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BLACK LOCUST, WHO ARE YOU?

Black locust, *Robinia pseudoacacia* L., is a North American tree largely planted in Europe, and spreading in natural ecosystems (meadows, forests etc.). Among the invasive species, the invasive trees have the distinction of all having an interesting use for a part of the populations of the territories where they were introduced.

However their dynamics of expansion outside the locations where they planted (gardens, parks, urban areas, forest plantations) raise questions because their presence modifies the functions of the ecosystems where they develop. For Black locust, the impacts are both positive - for example production of wood or honey - and negative - alteration of the biochemical cycles due to its ability to fix atmospheric nitrogen, modification of habitats for fauna or flora, destruction of infrastructures (dams, railways).

To help decision making on the use and control of Black locust in European forests, we need to get some information on its dynamics to understand how and where it is able to spread. We used national forest inventories to (1) evaluate in which forests it is developing and (2) to test whether its development was preferably observed in riparian forests close to rivers. (3) In South-West France, we quantified the role of sexual and asexual reproduction in the observed regeneration under oak and pine forests.

Stakeholders often get opposed over conflicts of use and interests



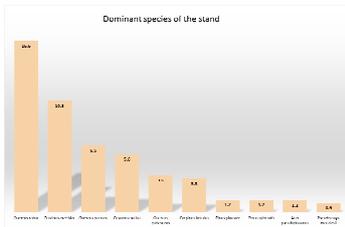
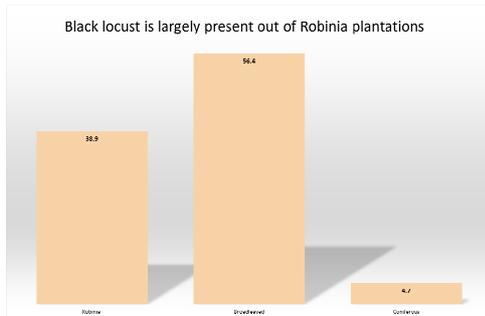
Examples of useful products from Black locust honey and vineyard poles



Expansion of black locust in riparian areas (Ciron, Bernos Beaulac, France)

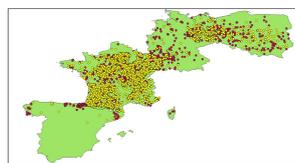
WHERE ARE YOU IN EUROPEAN FORESTS?

In France, more than half of the forest plots where Black locust was developing are not dominated by the species. The species is generally planted as a monoculture. Consequently, **its presence under other broadleaved suggests that its development in the forest largely results from natural spreading.**

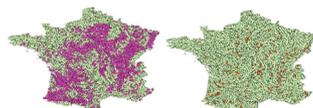


In France, when the dominant species is not Robinia, Black locust is mostly present in Oak stands

Using the Spanish, France, German and Polish inventories, plots with Robinia in riparian areas were extracted by creating a buffer (100m) around the river network. **In Spain and France, the presence of black locust in riparian areas was higher than expected, considering the sampling effort.** In Germany and Poland, its presence close to rivers was equivalent to the proportion of plots sampled in riparian areas.



Distribution of Black locust plots from the Spanish, France, German and Polish inventories



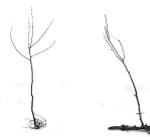
In France, distribution of Black locust plots in all forests (left) and in riparian forests only (right)

Chi-Square Test of Independence between Black locust distribution in European forests and the proximity to rivers (buffer 100 m)

Country	Species	Plots in river buffer	Plots outside buffer	% in buffer	chi-square	p
France	Black Locust	262	5557	4.5	41.56	<0.0001
	Others species	1833	60046	2.96		
Spain	Black Locust	15	185	7.5	11.72	0,0006
	Others species	2957	93504	3.07		
Poland	Black Locust	16	480	3.23	0.255	0.61
	Others species	798	28235	2.75		
Germany	Black Locust	7	465	1.48	4.66	0.03
	Others species	681	19377	3.4		

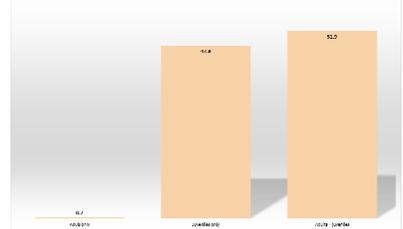
HOW DO YOU REPRODUCE?

Black locust reproduces sexually through seeds and clonally through root suckers, both mechanisms allowing the spreading. In French forests, half of the plots with Black locust present only juveniles, without adults.

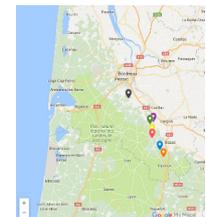


To assess the role of sexual reproduction in effective regeneration, 20 to 30 juveniles of black locust (H<130 cm, d< 2 cm) were uprooted in 8 oak or pine stands.

Large amount of plots in French forests with only juvenile black locusts

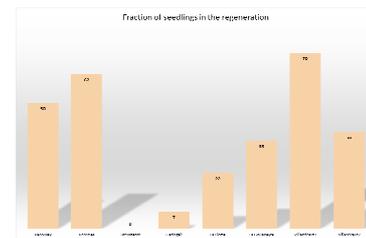


Data from the 3rd French national forest inventory - trees and flora surveys (IGN)



Sampled sites in South-West France (oak and pine forests)

On average, **35% of the juveniles corresponded to seedlings**, opposed to root suckers



In this sample, the proportion of seedlings was lower in the pine forests (~20%) whereas it was in average 50% in the oak forests (chi square 12.097, p = 0.002). Root suckers could have been promoted in pine forests, as a result of more intensive management: in South-West France, silvicultural operations are regularly performed in the stands (ploughing, understory cutting, pine tree harvesting) that could damage Black locust individuals, increasing locally its asexual spreading.

WHAT'S NNEXT?

Black locust is of particular interest to European foresters for wood production, but its spreading occurs away from the original plantations, from both sexual and asexual reproduction. Our first tests using forest inventories data or field sampling demonstrated that it spreads under different forest types (various species, intensive plantations or more natural forests, riparian areas). Further investigations could test the interaction between forest practices, habitats and bioclimatic zonation, to better evaluate the conditions when its natural dynamics is the lowest and to identify the lower risk locations for its cultivation, to minimise and control its invasion.

