Genetic Rights Foundation

PARTICIPATORY RESEARCH AND THE USE OF "SOFT" BIOTECHNOLOGY IN THE AGRO-FOOD SECTOR: A POSSIBLE ANSWER TO GMO

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The environmental and socio-economic crises, which characterise the present and will undoubtedly shape the future, offer great opportunities for scientific research and innovation technology.
International debate has for years been dominated by the inexorable rise in the numbers of dispossessed people in the world, together with the problems of famine and scarce water resources as well as climate change and the unstoppable loss of the planet's biodiversity.
These problems are closely intertwined even if their causes, the responsibility for them and their moral implications are widely different.

The clearcutting of primary forests, for instance, is one of the main causes of the loss of terrestrial biodiversity, but it also contributes to nearly 20% of global green house gas emissions. Legal and illegal logging activities in many countries also imperil the existence of various indigenous populations.
On the other hand, climate change is being felt more severely in the poorer regions of the world where the population already faces many serious risks due to the high levels of poverty and low standards of hygiene and healthcare.
At the same time, the effects of flooding, which are exacerbated by climate change, will have a notable impact in the countries of South East Asia which are already subject to typhoons and tropical storms

Even if many of these problems touched on call for political action rather than technological solutions, research and innovation obviously have an important role to play.
Italy, like many other countries, needs to prepare and adapt its own agricultural production to be able to address the effects of climate change, the demand for biomass and to improve pest resistance.
These characteristics can be acquired through traditional selection making use of the availability of genes already present in wild or non commercial plant varieties.

For instance, a maize variety which is particularly drought resistant, has been selected through traditional hybridisation as part of a project which has involved NGOs, growers' associations and research bodies, all of whom contributed to the gathering of different varieties of maize throughout the world. Maize hybrid ZM521, as it is known, is able to guarantee improvements in crop yields of between 30% and 50% when compared to traditional varieties in drought affected areas. The maize is now being made available free of charge and its use is spreading in Africa and South America.
Similar successes of the use of traditional hybridisation are also to be found in the selection of drought resistant wheat varieties in Australia and of a type of sweet potato which has higher concentrations of provitamin A in Africa.

In some cases however traditional variety selection techniques could take a long time and risk including the transfer of unwanted characteristics from the donor variety.
Modern understanding of molecular biology and genetics, used to produce GMO, may offer a valid tool for the rapid and reliable identification of individuals carrying the genes encoding the desired

character. Repeated cross breeding leads to what is known as “introgression” of the suitable genes which then continue through their subsequent progeny.
The variety which is produced thanks to MAS (Marker Assisted Selection) does not contain DNA fragments which are alien to its species at the moment of introgression as its characters are reproduced sexually - which can take place only between individuals either of the same or sexually compatible species.
As opposed to GMO, this guarantees environmental “integrity” for the new varieties, which leads increased public confidence and acceptance and therefore they are more readily suitable for commercial use.

MAS has shown itself to be particularly useful for the selection of different plant varieties which produce higher yields or are more pest resistant or are more tolerant of saline environments or have better nutritional qualities.
Compared with GMO which have been mainly produced for the commodities market and intensive farming, mas has proved to be a useful tool in improving varieties of wheat, sorghum, cassava, maize and millet the production of which is aimed predominantly at local consumption in different developing countries.
The introgression of genes conferring water submersion resistence through mas application has led to a rice variety which yields double that of conventional ones even when the plant has been submersed underwater for more than ten days. this new variety, the result of just three years of work, is ready to market in india and bangladesh and, as all of its other characteristics are the same as the original variety, has immediately found favour with growers.

Apart from MAS, micro-propagation has also been used successfully in various developing countries since the 1990s. The technique consists in multiplying healthy individuals in cell cultures which, once they grow into seedlings are then planted in the field. In many cases, the use of plants from different production centres has interrupted the propagation of some pathologies IN plant species such as potatoes, cassava and bananas. the asexual reproduction of these species is responsible for their genetic drift exposing them to pathogens that pass from one generation to the next thus threatening their survival.
Apart from being inexpensive, this technique can also be adopted by the people who are interested directly, as happens in some small centres of production of seedlings destined for the local market in Vietnam as well as Mali and Gabon in Africa. Some of these centres are even able to export a part of the selected seedlings to European counties such as Spain and France, further helping the local economy.

Many Italian research organisations have also successively being applying MAS techniques for a number of years and have seen improvements in such plant varieties as tomatoes, wheat, peppers and plums.
Apart from the potential which has been outlined, it is also important to bear in mind that scientific innovation should go hand in hand with new planning models and the development of research and its technological applications.
The participatory process envisages the involvement of research bodies, collective interest groups (environmental and consumer associations, representatives of food producers) as well as institutional bodies, from the very beginning of research. In this way the potential impacts of the project, be they positive or negative, can be identified and evaluated from the outset, thus promoting social acceptance of the final product.

The championing of agricultural-food research, in which interested parties are engaged from the very beginning, which foresees the use of “soft” biotechnology and guarantees easy access to the end product, could be the Italian answer to GMO.

The necessary preconditions to overcoming the stale debate on whether it is necessary or not to resort to genetically modified plants therefore already exist. What is needed is a competitive and innovative agricultural/food producing market which is able to respond to environmental and social needs and which, at the same time, underlines the importance of high quality organic products.