Open letter to decision makers in Europe

We all depend on plants for providing us with food, building material, textiles, medicine and fuel. Among the greatest challenges facing mankind are the provision of healthy and nutritious food, feed and fuel to a burgeoning population using agricultural and forestry practices that are environmentally and economically sustainable. Thanks to basic research on plants, we now understand well how plants grow, how they protect themselves against disease and environmental stress, and what factors limit production in agriculture and forestry.

Europe has a strong history of plant science. Robert Hooke introduced the concept of the "cell" in the 17th century after looking at cork slivers in his microscope. Carl Linnaeus developed systematics after his studies of plants and Gregor Mendel deciphered the laws of genetics after meticulous counting of plants in his monastery garden in Brno. Plant scientists discovered chromosomes, enzymes and viruses, and Charles Darwin spent a large part of his scientific career as a plant biologist; "The origin of species" starts "When we look to the individuals of the same variety or sub-variety of our older cultivated plants and animals…". Curiosity-driven plant research has been important both to deepen our understanding of nature and take benefit of it, still we lack basic understanding of many complex phenomena in plants.

27 of the "30 most cited authors in plant science" in Europe (http://www.labtimes.org/labtimes/ranking/2013_04/index2.lasso) hold at present a position at a publicly funded research organization in Europe, and 21 out of the 27 have signed this letter. We work on various aspects of plant science, for example systematics, physiology, biochemistry, molecular biology, genetics, ecophysiology, ecology, pathology, biodiversity and effects of climate change. It is possible to perform good curiosity-driven plant science in Europe and we acknowledge our support from various funding bodies, in many respects plant science in Europe is doing well.

However, well is not good enough. Plant science has arguably contributed more to the reduction of human suffering than biomedical research, yet compared with the latter it is hugely underfunded worldwide. Norman Borlaug's dwarf and rust-resistant varieties of wheat saved many millions from hunger. Basic science performed in Europe is also an efficient way of supporting applied research in poorer countries. We are concerned that Europe will have serious problems in reaching its ambitions of Horizon 2020: to "tackle societal challenges" and "to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation" and see three outstanding issues for decision makers to address.

First, to provide solutions to the societal challenges outlined in Horizon 2020 **funding for fundamental and applied plant science should be maintained or, if possible, be increased.** Most importantly, serious challenges are not adequately addressed, such as developing plants resilient to climate change, preventing loss of crop biodiversity, and creating an agriculture that avoids unsustainable demands for water, energy, fertilizers and pesticides. These tasks must be addressed in forthcoming Horizon 2020 calls.

Secondly, **plant scientists must be able to perform field experiments.** Many of us work with genetically modified plants as research tools, for example to understand how native plants and crops protect themselves against pests and will react to climate change. However, in most European countries permits to perform field experiments with transgenic plants are blocked, not on scientific but on political grounds. In countries that do permit field experiments, these are often systematically vandalized, causing huge scientific and financial losses. Some of us have even been threatened and had private property vandalized. This is a serious threat to science, to publicly funded research, and to European society itself. European authorities must ensure that approved and safe field experiments with transgenic plants are made possible. Vandals must be prosecuted and held accountable for scientific and financial damage.

Thirdly, **Europe must allow prompt authorization of genetically modified plant varieties that have been found safe by the competent authority following a thorough science-based risk evaluation**. This is essential to meet the Horizon 2020 goal of removing barriers to innovation and making it easier for the public and private sectors to work together in delivering innovation. The *de facto* moratorium on transgenic plant approvals has been detrimental for applied plant science and has effectively eliminated possibilities for publicly funded scientists and small companies to address the big challenges for society. The resulting reduced competition has enhanced the dominance of the major seed and agrochemical corporations. We believe that a fundamental revision of GM regulation is needed that strictly follows principles of a science-based evaluations and approvals, based on evaluation of the trait, rather than the method by which it is achieved.

Our scientific credibility comes from our work on basic plant science. Some of us also apply our knowledge to improving plants for the human society, but the reason that we make this statement is not commercial interests or hope of attracting more funding for our own research. Instead, we are seriously concerned that lack of adequate funding and safe infrastructures will relegate European basic and applied plant science to a second tier status. If plant scientists cannot apply their knowledge for the benefit of society, Europe will be unable to lead in global efforts to build a sustainable agricultural system and plant-based bio-economy. The most pressing global problems – how do deal with environmental change and secure food supply for all – arguably will only be solved with a massively increased worldwide investment in plant research.

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