A Review Paper on Threats and Future Viewpoints of Plant Biotechnology

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ABSTRACT: ***Under changing environmental conditions, developments in the understanding of plant biology, novel genetic tools, genome modification and omics technologies produce new options for food protection and novel processing of biomaterials. New candidates for genes and germplasm that are supposed to lead to improved crop yields and other plant traits under stress must pass long phases of development based on trial and error using large-scale field assessment.Therefore, combined with decision-making algorithms, quantitative, objective, and automated screening methods are likely to have several advantages, allowing the most promising crop lines to be rapidly screened at an early stage followed by final mandatory field experiments. The key objective of the plant biotechnological revolution in agriculture should be the combination of novel molecular methods, screening technologies and economic evaluation.The potential contribution of plant and agricultural biotechnologies to solve some of the major issues of world population, food supply, and climatic-environmental changes are discussed elsewhere. This is further emphasized by a recent report clearly revealing that world population is unlikely to stop growing this century, contrary to previous estimations.***

KEYWORDS:Biomaterials, Biotechnology, Candidates, Food, Plant, Agriculture, Guidelines.

INTRODUCTION

Development of novel plant-based biomaterials, which is an additional plant agriculture goal, is discussed separately here. Although agricultural production has progressed impressively over the past decades, owing, among other factors, to the introduction of biotechnological instruments, it is necessary to address a number of remaining important issues. The key current plant and agricultural biotechnology missions are listed below and are discussed further in this opinion article[1].

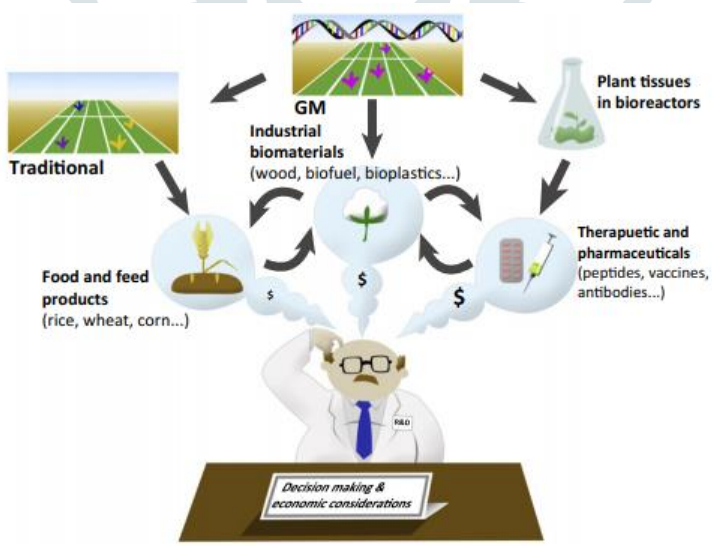

Figure 1: Illustrates the plants as factories for biomaterials[2]

