

Genetically Modified Rice Successfully Stored in Gene Bank

Alice Stuart-Brown

Rice has always been a versatile tool. From its use as a primitive form of cement when building the Great Wall of China, to providing nearly 20% of modern global caloric intake and acting as the main food source for 3 billion people worldwide, it has been an irreplaceable staple for humans for centuries. There are thousands of varieties of rice, but they are all in danger from the overwhelming threat of climate change (Ricepedia, 2018).

The International Rice Research Institute (IRRI) is out to change this. This largest gene bank in the world can be found in the Philippines; they are safeguarding over 100,000 varieties of rice to protect food supplies in a world with an ever-changing climate (International Rice Research Institute - IRRI, 2018).

Why is so much time being invested in rice?

Rice is an ideal food source to store in case of a global food crisis. Not only is it already a staple in our diets but it can be stored for long periods of time at low temperatures. Over the past 57 years, the IRRI has been dedicated to reducing poverty through growing rice. Rice is relatively easy to grow and produces a high yield so is ideal.

What is currently threatening rice yields?

Flooding is becoming an increasing problem due to rising sea levels and the predicted increased intensity of tropical storms with climate change. 20 million hectares of the world's rice-growing area is at risk of flooding in places such as India, Bangladesh, and China. Southern Asia is already one of the wettest regions on earth. It receives an average of 1000mm of rainfall annually, but increasingly severe weather is putting India, Bangladesh, and China at risk. The rise in temperatures due to climate change will mean an increase in evaporation which eventually results in more storms over areas already prone to such events (Pmm.nasa.gov, 2018).

In addition to its work towards preventing global food crisis, the IRRI can also address many issues raised by climate change, such as excess soil salinity from rising sea levels. Rice is usually only moderately tolerant of salt and yields are often majorly reduced when there is excess salt in the soil, but researchers can genetically alter some varieties to survive such conditions. The latest variety of rice to be stored successfully has been aptly named "scuba rice." Scuba rice has been genetically modified to withstand being submerged in flood water, and has been successfully grown in the large rice producing communities of Southeast Asia and researchers are currently investigating how to grow it successfully in Africa.

What issues are the IRRI facing?

Although genetically modified (GM) rice seems like a perfect solution to the global food crisis, many people have issues with GM crops. For example, people are wary of modification due to



Figure 1. Farmers transplanting seedlings in a flooded rice field in Asia. (Image from IRRI collection. Photographer information unavailable).

the potential for them to agitate allergies and potentially cause human disease. To create as many varieties of rice as the IRRI have, they must take genes from a wide array of organisms; some of these may be allergenic. There is widespread worry that consuming food containing genes from the allergen will cause a reaction. However, the many the regulations placed on food make this extremely unlikely. Before any food is allowed to be marketed and sold, it must reach certain standards; these regulations transcend national borders and are set by the World Health Organisation and the Food and Agriculture Organisation of the United Nations. For a GM crop to be marketed, the inserted protein must be compared to all known allergens. So far, no allergens have been found in GM products approved for human consumption. (Geneticallymodifiedfoods.co.uk, 2018)

Another worry is the risk of 'gene flow', in which the modified plants could pollinate non-modified plants to create hybrid offspring. For this phenomenon to affect the wild crops significantly, the trait that has been modified would need to be a desirable trait for survival in the wild, and this is not always the case. (Nuffield Bioethics, 2018)

Although there are worries about genetically modified crops, the benefits far outweigh the risks. Scientists are already seeing the catastrophic effects of climate change while dealing with a rapidly growing population. Traditional agricultural methods and natural crops will one day no longer serve their purpose, but genetic engineering could be the lifeline humanity needs.

REFERENCES

Ricepedia. (2018). Rice as a crop - Ricepedia. [online] Available at: <http://ricepedia.org/rice-as-a-crop> [Accessed 2 Nov. 2018].

International Rice Research Institute - IRRI. (2018). International Rice Research Institute - IRRI - Rice science for a better world. [online] Available at: <http://irri.org/> [Accessed 2 Nov. 2018].

Pmm.nasa.gov. (2018). How does climate change affect precipitation? | Precipitation Measurement Missions. [online] Available at: <https://pmm.nasa.gov/resources/faq/how-does-climate-change-affect-precipitation> [Accessed 2 Nov. 2018].

Geneticallymodifiedfoods.co.uk. (2018). Ethical Concerns and GM Foods. [online] Available at: <http://www.geneticallymodifiedfoods.co.uk/ethical-concerns-gm-foods.html> [Accessed 2 Nov. 2018].

Nuffield Bioethics. (2018). Concerns about GM crops - Nuffield Bioethics. [online] Available at: <http://nuffieldbioethics.org/report/gm-crops-developing-countries-2/concerns-gm-crops> [Accessed 2 Nov. 2018].