

CHALLENGES OF PLANT BREEDING EARLY IN 21ST. CENTURY

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At the beginning of the 21st century, agriculture faces many challenges. The questions and problems with special respect to plant breeding, we have to face are:

Growing human population. The main problem from breeding respect is that the population is growing faster than increases in food productivity. The need to improve crop productivity, to reduce the use of harmful agrochemicals and to produce nutritious and healthful food is greater today than ever before.

Sustainability (Protection of Environment and Biodiversity). The new concept implies meeting current human needs while preserving the environment and natural resources needed by future generations. To meet this demand, it may be the organic breeding.

Globalization. Its consequence, a conflict has been generated between multinational and local Seed Companies, and between the multinational and local breeders.

Global warming. Global climate change may lead to changing the local environmental conditions also in Europe. The consequence including the change in quality and quantity of biotic and abiotic stress.

Conventional or organic breeding? Organic sector of European agriculture is rapidly growing. Organic crops and varieties are required transgene free, implicitly organic farming sector needs special varieties.

Breeding for food or biofuel use? The main task of plant breeders are the optimization of the fatty acid composition in plant oil in addition amilose and amilopectin ratio in starch for both food and biofuel use.

Conventional or transgenic breeding? Most of the issues mentioned earlier, beg for molecular and biotechnical solution in plant breeding. Biotechnology based conventional breeding, offers appealing opportunities to develop new varieties capable to meet the new challenges.

Plant breeding contribution to meet the challenges. Considering the magnitude of the challenges we face, we should in general use all new knowledge and tools that can contribute to overcome the previous mentioned problems. Fundamental research in plant biology including molecular genetics, molecular biology, genomics, molecular physiology, and new interdisciplinary fields, as *in vitro breeding*, *molecular breeding* and *transgenic breeding* will help our capability to prevent the bad consequences or to overcome above mentioned difficulties.

Conclusion

It is clear that the challenges we face in the 21st century are greater than those we faced in the last century. Agriculture is called upon to produce more food and feed, more fuel and more industrial raw materials, I hope, modern plant breeding used *in vitro*, molecular and transgenic approaches is a magic bullet that will solve all of above mentioned problems and will play a key role in achieving those goals.

Key words: sustainability, globalization, *in vitro* breeding, molecular breeding, transgenic breeding