

# ORNATE - Optimisation of Reed Canary Grass as a native European Energy Crop

## Public abstract

There are major strategic drivers for the development of bioenergy, including biofuels, to substitute for fossil carbon. These include a reduction in greenhouse gas emissions, energy security, the long term trend of increasing oil price, opportunities for the creation of high tech "green jobs", and rural regeneration. The demand for bioenergy requires sustainable energy crop varieties with high and stable yields from low inputs, with harvestable biomass that can be converted with maximum efficiency.

The ORNATE project proposes to establish the research, development and knowledge necessary to develop reed canary grass as a crop to provide a sustainable bioenergy feedstock in Europe. A number of other energy crops already receive worldwide attention. However, reed canary grass has an important role to play in the mix of energy crops in Europe because it exhibits a unique combination of characteristics:

1. it is a native species of Europe, able to grow on very marginal land, with carbon sink and biodiversity benefits
2. it is inexpensive to establish and fits well into existing farming practice, providing flexibility and low risk to farmers, and
3. it is able to produce harvested biomass from late summer until early spring thereby producing biomass earlier in the year than other energy grasses and so reducing storage requirements for end users.

Reed canary grass was taken by early European settlers to North America where it was grown as a forage crop and a small level of interest has been retained in its use on both sides of the Atlantic since then. The earliest report of reed canary grass seed being sold for use as forage was in 1836 in Germany, while the first agronomic trials began in 1837 in Sweden. Although limited in its cultivation to date (with 20,000 hectares currently grown in Scandinavia) reed canary grass offers considerable potential as a bioenergy crop in Northern Europe including the UK, Ireland and Scandinavia especially on marginal land as it can grow well in both wet and dry areas. Reed canary grass grows extremely well in wet soils, withstanding flooding for long periods across a wide pH range whilst equally showing excellent drought tolerance.

ORNATE project [partners](#) will develop knowledge on how reed canary grass grows across multiple environments in Northern Europe including on marginal unproductive land not utilised for food production, of which many million hectares exist across Europe. In particular ORNATE will focus on those crop characteristics which will enable the rapid deployment of the crop: biomass yield, biomass chemical composition and seed yield. We will use this information to develop the genetic resources necessary to establish a reed canary grass breeding programme that is able to produce new varieties that are higher yielding, better able to grow on sub-optimal land, and better adapted to growth in the UK, Ireland and Sweden. In addition, we will explore opportunities to maximise the benefits of reed canary

grass through better understanding of emerging renewable energy markets and biomass value chains.

The objectives of the **ORNATE** project are to:

1. Develop a trial network of genetically diverse reed canary grass to help define optimum ideotypes matched to differing environments and end uses.
2. Set up broad pre-breeding populations using native collected accessions and hybrid populations from which to initiate recurrent selection for biomass yield and end-use quality.
3. Use state of the art genomics and phenomics, including LemnaTec based high throughput phenotyping, to establish tools for 21st century precision breeding.
4. Develop in a public-private partnership the opportunities for novel value chains and markets for reed canary grass as a sustainable bioenergy feedstock.

Our overall aim therefore in the ORNATE project is to create a step change in the improvement of reed canary grass as a sustainable biomass crop for energy purposes by creating the tools, germplasm and market intelligence to drive a state of the art breeding programme within a public - private partnership.

The science is of strategic importance to Europe and lays a strong foundation for the development and optimisation of reed canary grass as a sustainable biomass crop. It addresses the climate change challenge using a crop that is able to substitute for fossil carbon whilst maximising greenhouse gas benefits through carbon sequestration with low fertiliser requirements