FROM FLIES TO GOATS

ON-GOING INVESTIGATIONS OF THE IMPACT OF ENVIRONMENTAL FACTORS ON THE RELICT AND ENDANGERED *ZELKOVA ABELICEA* (ULMACEAE)

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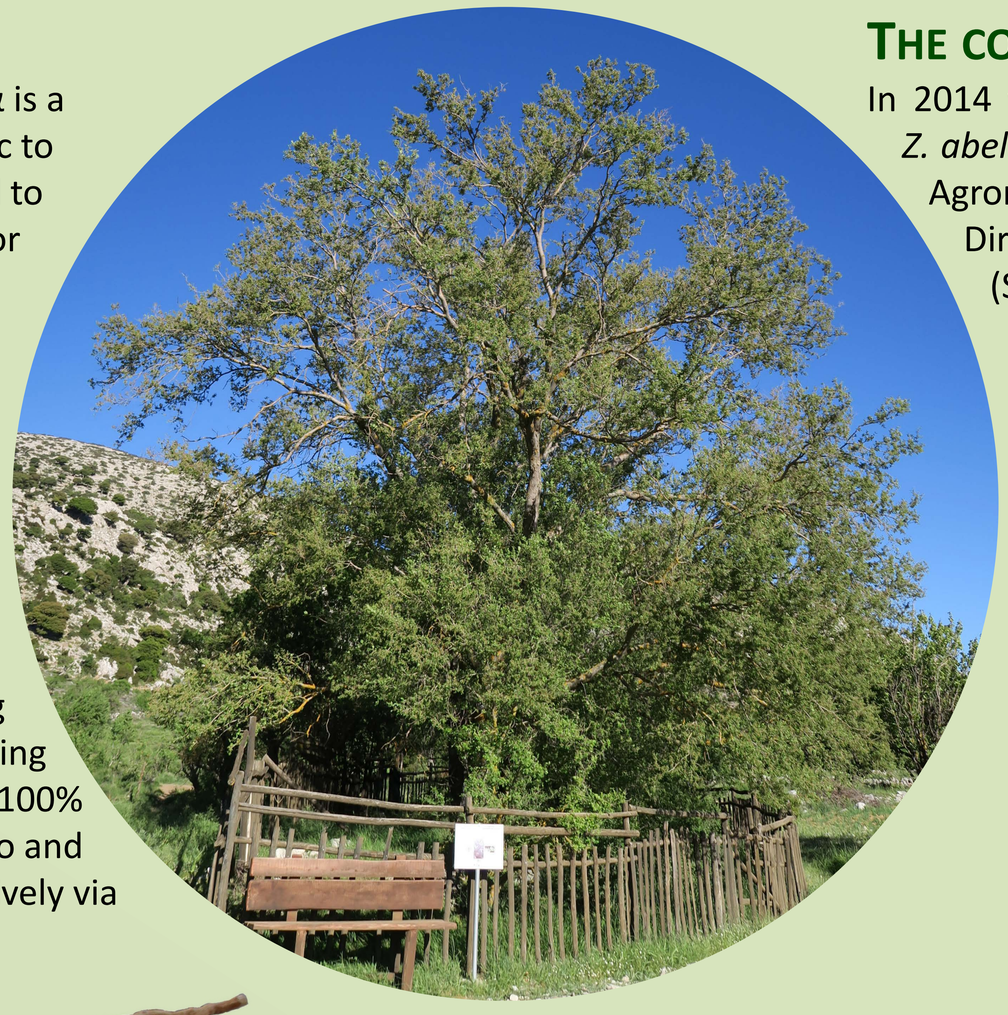
THE SPECIES & THREATS

Zelkova abelicea (Lam.) Boiss. or αμπελιτσιά is a relict tree species of the elm family, endemic to the mountains of Crete (Greece) and is used to make the traditional Cretan shepherd stick or κατσούνα. This rare species is classified as endangered on the IUCN Red List.
Overbrowsing, trampling and soil erosion due to the presence of flocks (both ovine and caprine) are the most important threats to the species. Up to 95% of individuals are kept in a stunted dwarfed bushy form mainly due to overbrowsing.
They have no possibility of forming fruit but can be very old (> 600 yr). The 5% of fruiting trees fructify in huge quantities during masting events every 2-3 yrs. However, between 50-100% of fruit were found to have no viable embryo and the species more often reproduces vegetatively via clonal root suckering.

