Sexual Plant Reproduction – Seed formation

Acronimo: **SexSeed**

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Abstract: By 2050, it is estimated that the human population will reach 9 billion. To feed this growing population, it will be necessary to at least double agricultural yields without increasing the amount of arable land. Most agricultural production is aimed at the production of seeds through sexual reproduction, and these seeds account for the majority of the calories consumed by humans (i.e. wheat, rice and corn), are major components of animal feed (i.e. sorghum, corn and soybean) and are a significant source for the production of high-value-added products such as oils, biofuels and proteins (i.e. canola, corn and soybean).

Understanding the factors that regulate sexual reproduction will enable this critical aspect of agricultural production to be engineered for increased productivity, without increasing arable land.

Our project will provide new insights into the network controlled by SEEDSTICK (STK), a MADS box transcription factor, which is the master regulator of seed production. The fundamental objective of this proposal is to strengthen research partnerships through short/long period staff exchanges and networking activities between all the partners, at international and intercontinental levels. By combining transcriptomic and genetic approaches, we aim to uncover new functions for STK targets and implicate them in putative signalling cascades, increasing our knowledge of the network that controls seed formation in Arabidopsis thaliana. Arabidopsis is an excellent model to study seed formation, as it shares a conserved developmental program with major seed-producing crop plants. By increasing our knowledge of Arabidopsis seed formation we can help to improve not only gross agricultural productivity, but also the composition of seeds and hence the production of components used for high added-value seed-derived products. This project focusses on a fundamental, economically important and experimentally tractable biological process, plant reproduction. The growing importance of seeds and seed-derived

products to humanity and the central role of STK in seed development mean that this project has great potential to contribute to Europe's excellence and competitiveness in the world.
Detailed analysis of the network of regulatory genes controlling reproductive development in Arabidopsis represents the biological theme around which our training programme will be built. By taking advantage of the complementary scientific competences developed by the partners, it will be possible to expand our knowledge of seed formation in the model species and then to transfer this knowledge horizontally into vital agricultural crop species.