IDENTIFYING BIODIVERSITY-RELATED SUCCESS FACTORS OF ECOLOGICAL RESTORATION PROJECTS

[1] Rhea Kahale, [1] Lilianne BouKhdoud, [1] Carole Saliba, [1] Christina El Habr, [2]Tony Chahine [1,2] Magda Bou Dagher Kharrat

[1] : *Université Saint-Joseph* | [2]*Jouzour Loubnan Association*

Background

Ecosystem degradation leads to habitat loss which is one of the most important cause of species extinction. Our study focuses on determining biodiversity-related success factors in ecological restoration of high-altitude forests in Lebanon. The region of Kfardebian is located in the Mount Lebanon range at an altitude of 2000 m known. The area was subject to a grazing disturbance over the past decades that has altered its species composition and soil depletion.

Approach

Among numerous factors contributing to the success of ecological restoration, we will present here the **effect of fencing (individual / global) on the biodiversity** of a restored site and explore the **role of animal wildlife on seed dispersal and herbivory** affecting the long-term sustainability of the restoration project. A noninvasive sampling method combined with genetic analysis of scats is applied to explore animal diet.

1. Role of fencing in Ecological Restoration (ER)

Individual fencing

Pros	Cons
Favorable micro-environment for the planted trees;	The Fence must be replaced when the trees grow;
Creates microhabitats for nesting birds;	Forest ecosystem will take longer to recover
Less irrigation needed;	
Reduces fire risk;	
Reduces constraints with shepherds.	

Global fencing

Pros	Cons
Protects the site's biodiversity;	Needs yearly maintenance;
Enhances soil quality;	Constraints with shepherds.
Enables natural regeneration	

2. Role of animal component in ER

	Animals	Scats	Seeds
ARTIODACTYLA	*S. scrofa*		*Sorbus sp.*
CARNIVORA	*C. aureus*		*Vitis vinifera*, *Prunus ursina*
CARNIVORA	*C. lupus*		*Pyrus syriaca*
CARNIVORA	*M. foina*		*Rosa canina*
CARNIVORA	*V. vulpes*		*Rhamnus cathartica*
LAGOMORPHA	*L. capensis*		*Prunus sp.*

1 cm   1 cm

The information needed to study the diets of animals can be found hidden in their scat which contains not only the animal's DNA, but also the species it has consumed. The DNA sequences obtained from such material are identified by comparison to a reference library of animals and plants of the Eastern Mediterranean countries.

Winter — *Rosa glutinosa*
Spring — *Ribes orientale*
Summer — *Prunus prostrata*
Spring — *Cotoneaster nummularius*
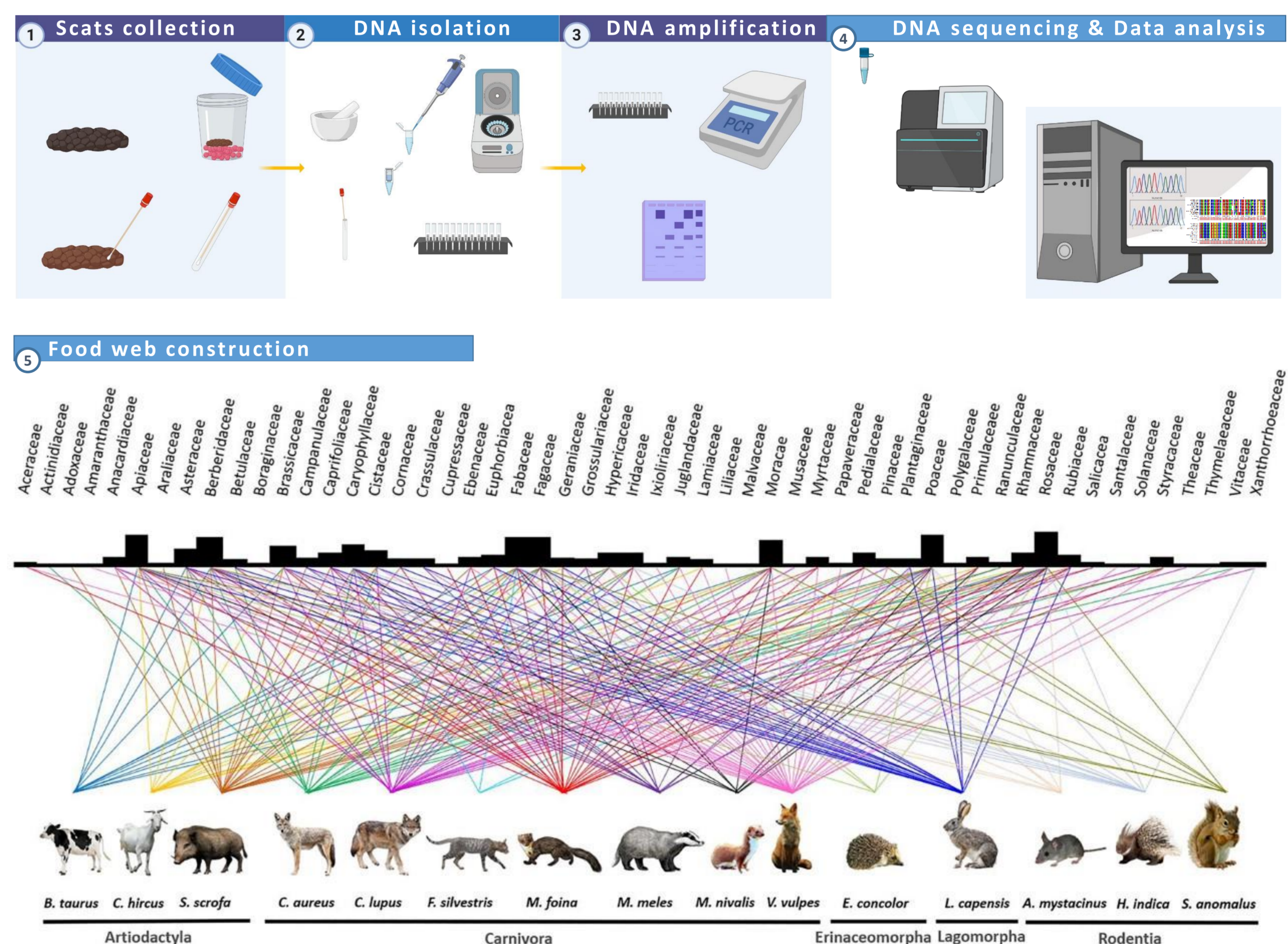Winter — *Juniperus excelsa*

