Agriculture 4.0

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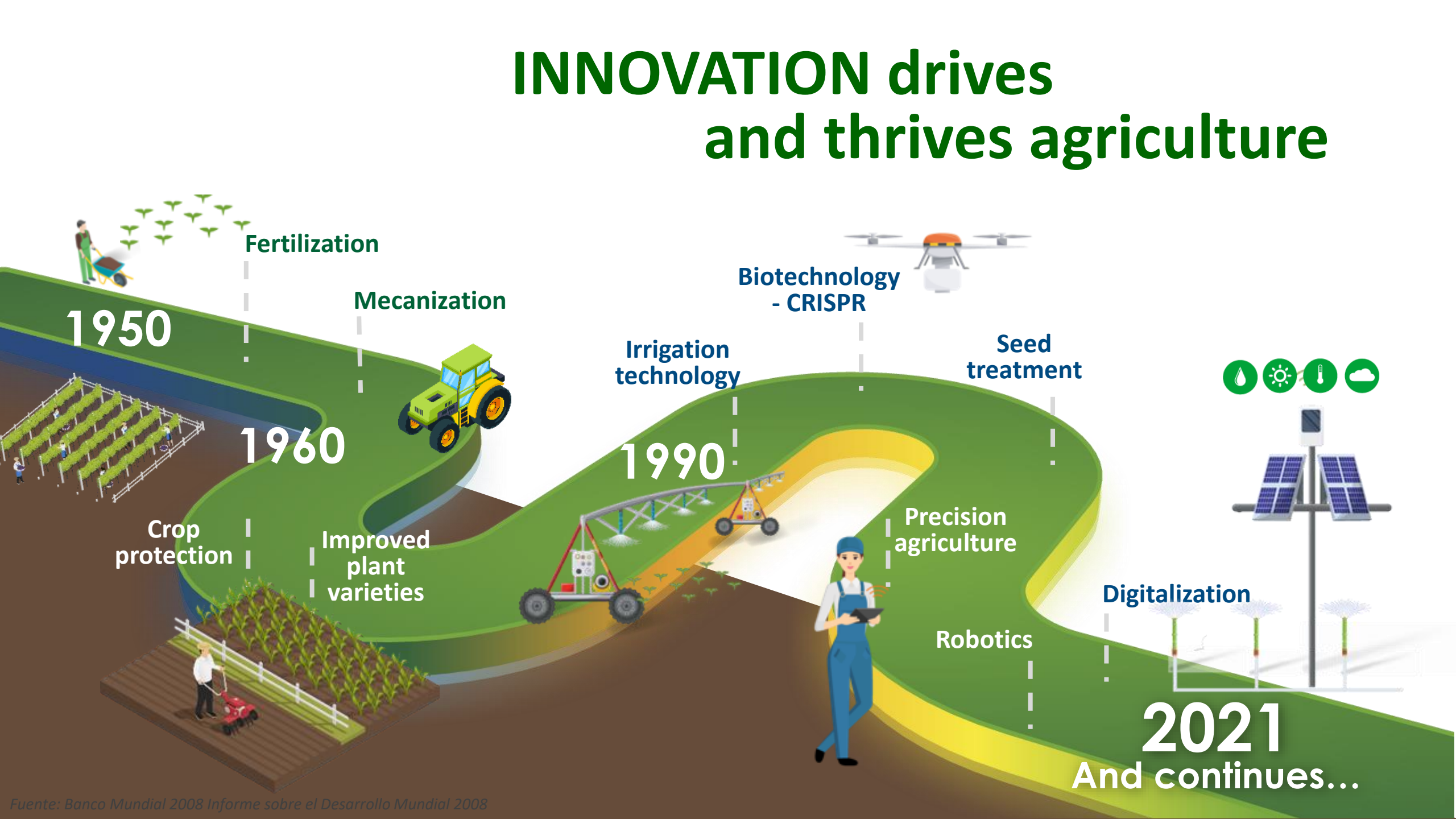
INNOVATION drives and thrives agriculture



