

Soybean production: A climate compatible with self-sufficiency on the European continent

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Credit: Pixabay

Currently, Europe imports nearly 90% of the soybeans it consumes, mostly from the United States and Brazil, mainly for animal feed. Although the area under soybean cultivation has quadrupled on the continent in 12 years, from 1.2 Mha in 2004 to 5 Mha in 2016, it represented only 1.7% of total European cultivated area in 2016.

Yet local soybean cultivation has many economic and environmental advantages. Like other legumes, it fixes nitrogen in the soil thanks to [symbiotic bacteria](#) living in its roots, which is beneficial for the

following crop and reduces the use of nitrogen fertilizers and their environmental impact. Moreover, the reduction of imports would reduce the cost and pollution associated with them. That is why researchers from AgroParisTech and INRAE set out to explore whether the European continent could become self-sufficient in soybeans, and whether [climate change](#) would be a help, or on the contrary, a hindrance, to this crop in Europe over the next few decades.

To do so, they developed a modeling approach based on the joint use of global agronomic and climatic databases and machine learning algorithms. Thanks to this, they were able to make continent-wide soybean yield projections directly from the available data, according to different crop area scenarios and based on forecasts of present and future climate conditions.

Self-sufficiency achievable with 11% of European cropland devoted to soy

The results, published in *Nature Food*, show that the European agricultural area suitable for soybean cultivation is much higher than the area currently harvested. Projections indicate an average yield of 2 metric tons per hectare under current [climatic conditions](#), even without irrigation or [fertilizer](#), and it would increase with future climatic conditions by +0.4 to +0.6 metric tons per hectare in 2050 and 2090. Projections also show a shift of the most productive areas from the south of the European continent to the north and east due to climate change.

With a constant need for soybeans, the results suggest that [soybean self-sufficiency](#) of 50 to 100% is achievable in Europe, under current and future climates, if 4 to 11% of the cultivated land was devoted to soybeans. This would require an increase in crop area by a factor of 2 to 3, or 5 to 6, for a 50% or 100% self-sufficiency rate respectively. Assuming that fertilizers are not used on soybeans, this increase would

cut back the use of [nitrogen](#) fertilizers by 4 to 17% on the European continent.

More information: Nicolas Guilpart et al, Data-driven projections suggest large opportunities to improve Europe's soybean self-sufficiency under climate change, *Nature Food* (2022). [DOI: 10.1038/s43016-022-00481-3](#)

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