1) An agriculture which produces specific landscapes

Soya harvest in Matto Grosso region in Brazil, March 2012, AFP.

Poultry indoor breeding in western France
2) **An agriculture which uses chemical inputs and irrigation**

Fertilisers spreading on a field by an airplane in the USA

http://water.usgs.gov/edu/gwdepletion.html
3) **Performances in Western countries and in India**

### Anglo-Saxon agricultural performances

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>Canada</th>
<th>New Zealand</th>
<th>United Kingdom</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (m sq km)</td>
<td>7.7</td>
<td>10</td>
<td>0.270</td>
<td>0.244</td>
<td>9.6</td>
</tr>
<tr>
<td>Arable land (m ha)</td>
<td>48.3</td>
<td>45.8</td>
<td>1.39</td>
<td>5.7</td>
<td>176</td>
</tr>
<tr>
<td>Wheat¹</td>
<td>6</td>
<td>7</td>
<td>-</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Sheep¹</td>
<td>2</td>
<td>-</td>
<td>6</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Milk¹</td>
<td>14</td>
<td>19</td>
<td>8</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Bovine meat export¹</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GM–planted area (‰ world)</td>
<td>0.7</td>
<td>9.7</td>
<td>Not allowed</td>
<td>Not allowed</td>
<td>69.4</td>
</tr>
<tr>
<td>Share of agriculture in GDP (‰)</td>
<td>3.1</td>
<td>2.5</td>
<td>6</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Caloric supply per capita per day 2002</td>
<td>3054</td>
<td>3590</td>
<td>3220</td>
<td>3400</td>
<td>3780</td>
</tr>
</tbody>
</table>

1. Rank in world production.
2. Gross Domestic Product.
Source: FAO and CNUCED 2002 and 2003

---

**WORD BOX**

- Malnutrition/ hunger/ famine
- Population pressure
- Plastic consumption
- Buffer stocks
- Grain
- Wheat
- Barley, rice, corn
- Soil
- Resilience
- Stress
- Value addition
- M = million
- MT = million tons
- ML = million litres

---

**FACTFILE**

The world's worst recorded food disaster, known as the Bengal famine, happened in 1943 in British-ruled India. An estimated four million people died of hunger that year alone in eastern India (that included today's Bangladesh). The Prime Minister of newly-independent India, Jawaharlal Nehru, said early in 1948, 'everything else can wait but not agriculture'. This awareness led to the government-inspired Green Revolution in order to increase yield, essentially during the period 1967-1978.

---

**DOCUMENT 1**

**Growth of population and food production since the 1950’s**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (m)</td>
<td>361</td>
<td>439</td>
<td>548</td>
<td>683</td>
<td>846</td>
<td>1000</td>
</tr>
<tr>
<td>Food grain production (mt)</td>
<td>50.8</td>
<td>82.0</td>
<td>108.4</td>
<td>129.6</td>
<td>176.4</td>
<td>201.8</td>
</tr>
<tr>
<td>Food grain import (mt)</td>
<td>4.8</td>
<td>10.4</td>
<td>7.5</td>
<td>0.8</td>
<td>0.3</td>
<td>-</td>
</tr>
<tr>
<td>Buffer stock (mt)</td>
<td>-</td>
<td>2.0</td>
<td>-</td>
<td>15.5</td>
<td>20.8</td>
<td>40.0</td>
</tr>
<tr>
<td>Milk production (ml)</td>
<td>17</td>
<td>20</td>
<td>22</td>
<td>35</td>
<td>55</td>
<td>75</td>
</tr>
</tbody>
</table>

Source: Indian Institute of Science

---

**DOCUMENT 2**

**Irrigation: the cornerstone of the Green Revolution**

---

**DOCUMENT 3**

**The stages of the Green Revolution**

The span of 50 years can be divided into four segments, as the ICAR’s Assistant Director-General, Dr. Muthunayaka, says. Up to the mid-60s, the national aim was to increase food production to manage famines and so that raw material to industry. In the mid-60s and 70s, self-sufficiency in food grain production and effective food grain distribution and management was achieved. In the 80s, there was resilience in food grain production, stress on diversification, poverty alleviation and rural employment. In the 90s, the talk revolved around food and nutritional security, sustainability, post-harvest technology and management, value addition and exports.**

*The Role of India, January 6, 2007.*
3) **Excesses of the productivist agriculture: the “mad cow disease” and the Green Revolution drawbacks**

a) Geography of the epizootic disease:

![Map of Europe showing the spread of mad cow disease](image)

The mad cow disease epidemic has spread across Europe. All of the countries in red have reported the presence of BSE in their cattle herds.

b) **What is mad cow disease?**

Mad cow disease, or bovine spongiform encephalopathy, is a neurological disorder in cattle. It is caused by an abnormal protein called a prion that infects a cow’s central nervous system and causes brain and nerve cells to die. Prions are passed to humans through consumption, and that can trigger the human form of the disease.

