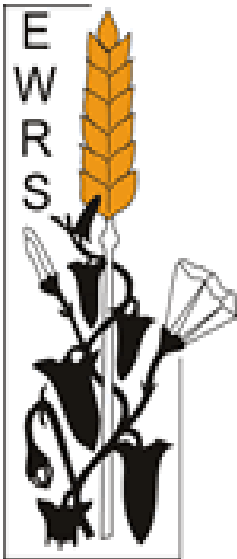


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How understanding ecological interactions provides tools for conservation biocontrol of the weedy leafy spurge (*Euphorbia esula*)

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Leafy spurge (*Euphorbia esula* L. subsp. *esula*, Euphorbiaceae) is a well known invasive species, not only in North America but also in Europe, its native range. Since the 1990s, its invasiveness has been reported in the floodplains of Val de Saône in central-eastern France, which are considered the last and largest European flood-meadows. Growing in dense patches, this latex-rich plant is toxic to cattle when present in cut hay. Annually mowed grasslands are losing their profitability as soon as they are infested. This economic loss may lead to ecological issues such as the shifting of mowed pastures into intensive agriculture (corn) and forestry (poplar). Natural annual floods and various agricultural practices such as mowing and grazing promote a rich floral and faunal diversity, which is protected under the Natura 2000 network.

Our project is an original multidisciplinary approach to the study of invasive plant/natural regulator/agricultural practice/biotic factor interactions in two ways: 1) we are determining the biological, genetic, ecological, and agricultural factors triggering leafy spurge invasiveness, and how these factors interact; and 2) we are proposing an integrated biocontrol program combining previously obtained data, by targeting invasive plant/natural regulators interactions, connected with agricultural practices, based upon field and laboratory tests.

Preliminary field results show that, as suspected, all factors tested are influencing the plant/insect complex. Mowing has a major impact on shoot density (shoots/m²), increasing it by two times on average. Mowing also negatively impacts the population size of the insect *Oberea erythrocephala* (Cerambycidae) by suppressing older shoots. This beetle is one of the natural phytophagous regulators of leafy spurge, and aged shoots are its major oviposition substrate. Grazing, including trampling caused by this practice, has an opposite effect, mainly on non-mowed patches that appear to attract cows. Shoot density decreased by 50 to 95% in August. This practice occurs only after *O. erythrocephala* population and oviposition peaks, reducing the potential impact on the density of its population. The flood factor does not seem to impair plant health. Further studies may show a positive impact on the spread of the seeds.