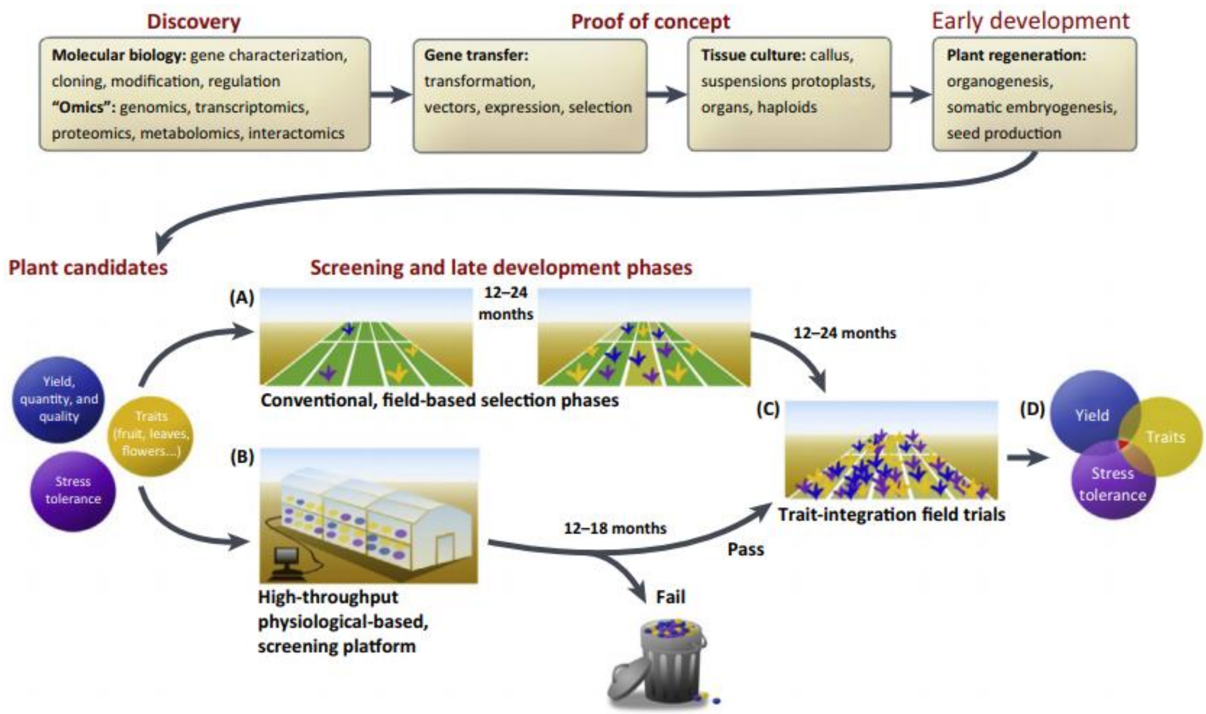

Figure 2: Illustrates the Bridging the genotype–phenotype gap[3]

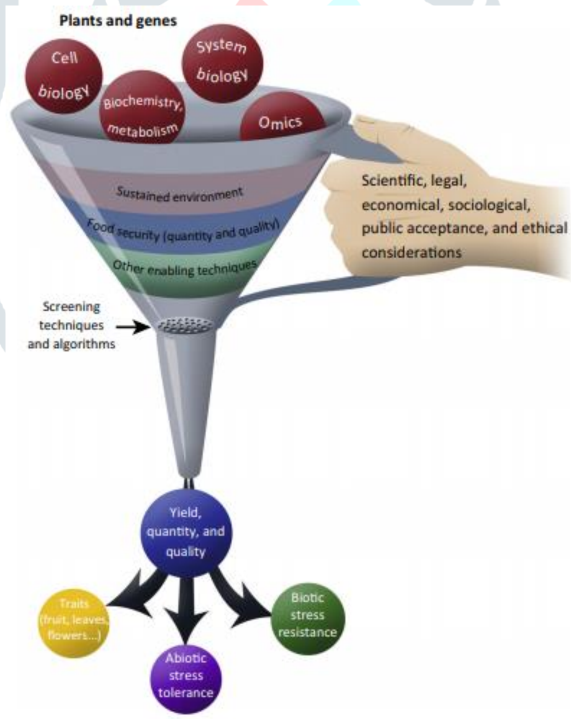

Figure 3: Illustrates the agricultural biotechnology processing and screening funnel[4]

Unlike laboratory studies, without robust testing procedures and screening techniques using accurate algorithms, as depicted by the funnel screen, the realisation of plant biotechnologies in the field cannot be translated and applied to agricultural practises. Multinational research already takes biology-farming crosstalk into account, paving the way for the more successful and sustainable production of new cultivars (Figure 2)[5].

DISCUSSION

Sustainability (practicing agriculture vis-a'-vis taking care of our ecosystem and maintaining a healthy ecological balance), food security (i.e. yields-both quantity and quality-supplying caloric needs, proteins, lipids, vitamins, and all other nutritional needs are the key objectives of plant and agricultural biotechnology, which are illustrated as the processing and screening funnel (Figure 1)[6]. (e.g., plant-based pharmaceuticals, bio plastics, biofuels).Since the first agricultural revolution, the broad pool of millennia-old plant and gene resources (at the top of the funnel) originating from ancient plant evolution and domestication has been accompanied by incremental, long-term improvements in the qualitative and quantitative characteristics of crops through continuous natural and human-directed breeding and selection[7].

