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Editorial

Plant science with relevance to biotechnology

Plants and other photosynthetic organisms are not only the food source for other organisms including humans but also oxygen and carbon suppliers. These amazing organisms are able to transform light energy into carbohydrates using atmospheric CO_2. Throughout centuries of evolution and human activities, most plants are no longer identical to their ancestors. Intensive breeding processes have turned crops into almost new species, improving some of their traits in benefit of human interests. With the rise of the genetic era, plants have also become good factories for foreign proteins and metabolites useful in the industrial and medical fields, among others.

Human population is continuously growing at exponential rates. It is expected that it will reach nine billion by 2050. Thus, a key problem for humanity is figuring out ways to efficiently produce food and energy for such a future population in limited regions of the globe where crops grow.

Plant Biotechnology has helped throughout history to improve crops yield. In this sense, traditional plant breeding, nowadays assisted by molecular markers and other molecular tools, has opened the doors for the selection of individuals better adapted for specific regions or growth conditions.

However, and according to the literature, potential and real crops production is almost reaching its plateau and novel strategies must be applied to increase crop yield. First and second generation GMOs have demonstrated a significant improvement in this sense but more research and development are needed to overcome the current yield boundaries. Biotic and abiotic tolerant crops may be the opportunity to make a dramatic increase in production and also allowing us to grow crops in stressful environments not suitable for today's strains.

The scientific literature exhibits many examples of technologies using transgenes, both in model plants and in crops, to improve a plant tolerance toward a specific stress. Notably, most of them have not become a market product yet. It is possible that prolonged field and safety trials are slowing down the arrival to the market, but it is more likely that most of these technologies are only effective under lab conditions, losing reproducibility under the highly variable natural environments. At least two situations are truly risky in this type of technologies, the scale up from a model plant to a crop and the scale up from the greenhouse or the culture chamber to the field. For these reasons it is very important to test transgenic plants in different conditions and to evaluate the yield in each of them.

Even when GMOs are not used for food production but as proteins or metabolites factories the production yield must be evaluated and compared to other systems like bacteria or yeast. This gives the study a real meaning, especially when its aim is the development of a technology to produce such metabolite or protein and its future scale up. When plants are used as oral vaccine factories, effectiveness of vaccination, at least in model animals, must be evaluated to validate the technology.

Since many agronomic crops and ornamental species are recalcitrant to transformation, novel methods and strategies of plant transformation as well as the development of new vectors with particular advantages are relevant.

The Plant Section of the Journal of Biotechnology aims at publishing articles describing novel genes capable of conferring beneficial traits to plants for the sustainable production of food, fuel and renewable materials; novel plant transformation methods, novel technologies to obtain metabolites useful in the industry and fundamental Plant Science research potentially useful for Plant Biotechnology. Reports on genes whose orthologs have been previously described in other species or whose function has already been analyzed in other plant systems will be considered only if the research significantly contributes new Biotechnological insights. Likewise, the identification of novel reference genes for expression studies will not be considered without additional contribution to Biotechnological applications.

In a broader sense, the Journal of Biotechnology aims at publishing relevant contributions in which the rigorous application of the scientific methodology is a prerequisite *sine qua non* while relevance to Plant Biotechnology must be clearly demonstrated and is undoubtedly a second requisite. Articles reaching these requisites and presenting novelty are welcome.

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