Domesticating wild pennycress into CoverCress using NGTs

The **EU Green Deal** aims to increase the sustainability of EU agri-food systems. However, impact assessments have warned that **these measures risk reducing EU agricultural production**[1,2,3].
Plant breeding is at the basis of our agri-food systems and is solely responsible for **~66% of production gains** over the past two decades[1].

Scientific and technological advances enabling **faster, more precise, and more efficient plant breeding** must be leveraged to maintain food and nutritional security in the EU and globally, while **ensuring the socio-economic, as well as environmental, sustainability** of our agri-food systems.

For more information on plant breeding, see our factsheet "Plant Breeding is the Basis of our Food Systems".

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Wild pennycress (Thlaspi arvense)

Is a common winter annual weed that has potential for use as a cover crop to protect the soil during winter.

However, undesirable characteristics such as seed dormancy, pod shattering, inconsistent growth and maturity or small seed size prevent its use as a crop[4].

Domestication of wild pennycress into CoverCress from a winter annual weed to a new cover and oilseed crop

Combining NGTs with decades of scientific knowledge on **Arabidopsis** (a model plant closely related to pennycress), breeders were able to precisely target six genes of pennycress, thereby developing a new crop: **CoverCress***.

Wild pennycress[5] CoverCress[5]

Compared to pennycress, CoverCress presents a better nutritional profile and **higher oil content**, as well as **reduced seed dormancy** and **more consistent germination**[4].

*CoverCress is a trademark of CoverCress Inc.

Domesticating wild pennycress into CoverCress

New genomic techniques

Targeted mutagenesis via genome editing of six genes of wild pennycress domesticates it in a few years' time.

Conventional breeding

Previous domestication effects of similar species have taken place over several decades.

Domesticating pennycress into CoverCress using classical mutagenesis would take many years and be extremely resource intensive.

The random nature of classical mutagenesis and the requirement for a specific combination of genetic changes for domestication, make unlikely the development of CoverCress using conventional breeding. **NGTs offer more precision and control in a shorter amount of time**, making the development of new crops more accessible.

Expected impacts

CoverCress provides a living cover on fallow croplands in winter, thereby **reducing nutrient leaching, soil erosion, and the need for herbicides** before sowing summer crops,[6,7,8].

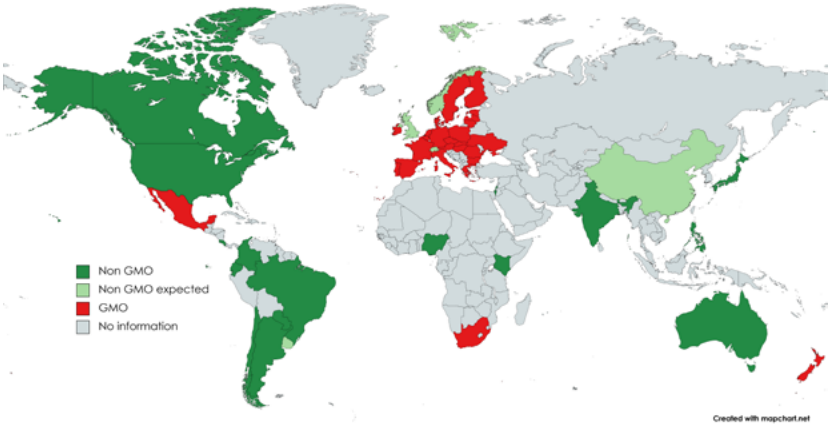
CoverCress' early flowering time provides **nectar and pollen** to pollinators at a time when forage is scarce[9].

CoverCress is a **low maintenance multipurpose crop** providing additional income to farmers while protecting the soil, supporting biodiversity, and providing a new source of oil and plant protein. Currently, CoverCress is only marketed in the US.

CoverCress is a good example of how NGTs are used to develop diverse plant varieties that could **increase socio-economic** and e**nvironmental sustainability** of European agri-food systems, in line with the **EU Green Deal** and **UN SDGs**.

How are NGTs being regulated worldwide?

By regulating NGTs as GMO, the EU is hindering their contribution to the EU Green Deal and UN SDGs. As non-EU countries are embracing these technologies, the EU is getting left behind, at the expense of the agri-food stakeholders, particularly farmers, SMEs and consumers.



Plants for the Future calls on EU policymakers to exclude plants developed using NGTs (targeted mutagenesis or cisgenesis) from the scope of the GMO directive, so that they may contribute to the transition towards more sustainable food systems.

About us

Plants for the Future (Plant ETP) is a multistakeholder platform representing the plant sector, with members for academia, industry and the farming community. Plant ETP considers the challenges and opportunities of agricultural value chains and develops a vision for future food systems.
For more information see our website: www.plantetp.eu.
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References

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