

CIP Position Paper

Approved by CIP Executive Committee on November 2015

Responsible Use of Biotechnology at CIP

CIP is committed to reducing poverty and achieving food and nutrition security on a sustained basis in developing countries through scientific research and related activities on potato, sweetpotato, and other root and tuber crops and through improved management of natural resources. CIP uses many available technologies to achieve the goals of improving agricultural productivity, increasing income from agricultural activities and providing more nutritious and healthy food to the resource poor. Genetic Modification (GM) is just one of many of technologies that CIP employs to achieve these goals.

Biotechnology makes use of living cells, microorganisms, or functional parts thereof, such as enzymes or proteins, for the research, development and deployment of useful products. In particular, one technology derived from biotechnology known as genetic engineering, transgenesis, or more commonly as GM enables the addition of genes into genomes to accelerate genetic improvement of existing or new varieties to help these sustain biotic and abiotic constraints during production and post-harvest, and acquire additional nutritional benefits. GM and genome editing techniques can directly introduce new genes, change the expression of endogenous genes, and even switch gene sequences.

For almost two decades, GM crops have been cultivated worldwide at an unprecedented rate of adoption. Equivalent to 80% of the total area of China or the US, GM crops are now grown in 28 countries by 18 million farmers of which 90% are small-holder and resource-poor farmers (Clive 2014).

There is no other agricultural technology that has seen such a fast adoption rate in recent history — thanks to the benefits GM brings. On average, GM crop cultivation has reduced chemical pesticide use by 37%, increased crop yields by 22%, and increased farmer profits by 68%. Interestingly, yield and profit gains are higher in developing countries than in developed countries (Klümper and Qaim 2014). Insect and disease control traits in potato and sweet potato may also provide significant benefits to small holders around the world.

CIP is convinced that GM crops can contribute to the agricultural development goals towards food security, poverty eradication, nutritious healthy diets, and more sustainable use of natural resources. CIP is committed to achieving its mission of a world without hunger and poverty that can only be attained by making responsible use of all available technologies including GM. However, like any new technology, GM has raised concerns. Another emerging biotechnology, genome editing, is just starting to deliver impressive breakthroughs in human therapy and crop improvement. Though barely commercialized, it raises similar concerns as GM technology has. Exploring these concerns, staying on top of the evolving science and aligning CIP's position with the goals of improving the lives of small holder farmers must always be prescient drivers behind our determination to adopt a new technology.

Concerns, perceived risks of GM crops

Almost as early as its first commercial successes, GM crops received much attention from scientists, industry, consumer associations, environmental protection societies, regulatory agencies, non-

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governmental organization, and civil society. Risks were formulated as well as concerns that were, and are still, addressed through widely accepted risk assessment methodologies and regulatory frameworks. As new GM crops continue to be developed, new concerns arise while others fade away.

Early concerns focused on safety to human health and possible long term effect of genetic modifications. Other concerns focused on the effect of GM crops with new traits would have on the environment in terms of biodiversity, crop relatives, and non-target organisms. Certainly the concentration and consolidation of GM crop production by a few commercial actors has fueled other economic and proprietary concerns. The spectacular performance and adoption rates generated by GM crops raised additional concern that GM crops may push aside existing and practical traditional knowledge, alternative crop management approaches, and conventional crop improvement products.

Today, an abundance of scientific literature exists on many of the concerns raised about GM crops. The research-based literature indicates that there are no negative impacts on health and the environment after two decades of cultivation. CIP has monitored the progress and done its own testing on GM potato and sweetpotato. Trait specific studies, analysis of compositional changes, and environmental impact assessments have been conducted including some led by CIP. The results of these tests give us further reason to be optimistic about the safety and efficacy of GM crop technology. Still, CIP adheres to the principle of acting responsibly in its use of GM and continues to analyze risk and impact of this technology to ensure that it achieves the desired results and does so comparably better than available alternatives.

Responsible Use of GM

GM for a purpose

Keeping the Center's mission in mind, CIP will use new plant breeding techniques purposefully, validated by peers and supported by the Center's stakeholders. The most compelling reason to do so is that GM products should be developed when other techniques are shown to be significantly less effective in achieving the desired ends. For example, CIP may tap into the gene pool of wild relatives of potato to transfer disease resistance genes to protect existing widely adopted varieties from pathogens. Decisions to use GM crop technology will come with gender and farmer preferences. Women-preferred traits and varieties with low-input seeds, nutrient-enrichment traits, and safer food are some examples of what CIP may consider. GM crop approaches to insect and disease control in potato and sweet potato should be considered as potential solutions to significant problems that have been challenging to solve by other means.

Freely accessible GM crops

Powerful technologies tend to be rapidly monopolized through intellectual property rights such as patents and trade secrets, such is the case for many biotech innovations. CIP will develop GM products as global public goods and ensure they have minimum proprietary restrictions and technology-associated costs that will make them easily accessible by resource-poor farmers. Research and

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development will include participation by resource-poor farmers, it will be transparent, and it will consider the opinions and values of partners, civil society organizations and other stakeholders.

Safe GM crops

CIP will ensure the safety all new technological innovations compared to existing and accepted risk levels. On a case-by-case basis, following science-based criteria, potential risks associated with GM crops products will be assessed. CIP will evaluate the stability of crop characteristics, impact on the environment and non-target organisms, food safety, and cultural, social and economic aspects.

GM in partnerships

CIP will work with national partners, using the best expertise available, to move GM crops from research to development and assure confidence in the product. If a recipient country lacks the expertise to conduct its own safety assessments, CIP will work with national partners to develop appropriate strategies and methodologies. CIP is also sensitive to concerns surrounding the release of GM crops in their center of origin and diversity and will always respect stakeholders' decisions.

GM responsibly

Stewardship of GM crops is an essential feature of CIP's conduct in research and development. CIP will comply with national or regional biosafety, food, environmental and policy regulations and will act responsibly and not distribute GM crops to any country that does not have biosafety regulations.

A Common Voice

Over the two decades that have passed since the introduction of GM crops, the science of them has been honed and opinions about them both for and against have evolved as well. Similarly, CIP's position on this field's applicability to potato and sweetpotato research will evolve as well. It is incumbent upon the organization to share this position with CIP's staff to incorporate their feedback and to develop an inclusive position. Sharing science and information also enables CIP staff to explain CIP's position to others and provides them with greater comfort with the topic when asked.

Source of cited data

Clive, J. (2014). Global Status of Commercial Biotech/GM Crops: 2014. *ISAAA Brief* No. 49. ISAAA: Ithaca, NY, USA

Klümper, W., & Qaim, M. (2014). A Meta-Analysis of the Impacts of Genetically Modified Crops. *PLoS one*, 9(11), e111629.