

A study shows the relationship that exists between carnivorous plants and fire

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Drosophyllum lusitanicum

One of the most striking and unusual species of all Iberian flora is the

carnivorous plant *Drosophyllum lusitanicum*, known as the 'fly-trap' and to which Charles Darwin directed his attention in the book *Insectivorous Plants*, published in 1875. In spite of this, little is known about this species that is currently being studied in detail by Maria Paniw and Fernando Ojeda, researchers from the Biology department of the University of Cadiz, in collaboration with Roberto Salguero-Gómez, a post-doctoral researcher at the University of Queensland (Australia) and graduate of the University of Cadiz. Specifically, María Paniw has focused the contents of her doctoral thesis on the biology and population ecology of *Drosophyllum*, detecting among other things a close ecological relationship between this species and fire or the direct link that exists between the smell that it gives off and its feeding method.

Drosophyllum lusitanicum is not only unusual for being a carnivorous plant, but is also unusual within the group of [carnivorous plants](#) on the planet. Most carnivorous plants are found on marshlands or at least, land saturated with water, while *Drosophyllum* grows on dry lands. "This [species](#) is the paradigm of botanical singularity in the Strait of Gibraltar region and the jewel in the crown of the Mediterranean heaths and stony wastelands", Professor Ojeda points out. Carnivorousness in plants is an adaptation to unfertile land. "Drosophyllum is unable to obtain its nutrients from the ground as its roots are not equipped with the necessary morphological adaptations. It feeds on insects that it traps in its leaves".

This species has glands along the length of its leaves that secrete drops of a sugary mucilage which gives off a sweet smell produced by a series of [volatile organic compounds](#) synthesized by the plant itself. "This smell attracts its prey, mainly small flies and other small and medium-sized insects, which become trapped in the sticky mucilage", explains Professor Ojeda. "In order to ingest them, the leaves of *Drosophyllum* excrete digestive enzymes from other glands in its leaves that dissolve the tissues of the insects before they are absorbed by these leaves,

leaving only the exoskeleton". This capacity of "fatal attraction" to insects in *Drosophyllum* was recently tested by means of an experiment carried out on the Puerto Real campus of the UCA using plants grown in the University of Cadiz research greenhouses.

However, the most relevant ecological aspect of this species is its close association with fire. This plant, which is only found in the Mediterranean heathlands of the south west of the Iberian peninsula and the north of Morocco, restricts its presence to areas of sparse vegetation, mainly for the first four or five years after a fire. After this period, the *Drosophyllum* plants disappear, with only their seeds remaining on the floor of the mature heathland, waiting for a new fire to occur. To conclusively prove this ecological dynamic of association with forest fires, Maria Paniw has carried out an important five year field study focusing on the demographic structure of the populations of this species after a fire.

Furthermore, a simple and interesting field experiment has been carried out. "We grew a high number of plants in small pots in the University of Cadiz greenhouse. Subsequently, thanks to collaboration with the Army, we moved these plant pots to the stony wastelands of the Army training and manoeuvres grounds in the Sierra de Retín mountains in Barbate, placing half of them in areas recently burnt and the other half in mature wastelands. Three days later, we returned to collect them and counted the number of insects trapped in their leaves. The differences were clear and striking", asserts Fernando Ojeda. It was demonstrated that, in mature wasteland areas, the *Drosophyllum* plants are much less successful at catching insects, thereby losing biological efficiency.

The work of these botanists from the UCA has also shown how, in spite of being an insectivorous species, there is little coincidence between the species that make up their prey and those that visit their flowers in order to pollenate them, thus avoiding a possible decrease in their reproductive

efficiency.

It must be noted that all these studies were carried out within the National Plan project 'Geographical barriers, habitat fragmentation and vulnerability of endemics: Biodiversity patterns in the Mediterranean heathlands across the Strait of Gibraltar' and which has given rise to several scientific publications in journals such as the American Journal of Botany or Biochemical Systematics and Ecology.

More information: N. Bertol et al. Effective prey attraction in the rare *Drosophyllum lusitanicum*, a flypaper-trap carnivorous plant, *American Journal of Botany* (2015). [DOI: 10.3732/ajb.1400544](https://doi.org/10.3732/ajb.1400544)

Maria Paniw et al. Local-scale disturbances can benefit an endangered, fire-adapted plant species in Western Mediterranean heathlands in the absence of fire, *Biological Conservation* (2015). [DOI: 10.1016/j.biocon.2015.04.010](https://doi.org/10.1016/j.biocon.2015.04.010)

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