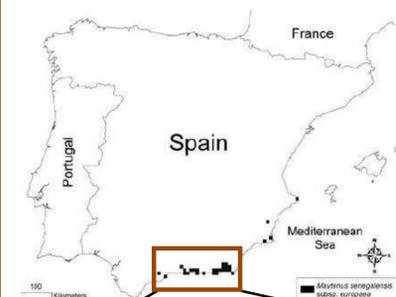


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## INTRODUCTION



*Maytenus senegalensis* subsp. *europaea* (Boiss.) Rivas Mart. ex Güemes & M. B. Crespo, belongs to the Celastraceae family. It is a very thorny deciduous shrub, capable of growing up to three meters. It is present in the Iberian peninsula from Cabo de la Nao (Alicante) to Málaga and from sea level up to 600 m above in Sierra de Nerja (Mendoza-Fernández *et al.* 2015).

*Europaea* subspecies differs from the *senegalensis* subspecies both in adaptations to the arid Mediterranean climate and genetic diversity, which yields a high variability population. *M. senegalensis* fosters high biodiversity and by protecting this species, many other species could be preserved as well.

Even so, *M. senegalensis* subsp. *europaea* has suffered steep habitat loss due to the increase of greenhouse agriculture and the introduction of *Agave* spp. since 1957 (Mota *et al.*, 1996). In 2011 has lost 43,34% of total habitat compared to that in 1957.

Figure 1. *Maytenus senegalensis* subsp. *europaea* distribution in the SE of Spain 10x10 km UTM grid (Mendoza-Fernandez *et al.*, 2015).

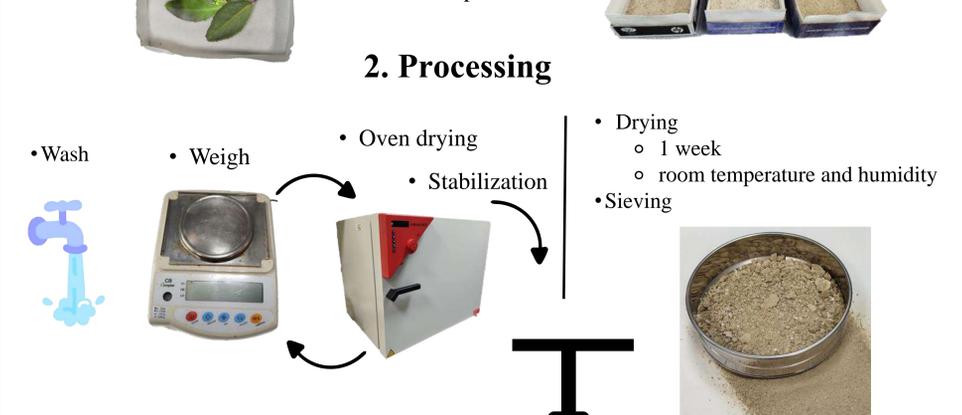
## MATERIALS AND METHODS



Figure 2. Populations of *Maytenus senegalensis* subsp. *europaea* sampled. PIZ = Pizarra (Málaga), TOR = Torremolinos (Málaga), MOR = Cala del Moral (Málaga), NER = Nerja (Málaga), MIE = Torre del Río Miel (Málaga), GOR = Cerro Gordo (Granada), HER = La Herradura (Granada), LOB = Lobres (Granada), CAL = Calahonda (Granada), CAS = Castel del Ferro, YES = Los Yesos (Granada), ALB = Albuñol (Granada), ALC = La Alcazaba (Almería), EJI = El Ejido (Almería), GAD = Sierra de Gádor (Almería), ALH = Baños de Sierra Alhamilla (Almería), TOY = Toyo (Almería), GAT = Salinas de Cabo de Gata (Almería).

### Processing protocol

**FOLIAR** **SOIL**



### 3. Element characterization

• ICPC-OES: 32 elements



#### DATA

- Element concentration
- Macronutrientes
- Micronutrientes
- Heavy metals

Table and Graphics

### 4. Statistical Analysis

$$BCF = \frac{\text{element concentration in plant (mg/kg)}}{\text{soil element concentration (mg/kg)}}$$



Coefficients of correlation: Spearman and Pearson

Ternary Plot (Olde Venterink *et al.*, 2003)



## OBJECTIVE

Characterize the elementome of *Maytenus senegalensis* subsp. *europaea* in southeastern Iberian Peninsula populations and its association with soil properties

## RESULTS

Element	Ntotal (g/100g)	Ctotal (g/100g)	Al (mg/Kg)	As (mg/Kg)	Be (mg/Kg)	Bi (mg/Kg)
Leaves	1,334917	46,6704889	213,688657	0,07654698	0,01860938	1,79991205
Soil	0,27108278	5,50408889	42948,2787	12,5915721	1,34916004	12,6708053
Element	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	K (g/100g)	La (mg/Kg)
Leaves	0,10666205	0,99274268	6,32465708	133,604494	0,78810197	0,01
Soil	14,0900469	90,6170751	21,2634917	33149,2847	0,89210523	0,01
Element	Mn (mg/Kg)	Mo (mg/Kg)	Na (g/100g)	Ni (mg/Kg)	Pb (mg/Kg)	P (g/100g)
Leaves	67,2368177	0,09427469	0,33400564	0,49381925	0,45628227	0,08250087
Soil	912,072044	0,636	0,07351125	37,7302102	63,9548665	0,04224739
Element	Se (mg/Kg)	Si (mg/Kg)	S (g/100g)	Sr (mg/Kg)	Ti (mg/Kg)	Tl (mg/Kg)
Leaves	0,04667784	399,277262	0,267463	65,4680887	12,2608665	7,55471979
Soil	8,80195727	359,779663	0,08078834	129,915031	296,276859	18,186021

Table 1. Average soil and foliar concentrations of the 32 elements studied. "Element" indicates the chemical specie. "Leaves" indicates the value is related to leaves samples. "Soil" indicates the value is related to soil samples.