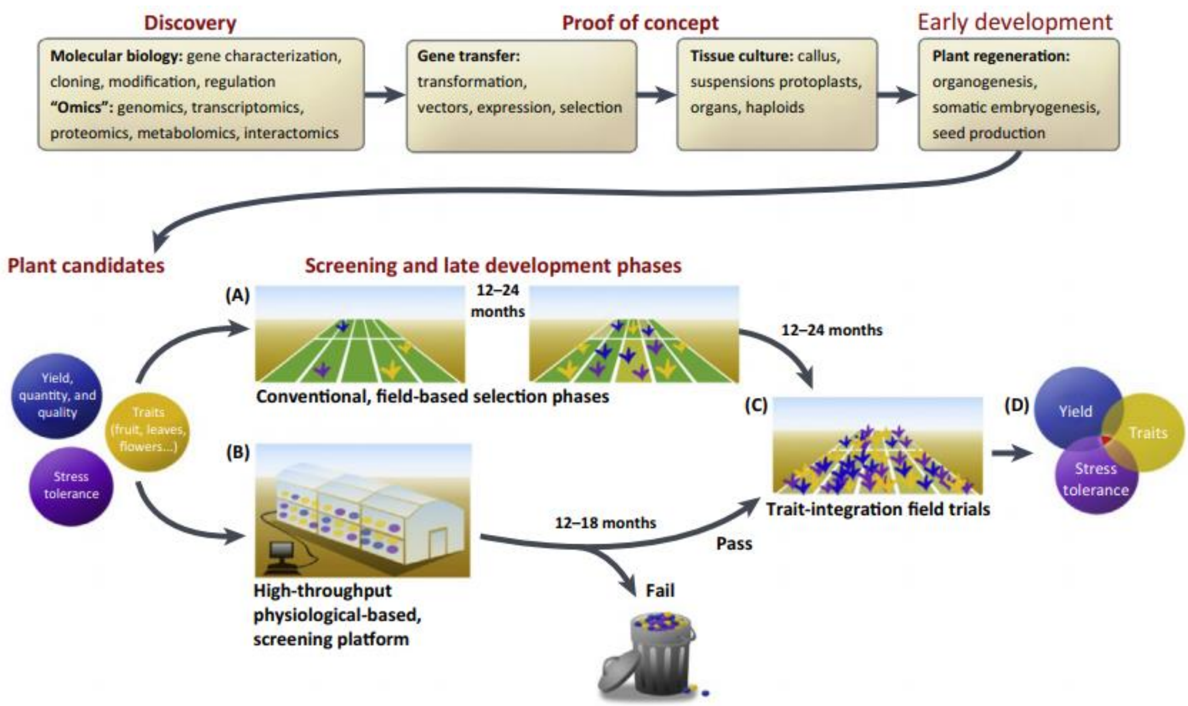

Figure 4: Illustrates theBridging the genotype–phenotype gap[8]

One of the key dreams of agro technology is pre-field phenoltyping to increase the proportion and number of high-potential crop candidates, thus saving time and money and bridging the genotype-phenotype gap (Figure 2). As seen in the discovery panel, gene discovery combines methods and procedures for molecular biology and omics. This is accompanied by the proof of concept panel, which involves phases of gene transfer and various operations of tissue culture. Following in vitro plant regeneration, early production of transformed plant candidates occurs, producing plant candidates for different traits[9].Figure 1 illustrates the plants as factories for biomaterials. Figure 2 illustrates the Bridging the genotype-phenotype gap. Figure 3 illustrates the agricultural biotechnology processing and screening funnel. Figure 4 illustrates the Bridging the genotype–phenotype gap.

CONCLUSION

Although the implementation of novel molecular marker-assisted crop breeding and genetic engineering has brought plant agricultural biotechnologies to fruition, it is important to distinguish the several significant achievements from many remaining issues and to point out potential needs for R&D.The use of genome mapping and omics markers resulted in remarkable success at the genotype level and became normal in the breeding of multiple field, horticultural, and forest plants. Improved agricultural techniques (e.g. precision agriculture) are increasingly being implemented at the phenotype stage, resulting in improved agricultural, horticultural, and forestry yields and quality characteristics. Furthermore, new high-throughput selection systems are being developed to allow for rapid pre-field screening of specific characteristics and may eventually become routine.

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