**How it spreads from cows to humans**

1. Person eats contaminated food. Prions are found primarily in brain or spinal cord tissue from infected animal.
2. After a person ingests infected meat, prions spread to the brain through the body’s lymph nodes and immune system, where they can remain dormant for years.
3. Disease attacks nervous system. Outer layer of brain develops tiny holes, looks spongy. Host goes into seizures; death may occur.

**Prevention**

- **Eradication:** Infected farm animals are destroyed.
- **Regulations:** Animal products containing brain or central nervous system tissue aren’t used as livestock feed.
- **Consumers:** Avoid beef that contains parts of the cow’s main nervous system. Prions are heat resistant, so cooking the meat will not reduce the risk.

Sources: Associated Press, McClatchy-Tribune

Bay Area News Group
Your task: First, explain what are the benefits provided by a productivist agriculture, using and analysing the proper documents. Then, find and analyse the right documents to explain the doubts and dangers raised by such an agricultural model on environment and human health.
1) **Genetic engineering principle**

![Diagram of genetic engineering principle](http://www.anselm.edu/homepage/jpitolch/genbio/geneticsnot.html)

2) **Genetic Modified Food: Monsanto Empire**

An Overview of the Safety and Advantages of GM Foods

Like you, Monsanto employees care about the food we buy at the store and feed to ourselves and our loved ones, and we are committed to developing products that contribute to safe and nutritious food choices. We place the highest priority on the safety of our products and conduct rigorous and comprehensive testing on each. In fact, seeds with GM traits have been tested more than any other crops in the history of agriculture – with no evidence of harm to humans or animals. In addition, governmental regulatory agencies, scientific organizations and leading health associations worldwide agree on the safety of GM crops. As a seed company, Monsanto employees breed, grow and sell seeds to farmers around the world. Because many of the foods we eat and products we use every day begin as seeds, the safety of each of Monsanto’s seeds – whether GM or conventional – is a top priority to each of us. After 30 years of research and assessments, the safety of GM crops is supported strongly by scientific evidence and the conclusions of the global scientific community. In fact, GM crops have been reviewed and tested more than any other crops in the history of agriculture and have been shown to be as safe as conventional crops.

![Monsanto Empire](http://www.monsanto.com/newsviews/pages/biotech-safety-gmo-advantages.aspx)
3) Indian suicides

Indian Farmers Committing Suicide as a Result of Monsanto's GM Crops

Monsanto’s GM crops were supposed to feed the world hunger and starvation but instead the diverse sustainable organic agriculture was replaced with globalization, GMO crop failures and its threat to environment and human’s health, monopoly, farmer’s suicide and world wide control of seeds. Every 30 minutes an Indian farmer commits suicide as a result of Monsanto’s GM crops. In the last decade more than 250,000 Indian farmers have killed themselves because of Monsanto’s costly seeds and pesticides. Globalization and monopoly have forced farmers to buy GM seeds and since GM crops have become pests’ resistance, the farmers have no choice but to purchase Monsanto’s pesticide. Sometimes GM crops fail over and over again; GM crops also do not grow back again next year and every year farmers have to buy new seeds. In 2008 Daily Mail called the continuous suicide of Indian farmers a “genocide” in human history. What’s really disturbing is that often time farmers commit suicide by drinking the insecticide shipped to them by Monsanto. After use of Monsanto’s BT cotton in 2002 the rate of suicide in Indian farmers increased drastically. 90% of Indian cotton farmers changed to Monsanto’s Bt crop hoping that Bt crop are pest resistant and they do not have to buy pesticides. However after a while Bt cotton’s pests resistant quality started fading away and pests adapted so farmers had no choice but to buy and use Monsanto's pesticides. The fact that farmers have to buy new seeds every year, the costly use of GM seeds, use of pesticides and great reduction in crop value have often times left farmers bankrupt and as a result many farmers are falling into the endless cycle of debt, depression, hopelessness and despair and they have no choice but to ends their lives. The figures provided by NY University School of Law show that just in 2009 alone, 17,638 of farmers committed suicide.


