Cambridge Pre-U

Cambridge International Examinations
Cambridge Pre-U Certificate

GLOBAL PERSPECTIVES **9766/11**

Paper 1 Written paper **May/June 2017**

INSERT (Resource Booklet)

1 hour 30 minutes

READ THESE INSTRUCTIONS FIRST

This Resource Booklet contains Documents 1 and 2 which you should use to answer the questions.

You should spend approximately 10 minutes reading the documents before attempting to answer the questions. This is allowed for within the time set for the examination.

CAMBRIDGE International Examinations

The documents below consider the challenge of Genetically Modified (GM) crops. Read them **both** in order to answer **all** the questions on the question paper.

Document 1: adapted from *GM – For Food Sufficiency and Environmental Protection* by Professor Jonathan Jones. The author is a senior scientist at a British university and co-founder of a biotechnology organisation. The article was published online in 2015.

There are now over seven billion humans, and there will be two billion more by mid-century. Over a billion are hungry today.

Civilisation depends on efficient food production. In the last 100 years food production per acre has increased by up to ten-fold because of plant breeding, chemical fertilisers, chemicals for pest and disease control and mechanisation of agriculture. But production must be doubled again by 2050, because as world living standards rise, people demand diets richer in animal protein; this requires animal feed, which requires more crops.

Since 1982, we have been able to add or modify genes to protect plants from diseases and pests and improve crops in benign ways impossible by older methods. Their design is based on knowledge of what genes do, in contrast to the scattergun approach of traditional breeding or the use of chemicals or radiation to induce mutations.

Genetically Modified (GM) crops contain an extra gene that provides resistance to certain insects and therefore require much less pesticide. Thanks to GM, over 200,000 tons of insecticide has not been applied and therefore not run off the land to poison rivers, lakes and oceans. Contamination of our food by cancer-inducing toxins is also reduced in insect-resistant GM corn because without the insect damage, fungi cannot invade the plants.

In Europe, farmers spray potatoes with fungicide 15–25 times per season to control diseases. GM disease resistance can reduce or eliminate these sprays. The rapid adoption of GM herbicide-tolerant soybeans has also reduced ploughing or tilling for weed control. This “no-plough” farming is more sustainable, helps maintain organic matter in soils and shrinks agriculture’s carbon footprint. Admittedly, reliance on one herbicide has resulted in herbicide-resistant weeds but the solution is to deploy and rotate different herbicides and herbicide-resistance genes.

The technology has been a resounding success. In 2010, GM crops were grown in 29 countries on more than 360 million acres by 15.4 million farmers, 90% of whom are smallholders. Farmers use GM crops because output increases, costs decrease and less hazardous chemicals are needed. In 2011, 88% of US maize, 94% of US soybeans and 90% of US cotton was GM.

Myths about GM crops do not withstand scientific scrutiny. Decades ago, when molecular approaches to plant improvement were relatively new, caution was justified. Now, we need to worry that excessive regulation is preventing GM methods from increasing output. Ultimately those who lose most will be those we cannot feed.

Document 2: adapted from *There Are Solutions – But They're Not GM* by Emma Hockridge. The author is head of policy at the Soil Association, having previously worked for the Department for Food and Rural Affairs. The article was published online in 2015.

Despite huge amounts of research funding, GM crops have failed to deliver the promised benefits. In recent years increasing numbers of scientists and policy makers have highlighted the importance of organic farming to feed the world in a future of increasing oil prices and the need to cut greenhouse gases. This is supported by the largest ever review of its kind, The International Assessment of Agricultural Knowledge, Science and Technology for Development report supported by 400 scientists and 60 countries.

We need to be honest about the failures of certain technologies – such as GM – to provide food for a growing global population. The majority of the world is fed by small, local, often organic farmers. Their systems are better for the environment and for animal and human welfare. The 'Green Marshall Plan', published by the United Nations (UN) in 2011, has condemned large-scale, chemical approaches to boost food production. Further research from the UN has shown that the adoption of organic and near-organic farming practices in Africa have doubled production, improved access to food for farmers and local communities and raised incomes through the use of low-cost, locally available technologies.

Almost all the claims made for GM crops by supporters of the technology are about benefits that GM technology will deliver in the future. This is not new – such claims were being made in the late 1990s, when GM crops were first introduced. But assertions that GM crops will solve world hunger, or will deliver drought resistant, nitrogen-fixing or nutrient rich crops, are not science but prophecy. The pro-GM lobby and the media treat these claims as if they are science, but none of them are based on scientific evidence. They are opinions, often expressed by companies or scientists with a strong financial interest in seeing them treated as fact.

GM products also have adverse impacts in the real world. Once a GM variety has been grown, contamination makes it hard for the farmer to revert to non-GM crops; so GM crops tie farmers into long-term relationships with GM seed producers. This allows these companies to exert considerable power over farmers. From experience, we know that GM is a 'one in, all in' technology, effectively stopping farmers over a wide area growing non-GM or organic crops where a GM variety of the same crop is grown.

We don't have more time and money to waste on this outdated and niche technology. Instead, we need to focus our research and policy attention on the areas of agriculture which really hold the answers for the future. Increasing numbers of scientists and policy makers around the world accept the scientific evidence that systems such as organic farming will deliver the range of outcomes we need from farming – more affordable food where it is needed most, more farmland wildlife, better animal welfare, more farming jobs, less pollution and lower greenhouse gas emissions.

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