Fuente: Banco Mundial 2008 Informe sobre el Desarrollo Mundial 2008

All these technologies already allow…

to produce more in less arable land

Increased productivity

Improved efficacy

Less toxicity

Reduced inputs per hectare

However, be mindful that agriculture contributes to…

30 - 40 % of global **greenhouse effect** emissions

Deforestation, estimated in 73% and 25% of **soil degradation**

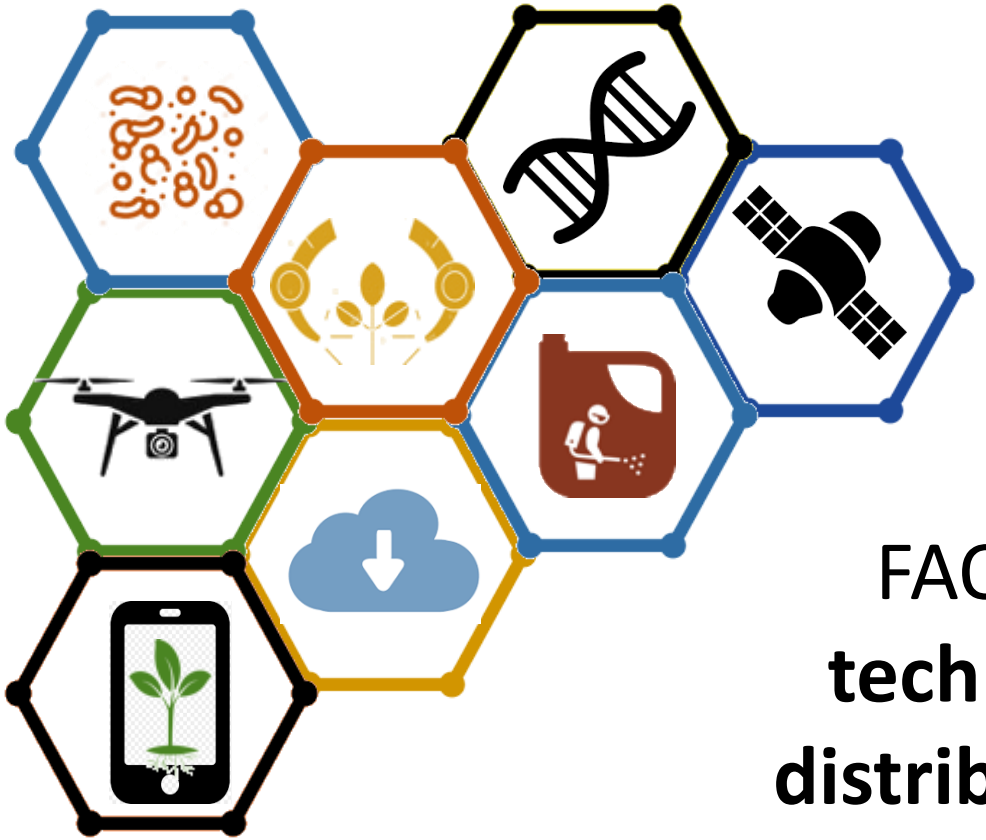
Loss of biodiversity estimated in 80%

Use of 70% of global **drinking water**

Source: Food Systems Summit 2021


While still in its infancy, **Agriculture 4.0** can already contribute to resilience and sustainability by allowing unprecedented **visualization of farmlands** through **access to real-time data**, allowing quick and accurate **decision-making by farmers**.

New technologies enable **better plant variety selection, identifying plant stress, use of precise amounts of water, fertilizer and pesticides in specific areas** as opposed to uniformly across entire fields, making the best of every droplet of crop care used, and deciding the **ideal time to harvest**.



The new paradigm includes digital farming

FAO describes it as the **spread of mobile technologies, remote-sensing services and distributed computing that improve access to information, inputs and markets**, **increasing production and productivity**, streamlining supply chains and **reducing operational costs**.

Source: http://www.fao.org/digital-agriculture/en/

Digital farming includes…

Sensors, drone and **satellite imagery**, **data analytics** (including use of **internet of things**), **automated crop care application**, data collection and management that render increased autonomy to farming.

- Time to plant can be better planned, stressed areas in field can be singled out and treated quickly with precision.
- Productivity and efficiency in terms of cost, labor and use of inputs (i.e. water, pesticides and fertilizers) is improved and therefore preserve natural resources.
- Data can be collected and categorized for future, improved action.

Examples of digital farming

- **Satellite and drone imagery** used to calculate biomass. Healthy plants containing higher biomass can be displayed in green. Plants impacted by pests or diseases can be shown in yellow or red.

- Sensors installed in state-of-the-art tractors, harvesters and other connected devices, even leaves, provide **information on the soil type and condition, as well as water and nutrient availability**.

- **Machine learning** can help select **traits** and identify optimal conditions to plant depending on soil health, nutrient availability, location and climate conditions.

Keys to digital farming

- Compatibility between hardware and data sets boosted by collaboration in the past 15 years.
- Access and compatibility of data from weather stations, aerial and satellite imagery.
- COVID-19 propelled use of technology for crop issue identification to make more informed crop management decisions.

https://sprayers101.com/challenges-drone/

www.technologynetworks.com

Challenges to digital farming

- Regulating wrong aspects, or overregulation (i.e. drones applications).
- Connectivity to satellite signal not authorized in several countries.
- Privacy of imagery collection and data.
- FAO also identified labor replacement, need for re-education (acceptance), and the risk of creating a digital divide between countries and individuals as concerns.

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Contribution of digital farming

Improved farming practices bolster safe and sustainable food production, guaranteeing enough food production to feed the growing global population.

Increasing accessibility to digital farming in emerging markets will allow sustainable and efficient food production. Dissemination of digital solutions offset the negative externalities of farming across the globe, including environmental degradation.

Intellectual Property in digital farming

- Access via licensing to copyrightable **imagery and crop data**.

- **Protection for analytical algorithms** used to diagnose and recommend crop protection varies (patent, software, copyright). CBI could be preferred option.

- Collected data could populate databases. However, data could reside in public domain for IoT use.

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Y DEBE SER SOSTENIBLE