlorë , Tunneli	40.421485; 19.488230	18	440			12 plants	B
Vlorë, Ujë i Ftohtë	40.421293; 19.487295	16	210			8 plants	C
Vlorë, Resort Marina Bay	40.415465; 19.482669	19	45			12 plants	B
Vlorë, Bar-Restaurant “Kala”	40.412923; 19.480489	12	34			10 plants	D
Radhimë / Over the road	40.412221; 19.481160	14	340			18 plants	B
Radhimë/ Jonufër/Ex camping of youth	40.240523; 19.284835	8	160	Yes	Yes	No	
Karaburun / Pashaliman-Zhapovel	40.200454; 19.245848	0-50	927795			No	
Karaburun / Shen Jan –Shpella e Haxhialiut	40.224962; 19.240543	0-50	270 836			No	
Karaburun / (South) / Gjiri i Brisanit	40.192435; 19.212056	0-40	650			No	
Karaburun /North/Orikum	40,193006; 19.281468	0-40	692			No	
Karaburuni/Alican - Gjiri Bristanit)	40.315463; 19.379214	14-18	4678			1-2 plants/100m/ not collect	D
Sazan Island – South side	40.480726; 19.286550	18	6728			30-40 plants/100 m ²	B
Sazan Island- North side	40.506662; 19.276134	9	3936			30-40 plants/100 m ²	B
Porto Palermo /South / Gjiri	40.254938; 19.195964	0-80	270836			No	
Porto Palermo /South/ Tuneli	40.034387; 19.465335	0-20	108447			No	
Porto Palermo /North/ Shpella	40.041836; 19.465345	0-20	10240		Yes	No	
Porto Palermo /Rock	40.051141; 19.792803	20-30	6400			30 plants/Not collected	D
Gjiri i Gjipesë	40.128361; 19.672164	15-25	14600	Yes	Yes	18 plants/Not collected	C
Himarë/Potam beach	40.089685; 19.752504 40.088730; 19.750805	8-40	601			28 plants	A/B
Himarë, Seaport	40.060386; 19.442845	8	130			4 plants	A

Years: *)Paparisto & Qosja 1976; **)Barina, Pifkó & Pintér , 2011; ***) Jani et al 2019-2021; Accessibility: A. The entire population or up to 80% of the plants are accessible; B. Between 20% and 80% and C. Less than 20% accessible; D. The entire population is inaccessible unless special equipment is used.

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Evaluation:

- On the whole, **the conservation status** of wild *Brassica* in Ionian coast of Vlora **is rather satisfactory due to the inaccessibility of most populations.**

- **However, the possibility of extinction for some small populations remains open;** As you saw in the table 1 :
 - a small population in **the ex-camping of youths**, explored in 1975 by an Albanian mission (Paparisto & Qosja, 1976) and evidenced again in 2007 by a Hungarian mission (Barina, Pifkó & Pintér, 2011), it was no longer found in 2020 by our mission.
 - **Not even the small population**, explored by the Hungarian mission in 2010, **was found** on the maritime limestone rock wall near **the cave in Porto Palermo.**

 - Even a small population explored by our mission in 2019 near "**Bar Kalaja**", was seriously damaged in 2020 by the gardeners of the resort.

- **Some other populations at risk owing to their tiny size are: Vlorë/Tunnel; Skele Homegarden, and Seaport of Himara.**

- **The number of individuals in some other populations** such as the **Vlorë/Ujë i Ftohtë** **has been observed to decrease drastically.**

- **Meanwhile, some other populations have been created**, such as in **Porto Palermo, Karaburun and Sazan** , but the risk of their damage by livestock is high.

Brassica wild relatives in Ionian coast of Vlora and Sazani island, Albania



Habitat:

- **Preferred substrates are limestone** – or sometimes quartzite – **rocks forming the cliffs** but occasional plants can also be observed on gravel or sand .
- They prefer the orientation: Western, more often SW or even Southern rarely northwestern;
- These plants are available in gulfs, beach sides or mountain river mouths.
- They are usually absent in areas of dense shrubby vegetation but **often present when shrubs are sparser** or in grassy slopes.

The most common accompanying plants were the following: *Aurinia saxatilis*; *Brachypodium rupestre* ; *Campanula versicolor* ; *Crithmum maritimum*, *Cymbalaria muralis*, *Daucus gummifer*, *Mediterranean maquis*, *Urginea maritima*, etc.



Collection of seed samples and *ex-situ* and *in-situ* conservation.

- **The collected seed samples were included in the fund** of the Basic Collection of the Albanian Genetic Bank, for **long-term storage**.
- **The size of seed samples varied** depending on the number of plants present, their individual development and their accessibility.
- **Four localities remained uncollected because they proved to be practically inaccessible.** In fact, most other populations were inaccessible as a whole but often had parts that could somehow be reached.
- Meanwhile, in the spring of 2021, in Dukat (Karaburun) began the preparation of seedlings for the recovering of damaged *Brassica* populations, and in-situ conservation activity.

Conclusions and some suggestions for the future

- These species are generally found in small populations, fragmented, with few plants and distributed in a narrow territory.
- In Ionian coast of Albania, the conservation status of wild *Brassica sp* is rather satisfactory due to the inaccessibility of most populations.
- The habitats of *Brassica* wild relatives in Albania, as and in many other countries, are endangered by climatic changes , overgrazing and human activities.

For the future:

- In-depth knowledge and analysis of the situation of species, accompanied by their genetic analysis.
- Annual monitoring of *Brassica* wild relatives populations;
- Establishing field/greenhouse collection(s) of conserved CWRs populations and their regeneration ;
- The re-covering of damaged *Brassica* populations, and in-situ conservation.
- Selection and multiplication of accessions for inclusion in AEGIS ;



**Thank you
for
your attention**

