

**FAO Expert Workshop on
“Perennial Crops for Food Security”
Rome, 28-30 August 2013**

Development of *Lepidium campestre* as a perennial oil crop through domestication

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Abstract

Several challenges are facing future agriculture. Nutrient leaching is a major factor that causes groundwater contamination, especially under intensive use of nitrogen based fertilizers and tillage. Planting biennial or perennial crops and use of cover crops could alleviate this problem. However, suitable crop species that fit into such cropping systems are very limited in Sweden. Plant oils: the demand of plant oils for food and biodiesel is expected to increase steadily in the coming 20 years. However, the potential of increasing production from the existing oilseed crops is limited. For example, in Sweden, the only economically viable oilseed crop is winter rapeseed, but it can only be grown in the southern part of the country. We are pursuing a fast-track domestication of *Lepidium campestre*, a biennial Brassicaceae species, into a combined novel oil- and cover crop. Late prof. Arnulf Merker at SLU identified *L. campestre* as a promising species for domestication. It is a high seed yielding plant (5-6 ton/ha, higher than the average yield of winter oilseed rape) with an upright stature and synchronous flowering. Moreover, it is biennial with a potential to be perennial crop. As a cover crop, it is sown under cereal crops during spring and seeds are harvested the following year thus reduces nutrient leaching and tillage. *L. campestre* is also cold-hardy and can be successfully grown in the northern parts of Sweden. However, some of its properties must be altered in order for the plant to be an economically viable oil crop. We will present our strategies to domesticate this species using both GM and non-GM approaches and report on so far achieved results.

Key words: biennial; cover crop; domestication; *Lepidium campestre* oil crop; perennial