Canis lupus
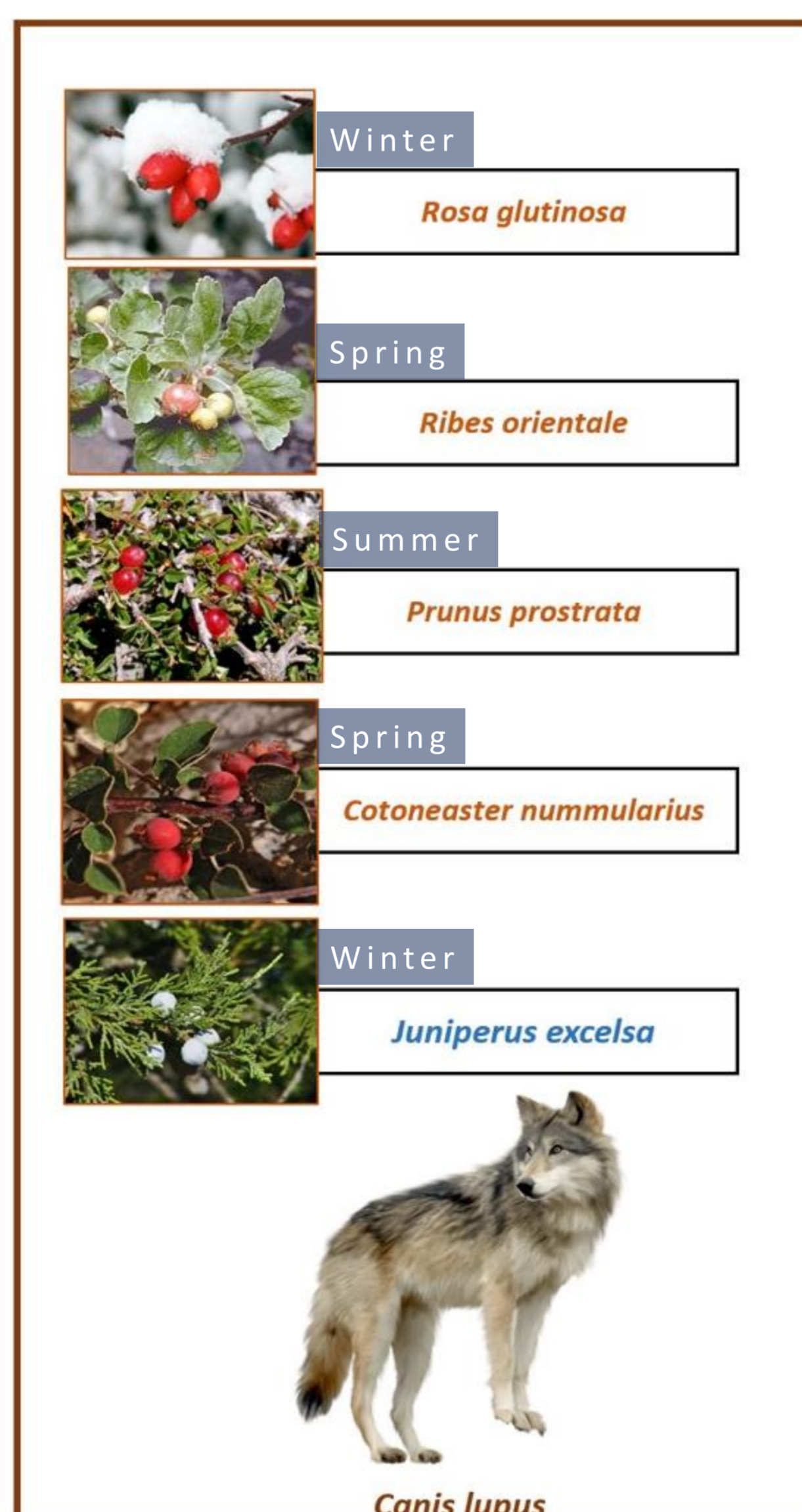
A total of 18 vertebrate species were recorded and information about their diet were obtained. Many of these animal species are endemic for the region and/or threatened especially in Lebanon.
The native plant species that we identified as commonly consumed by mammals in this study should be considered for reforestation and ecological restoration projects, especially Rosaceae and Fagaceae trees.
Planting these species will help to attract wildlife to Lebanese forests and to preserve Mediterranean biodiversity.

Role of animal component in ER

1 Scats collection   2 DNA isolation   3 DNA amplification   4 DNA sequencing & Data analysis

5 Food web construction

Recommandation

❑ In presence of grazing, global fencing of « restoration islands » should be privileged over individual fencing.
❑ Use a diversity of plant species in ecosystem restoration that animal species can feed on all year long.

This work supports the dogma of restoration ecology, that a variety of native species should be planted in order to promote and preserve a rich wildlife.

Références:
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