

# Domestication of *Lepidium campestre* through genetic engineering

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## Introduction

Nutrient leaching in modern agriculture is a major contributor to the problem of surface water pollution in the coastal areas. Two major causes of nutrient leaching are overuses of fertilisers and tillage. Cultivation of biennial or perennial species could alleviate this problem.

*Lepidium campestre* (Fig 1), a wild and biennial oilseed crop, could be used as a catch crop to reduce tillage and the use of fertilisers. It has a high yield potential (ca. 5 ton/ha) and upright structure. It is also winter hardy and resistant to lodging. However, it has low oil content, undesirable oil composition and pod shatter problems and needs to be improved before any commercialization.



Fig 1. *Lepidium* plant and flowers

## Genetic engineering of *L. campestre*



Fig 2. Pods of lepidium plant

Domestication of *L. campestre* using transgenic approach is a subproject within the multidisciplinary research project: MISTRA-Biotech which aims at exploring plant biotechnology applications in developing more sustainable and competitive agriculture and food systems.

The targets of this subproject are, through genetic engineering, to: 1) increase the oil content; 2) alter the oil composition for food consumption; 3) to reduce the pod shatter (Fig. 2).

In order to genetically transform this species, an efficient regeneration and transformation protocol is prerequisite. However, there was no transformation method available when we started this project one year ago.

## Results

We have so far developed an efficient regeneration and transformation protocol for this species and the transgenic lines were confirmed by Southern blot analysis (Fig 3). Oil analysis on transgenic lines containing the jojoba *FAR*, *WS* and *FAE* genes showed wax ester production in lepidium seeds (Fig 4). Transgenic lines with other target genes are currently under evaluation.



Fig 3. Southern blot analysis on the *nptII* gene of transgenic lepidium lines

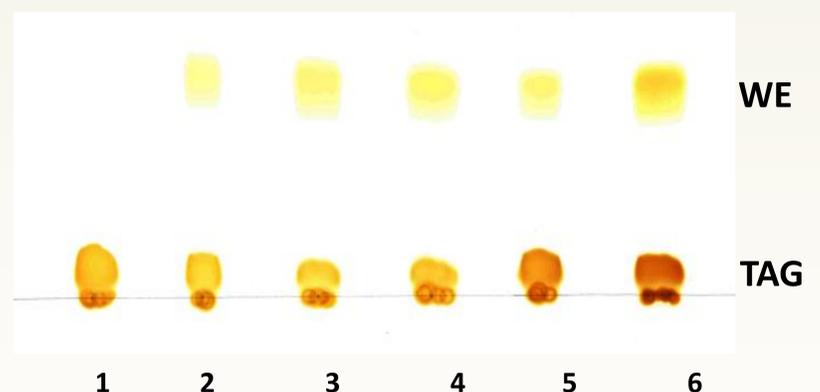


Fig 4. Wax ester content in pooled-seeds of transgenic lepidium, analysed by TLC. 1=non-transgenic control. 2-6=transgenic lines. WE=wax esters. TAG=Triacylglycerol

**Acknowledgements:** Financial supports from SLU Vice-Chancellor's grant and MISTRA (The foundation for strategic environmental research, Sweden) are highly acknowledged.