Cambridge Assessment International Education

Cambridge International AS & A Level

GLOBAL PERSPECTIVES & RESEARCH **9239/11**

Paper 1 Written Examination **May/June 2020**

INSERT **1 hour 30 minutes**

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INFORMATION

- This insert contains all the resources referred to in the questions.
- You may annotate this insert and use the blank spaces for planning. **Do not write your answers** on the insert.

This document has **4** pages. Blank pages are indicated.

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The following documents consider issues related to genetic engineering. Read them **both** in order to answer **all** the questions on the paper.

Document 1: adapted from *In Latin America, a growing backlash against genetically modified (GM) food*, written by Simeon Tegel in 2013 for Public Radio International (PRI). PRI is a nonprofit global news platform which aims to 'share powerful stories, creating opportunities to help people take informed action on stories that inspire them.' The author is a journalist in Peru and has a degree in Latin American Studies.

LIMA, Peru – In Latin America, vast quantities of genetically modified (GM) crops are grown. Together, Argentina, Brazil and Paraguay have roughly 120 million acres of GM crops, mostly soybean and corn. However, Ecuador actually prohibits them and Peru recently voted to delay a decision on GM crops for 10 years.

Are GM crops the answer to global hunger and climate change? Supporters say genetically modified organisms (GMOs) increase yields, allow the world to feed a growing population, and will even help farmers adapt to climate change. Or are GM crops "Franken-foods", i.e. foods with genes put together with unknown future consequences? Already, critics have warned that GMOs are dangerous to the environment and might affect human health. GMOs have also made some farmers dependent on the corporations that provide the seeds and herbicides.

Critics are concerned that GM crops could cause new allergies and do affect nearby non-GM crops and wild plants. In 2003, University of California scientists discovered that DNA from GM corn had entered local crops in Mexico. As Mexico has a huge variety of wild and domesticated maize, this change in DNA has far-reaching consequences for bio-diversity.

Grain, a nonprofit organisation that supports small farmers, states that 48 million acres (60% of Argentina's agricultural land) is now used to grow GM soy, mainly for export. This is a huge change from its traditional exports of beef and wheat. The change began in 1996, when – without any legislation – the first GM soy was planted. A Grain spokesperson told us, "The impact has been brutal, because of the amount of herbicides that they need." Grain said Argentina's massive soy harvest requires an annual spraying of 50 million gallons of Roundup, a herbicide manufactured by Monsanto, the corporation that has led the GM revolution. Monsanto also sells many of the GM soy seeds to Argentine farmers. The Argentinian government has agreed to Monsanto's demands that farmers be banned from sowing seeds collected from GM crops. This means growers are forced to buy more from the company after every harvest. "It is all about Monsanto selling more seeds and agrichemicals", says Grain.

PRI contacted several of the companies that market GM seeds in Latin America. Cargill and Monsanto did not respond, and Dupont said its staff was too busy to discuss the matter. However, a spokesperson for German pharmaceuticals giant Bayer, in a written response, described GM crops as "the most intensively studied plants in the world." Bayer claimed that research has cleared them of being harmful to human health. Bayer admitted GM crops have endangered genetic diversity but blamed that on modern large-scale agricultural techniques rather than GMOs. "Farmers can decide for themselves," he added. Despite these arguments leaving many unconvinced, vast agricultural areas are used exclusively for GM crops.

So, "Franken-foods" are now a central part of the global food supply. Only time will tell what their effects on human health and the environment really are.

Document 2: adapted from *Latin American GMO powerhouse Brazil expands portfolio of crops with intro of new herbicide resistant soy*, written by Daniel Norero in 2015 for the Genetic Literacy Project, which aims to promote public awareness and discussion of genetics and biotechnology. The author is a biochemist and works in the Laboratory of Molecular Plant Pathology at the University of Chile. He is the founder of the biotechnology advocacy movement: "I Do Want GMOs".

Brazil is currently one of the world's leading developers of GM crops and the second largest GM grower in the world, with 104 million acres in 2014; 72 million of this is GM soybean. More than 93% of the country's soybean crop, almost 90% of the corn crop and more recently 65% of the cotton crop is GM.

The Brazilian National Technical Commission on Biosafety is in charge of approving new GM crops in Brazil. It is considered one of the most effective commissions worldwide. It is internationally recognized as having one of the strictest approval processes. It has a clear regulatory framework using the new "11.105 law" of bio-safety.

Beans are as common on Brazilian dinner plates as corn tortillas are in Mexico. Brazil's latest home-developed GM soybean has government approval. These GM soybeans are combined with a herbicide, which can be applied from the initial planting until the early plant growth stages. The system was developed with over 20 years of technical cooperation between EMBRAPA, a state owned company associated with the Brazilian Ministry of Agriculture, Livestock and Food Supply, and the private sector.

Brazil's government has embraced GMOs strongly. This is because, according to an analysis in Bloomberg News, Brazilian farmers lack the subsidies and price supports that the U.S. government showers on its politically important farming class. So, Brazil's farmers are more price-sensitive when it comes to such things as seeds, pesticides, and herbicides. Mark Langevin, an international adviser to the Brazilian Cotton Producers Association, says Brazilian farmers have a much greater reason to welcome those GM seeds that yield more, or require fewer pesticides and herbicides.

Brazil is also more open to using GMOs because it is such an exporting giant. GMOs are approved for import in 17 countries, including China, the largest global importer, and the European Union, which is a huge buyer of soy meal.

Clear economic and environmental benefits also support this technology in Brazil. According to agricultural economics consultants Brookes and Barfoot, the economic benefit to Brazil from GM crops is substantial: For the 10-year period (2003–2013) the benefit was USD11.8 billion, of which USD3.4 billion was for 2013 alone. In addition, GM crops have reduced the environmental impact by using less herbicides and pesticides compared to conventional crops.

Other important environmental benefits are saving water, saving agricultural fuel and reducing CO_2 emissions. A study by the Brazilian consultancy "Céleres Ambiental" concluded that between 1996 and 2009 GM crops saved more than 12 billion liters of water. Furthermore, it saved 105 million liters of diesel fuel used in tractors. This is the amount required to supply a fleet of 43 700 vehicles over the same period. Saving this amount of diesel reduces the emission of 270 400 tons of CO_2 into the atmosphere.

All these economic and environmental benefits can be further improved if Brazil continues to progress in the production of GM crops and continues to facilitate their development at a public and private level.

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