- Foliar concentrations of N, C, P, S, Na were generally higher than soil concentrations across most populations.
- Elevated foliar concentrations of Ca, K, Mg, Sb, Si, Sr, Ti were observed in some populations. Notably,
- Los Yesares population exhibited a bioaccumulation factor of 6.7 for molybdenum (Mo).

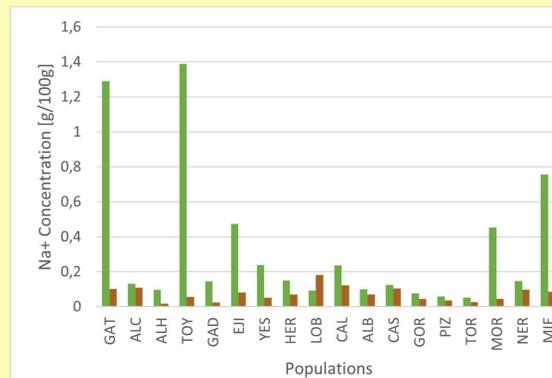


Figure 3. Sodium concentrations in leaves (green) and soil (brown) for each population studied. Same abbreviations as Figure 1.

### Coefficient of correlation

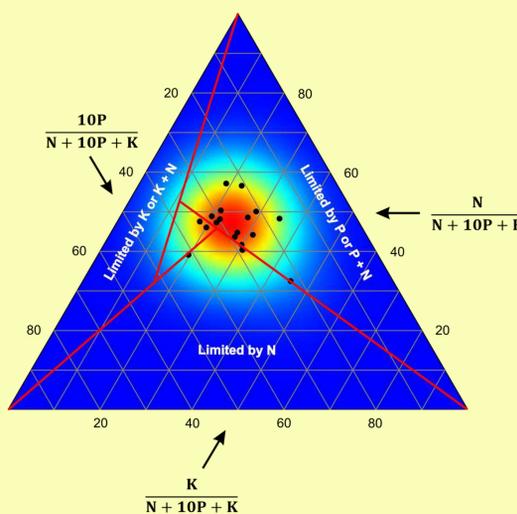
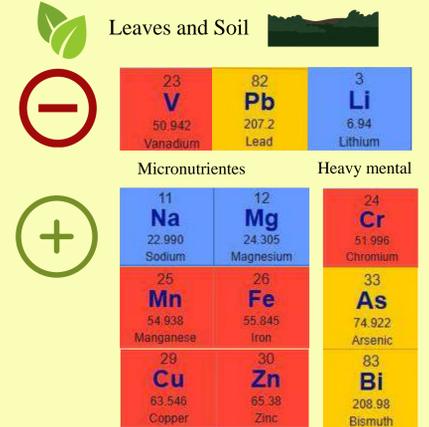


Figure 4. Ternary plot for N-P-K concentrations.

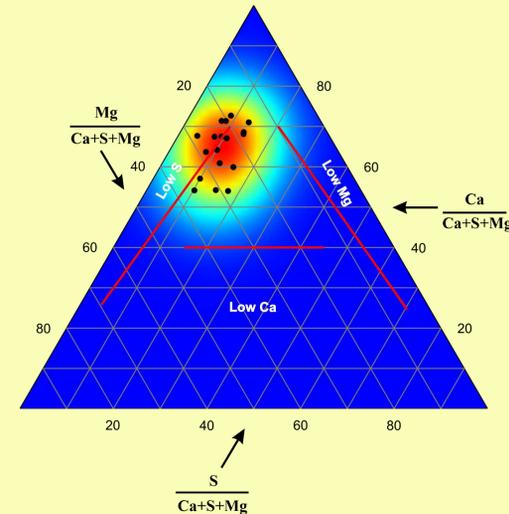


Figure 5. Ternary plot for Ca-P-S concentrations.

## DISCUSSION

Positive correlation between Na soil content and foliar concentration has been found. Na BCF > 1 shows that Na intake makes foil concentration higher than that of soil. Despite this fact, *M. senegalensis* is not a halophyte, neither it grows in saline soils, so further research is needed in order to explain this behavior.

Many micronutrients show positive correlations between soil and leaf concentration, which is expected, as well as some heavy metals this species could be sensitive to. None of them shows BCF > 1, that is leaf concentration is lower than soil's.

Highly noxious metals (V, Pb, Li) present negative correlation, which could heighten its survival capacity.

The NPK ternary plot show only three locations (El Toyo, El Ejido y Albuñol) have no real limitations regarding N, P and K. In contrast, most of the other locations endure P limitations, while half of them are also limited by N. In relation to K, none of the sampled locations are limited by this element.

The CaMgS ternary plot tells a kinder story. Most of the locations have no limitations whatsoever and only a few of them suffer from S shortage.

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