Your task: Analyse the 3 documents to explain to what extent Genetics can help feeding the world. In a first part, explain the scientific principle used to give birth to HYV but underline also in a second part its drawbacks with the example of the US firm Monsanto.
In Africa, scientists are hard at work restoring land once rich with biodiversity and vegetation. Eleven countries in the Sahel-Sahara region—Djibouti, Eritrea, Ethiopia, Sudan, Chad, Niger, Nigeria, Mali, Burkina Faso, Mauritania, and Senegal—have joined to combat land degradation and restore native plant life to the landscape. In recent years, northern Africa has seen the quality of arable land decline significantly due to climate change and poor land management. Uniting under the banner of the “Great Green Wall” initiative, national and regional leaders hope to reverse this trend. The bulk of the work on the ground was originally slated to be concentrated along a stretch of land from Djibouti, in the east to Dakar, Senegal, in the west—an expanse 15 kilometers (9 miles) wide and 7,775 kilometers (4,831 miles) long. The project has since expanded to include countries in both northern and western Africa. Land degradation typically stems from both human-related and natural factors; overfarming, overgrazing, climate change, and extreme weather are the most common causes. Beyond affecting land and the natural environment, land degradation poses serious threats to agricultural productivity, food security, and quality of life. Nowhere is this issue more urgent than in sub-Saharan Africa, where an estimated 500 million people live on land undergoing desertification, the most extreme form of land degradation. Jean-Marc Sinnassamy is a senior environmental specialist with the Global Environment Facility (GEF). He helps manage a program developed under the Great Green Wall initiative with countries in the Sahel and West Africa. The GEF has been with the initiative since the beginning, helping to convene country leaders at the headquarters of the United Nations Convention to Combat Desertification in Bonn, Germany, in February 2011. The World Bank and other organizations focused on global development and the environment provide
financial and technical support. For Sinnassamy, the partnership represents a unique opportunity to work across the region with a solid political base. “Here, we saw political leaders, heads of state, ministers in different countries wanting to work on common environmental issues and wanting to tackle land degradation issues together,” he says. “... For us, this is a political blessing. We have to respond to this demand, and we have to capitalize on that.” Beyond the project’s strong political foundation, its carefully crafted approach brings environmental benefits both locally and globally. The initiative uses an “integrated landscape approach” that allows each country to address land degradation, climate change adaptation, biodiversity, and forestry within its local context. “In this case, working to combat land degradation is the best way to address both very local issues and improve the global environment,” Sinnassamy says. “We are working with the land, which is the basis of livelihood in these communities. We are working with people to improve soil quality, which improves crop yield and in turn agricultural production and the overall quality of life in the community. These very local benefits are also a way to generate global benefits for water, land, and nature.”

In the end, Sinnassamy hopes the region as a whole will be composed of a “mosaic of landscapes” that increases biodiversity and maintains native flora as part of agricultural land. Each participating country has its own individual goals, which include reducing erosion, diversifying income, increasing crop yield, and improving soil fertility. While trees and forests are only part of the focus of the Great Green Wall initiative, many in the media have cast the project as solely a tree-planting project and an attempt to halt the southward expansion of the Sahara Desert. Sinnassamy is quick to point out two faults in this perception. The first is that the Great Green Wall initiative is much more nuanced than simply planting a belt of trees across the continent. “Behind the name or the brand ‘Great Green Wall,’ different people see different things. Some people saw just a stripe of trees from east to west, but that has never been our vision,” he says. “In Niger, Mali, and Burkina Faso... natural regeneration managed by farmers has yielded great results. We want to replicate

and scale up these achievements across the region. It’s very possible to restore trees to a landscape and to restore agroforestry practices without planting any trees. This is also a sustainable way of regenerating agroforestry and parkland.”

The second misperception Sinnassamy points to is that the Sahara Desert is not, in fact, expanding. “We are not fighting the desert,” he says. “In the majority of the areas we are working in these 11 countries, the desert is not advancing. The [Sahara] Desert is a very stable ecosystem. Of course, there are some areas on the margins—for instance in Senegal, Mauritania, and Nigeria—where there are some sand movements. But from a geographic perspective, over time the desert has been relatively stable in this area.” (...) Examples of success include more than 50,000 acres of trees planted in Senegal. Most of these are the acacia species Senegalia senegal, which has economic value for the commodity it produces, gum arabic. (Gum arabic is primarily used as a food additive.) A small portion of the trees are also fruit-bearing, which, when mature, will help combat the high levels of malnutrition in the country’s rural interior. Even more dramatic is the project’s potential social impact. The BBC reports that the improvements in land quality and economic opportunity in Mali may help curb terrorism in the country, where famine and poverty have exacerbated a spike in political and religious extremism.
b) The agroforestry benefits

Figure
A schematic representation of the potential benefits of introducing an agroforestry system on ecosystem functioning


Your task: Analyse the 3 documents to explain to what extent the Great Green Wall initiative is sustainable. In a first part, explain the scientific principle used to improve the ecological quality of arable land of the Sahara-Sahel region. Then, describe, with a critical eye, the first results of such an experiment.

***

TESTING OUT AN ORGANIC FARMING

At a local scale, an organic experiment: Fir Tree Farm, England, near Liverpool

Your task: First, sum up the story of this comics. Then, define what are the rules established by the European Union to get the logo for organic products. Finally, try to explain why the European Commission chose Fir Tree Farm as an organic model of farming, remembering the 1980s...

To download the comics: http://ec.europa.eu/agriculture/organic/downloads/brochures/index_en.htm

***