

The use of bioenergetic plantations of sources of renewable energy is one of the main directives of the energetic policy in Europe. Being part of the natural composition of Polish vegetation, willow has been recommended as bioenergy crop for Poland.

Indeed, Poland has favourable conditions for production of willow biomass, being estimated that 1.5-to 2.1 Mha the surface that could be dedicated for short rotation coppice plants. Willows plantations are being used primarily for energy and phytoremediation. In 2009, willows plantations for bioenergy surface (6,160 ha) represented 60.5% of total energy crop surface and 95% of all perennial energetic plantations. Willow plantations are expected to play a significant role amongst the energy-dedicated lignocellulosic biomass crops to reach the goal of 14% of energy derived from biomass in Europe in 2020). Understand the molecular mechanisms underlying wood formation and the modulation of the cell wall composition can lead to new breeding strategies of willows for bioenergy purposes.

PurpleWalls will address new and relevant insight genetic and molecular mechanisms controlling phenotype determination, and phenotypic adaptation to growing conditions in *Salix purpurea* as model for other Salicaceae and perennial species used for bioenergy. Until now, most of the research developed on identification of candidate genes and key regulatory gene networks in developing xylem, did not consider the interplay between different levels of regulation in woody plants.

**PurpleWalls will use an Integrative Biology approach to reveal new key genes and regulatory gene networks that modulate xylogenesis and the secondary cell walls biosynthesis.**

Data generated within the project will be made available through dedicated and open access databases for scientific community. Publication of the results will be directed towards the high impact (1st Quartile) peer-reviewed journals, due the novelty and importance of this research theme. Preferentially, it will be chosen open-access journals in order to facilitate article dissemination. Results will be also presented (posters and oral communications) at renown national and international conferences This highly innovative and appealing were able to attract new national and international collaborations, and together with advanced formation (master and PhD thesis) will contribute to reinforce the transfer of knowledge and technology and the capacity building of the new team – *Cell Wall by Design* - to be created in the frame of this project.

At long-term, it is expected that the tools and knowledge gathered in the frame of PurpleWalls project will contribute to reduce production inputs, and to increase productivity of planted forest and quality of the forest raw products, thus contributing to a sustainable mitigation of human pressures on native forests, associated biodiversity, and of the use of marginal land, and to the empowerment of local populations. Moreover, the PurpleWalls potentially able to patentable applications, to be transformed into practical breeding applications with high commercial impact.