



Importance of Plant Genomics in Europe

Why do we need a European initiative for opening national programmes in plant genomics?

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The Need for a European Plant Genomics initiative was realized by...

- The scientific community
 - Explicitly articulated by in the EPSO 10-year vision paper, written in response to Busquin's ERA proposal in early 2000
- European commission
 - The EC organized a workshop on "*Genomics And Post Genomics Agricultural Research in the ERA*" in Bordeaux in October 2000
 - Plant Genomics was recognized as a key priority in agricultural research at the Versailles Conference "*Agricultural Research in the European Research Area*" in December 2000



A European Plant Genomics Programme however...

- Failed to materialize in the FP6 programme
 - Plant genomics was not selected as a priority theme in FP6, as a consequence of the European agricultural policy crisis in early 2001
- A missed opportunity that was in the meantime compensated by various bottom up initiatives
 - The bilateral Franco-German *Genoplante-Gabi cooperation*
 - Genome resource projects like the CATMA project
 - EPGI - *European Plant Genomics Initiative* - an Expression of Interest to consolidate plant genomics programmes
- Now, the opportunity finally materializes through
 - The selection of plant genomics by CREST as an area of **strategic importance** in the ERA for opening up national programmes



Importance of Plant Genomics in Europe

- Was already clearly articulated in
 - The report on *Genomics And Post Genomics Research In The ERA* presented at the Versailles Conference On "Agricultural Research In The European Research Area." presented in December 2000
- The scientific progress of the past three years
 - Demonstrated the immense biological knowledge generating capacity of genomics
 - As illustrated by the landmark achievements of the human, and mouse genome sequences
 - Underscored the far-reaching impact of genomics in all areas of the life sciences
 - Genomics has led to a paradigm shift



The Genomics Paradigm Shift

- While initially the goal was to
 - Completely sequence the genomes of man and a few selected model organisms
 - The current global ambition is rapidly broadening
 - Collect genome sequences from a host of organisms representing the tree of life
- Concomitantly, plant genomics is rapidly moving beyond the reference organism *Arabidopsis*
 - Rice genome sequence is almost complete
 - Various plant genome sequencing projects have been initiated
 - Poplar, maize, Medicago, lotus, tomato, and certainly more to follow



The Plant Genomics Paradigm Shift

- "Conventional" plant science paradigm
 - Studying genes one by one
 - In a genomic context that was essentially a black box
 - Resulted in a slow progress
 - Only 5% to 10% of the genes are known to date
- "New" plant genomics paradigm
 - The genome sequence provides an inventory of all the genes and
 - Functional genomics platforms allow the systematic identification of their function
 - Generating a tremendous acceleration of gene discovery
 - Providing unprecedented opportunities for improving agricultural species



Anticipated Benefits of Plant Genomics

- **Agriculture**
 - Better utilization of Europe's genetic resources
 - Enhanced agricultural productivity and sustainability
 - Improve the economic competitiveness of European farmers
- **Society**
 - Guaranteed food and feed quality and safety
 - Improved human and animal health
- **Environment**
 - Better understanding of biodiversity, and hence its conservation
 - Solutions for environmental problems



Bottlenecks For Plant Genomics in Europe

- **Technological**
 - Limited access to a broad spectrum of emerging technologies, developed primarily in the US
 - Heterogeneity of the skills and competences in genomics research in different countries
- **Organizational**
 - Lack of strategic planning and commitment at the European level
 - Consequently, the investments in the US and Japan far exceed the European efforts
- **Political**
 - The wide ranging debate on socio-economic and ethical issues around GMOs and genetic resources



Basic Requirements for Plant Genomics in Europe

- **Structural**
 - Creation of European networks of expertise in genomics
 - Appropriate infrastructures for high throughput biology
 - Strong bioinformatics centers
 - Genome resource centers
- **Organizational**
 - Organize internationally competitive large scale projects
 - Structure appropriate programmes for implementation of genomics in a broad range of relevant species
- The Bordeaux workshop provided a host of recommendations



Plant Genomics: Which Species?

- **Model species: Arabidopsis, rice, Medicago**
 - Europe must consolidate its participation in the international large scale genome sequencing programmes
- **Bridge species: link between model and production species (tomato, poplar,...)**
 - Europe must invest in a limited number of genomics programmes
- **Production species**
 - The choice of genomics projects on these species must be based on global, regional and national relevance



Plant Genomics: Infrastructures?

- Genomics requires specialized infrastructures
 - Automated large-scale data production and acquisition
 - Computational centres for bioinformatics
- Specialized infrastructures must be organized in networks
 - Centers of expertise providing technologies and training
 - Resource centers developing and disseminating genomics resources to the European scientific community
- Bioinformatics is a key priority
 - Insufficient skill base due to an extensive brain drain
 - Support training at graduate and post graduate level



Plant Genomics: Mobility Of Researchers

- High priority
 - Level out the differences in expertise between the European countries
- Appropriate financial support for
 - Mobility and training of researchers and technicians within genomics networks
 - Disseminate the available but widely dispersed skills in the field of genomics
 - Transfer of knowledge and expertise in post-genomics technologies



European Plant Genomics Programme

- European programme should reflect
 - A sufficiently broad and long term vision
 - The acquisition of genomics knowledge on all species relevant for Europe
 - Programmes with an 8 to 12 year perspective instead of the traditional short-term focus
 - High degree of flexibility
 - Genomics is a rapidly moving field
- European programme should focus on
 - Both large and small scale projects
 - European projects should provide added value over national activities
 - Integration of European and national initiatives



The Opening up of National Programmes

- Constitutes a valid alternative to FP6 to
 - Realize the desperately needed European research integration
 - Structuring and funding of large projects of longer duration
 - Development of novel organizational structures for transnational research programmes utilizing existing competencies
 - Develop a new research culture focused on multi-disciplinary collaboration



The Opening up of National Programmes

- Offers an excellent opportunity for Europe to meet the genomics challenge
 - May allow Europe to become a world force in plant genomics research
- The present workshop "Towards European Coordination of Plant Genomics"
 - Is meant as a first concrete step to realize these ambitious objectives...



The present workshop

- Despite the short notice we tried
 - Achieve the broadest possible representation of science and governance
 - 19 countries represented
 - In certain cases we opted for more than one representation per country
 - Our objective is to achieve optimal transparency and openness
 - Create a platform that remains open to future participation



The present workshop

- Part I - today
 - Focus is on information exchange in the broadest sense
 - Presentations by country in alphabetical order
 - Goal is to get a good sense of the state of the art in plant genomics and the expectations for the future
- Part I - tomorrow
 - Brainstorm on the most practical way forward
 - Goal is define concrete steps for future actions