Shepherd stick - κατσούνα



Zelkova abelicea tree

THE CONSERVATION PROJECT

In 2014 was launched a project for the conservation of *Z. abelicea* in collaboration between the Mediterranean Agronomic Institute of Chania, the four Forest Directorates of Crete and the University of Fribourg (Switzerland), with actions aiming at:

1) the implementation of in situ measures for protecting *Z. abelicea* against its most important threat: browsing.
2) the ex situ conservation of all known populations of the species
3) increasing public awareness

The first phase of the project ended in 2016 and a second phase will extend until 2020.

Dwarfed & browsed *Z. abelicea*

Goat on a dwarfed tree

PRELIMINARY FINDINGS & OBSERVATIONS

FLIES & FRUIT

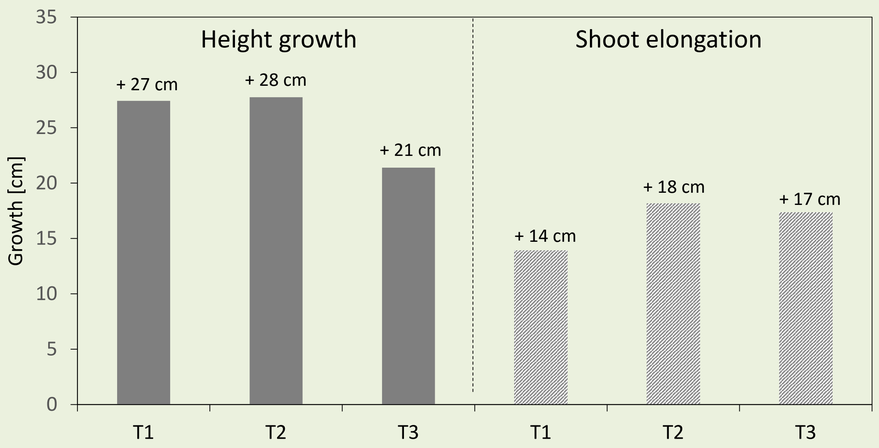
A previously unidentified Dipteran insect was recently observed to lay eggs on and affect the morphology of flowers of *Z. abelicea* by inducing gall formation. Research is under way to investigate if and how this insect could influence embryo development and fruit soundness.
In autumn 2017, fruit were collected from 37 trees throughout Crete in order to investigate fruit soundness. Analyses are on-going but there is a clear trend towards trees with higher percentages of sound fruit in western Crete than in central or eastern Crete. However, the presence or absence of the Dipteran insect does not seem to affect fruit soundness although trees for which numerous flowers are affected by insect presence seem to produce fewer fruit. It is possible that the development of the tree embryo is rather strongly affected by dry summer conditions that seem to be more intense in the central and eastern parts of Crete.

Flowers and flowering shoot of *Z. abelicea*. The green anthers are clearly visible .

Deformed flowers of *Z. abelicea* due to the presence of a Dipteran insect inducing gall formation.

REMOVING BROWSING

31 plots with *Z. abelicea* individuals were fenced throughout the mountains of Crete. Only small plots (2.5-360m^2) were established to avoid deliberate destruction and minimize impact on land user activities. As soon as fences were installed, *Z. abelicea* dwarfed individuals began to grow and elongate and vegetation cover to change, confirming the strong impact of browsing flocks.



Average growth (left) and average shoot elongation (right) of *Z. abelicea* dwarfed individuals one (T1), two (T2) and three (T3) years after fencing.

Elongated shoots on dwarfed *Z. abelicea* individuals. The longest measured shoot was 120 cm the first year and 57 cm the second year after fencing.

Differences in vegetation cover between inside the fenced plot (left) and outside (right) in an area under strong browsing pressure.

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www.zelkova.ch www.abelitsia.gr Project *Zelkova*