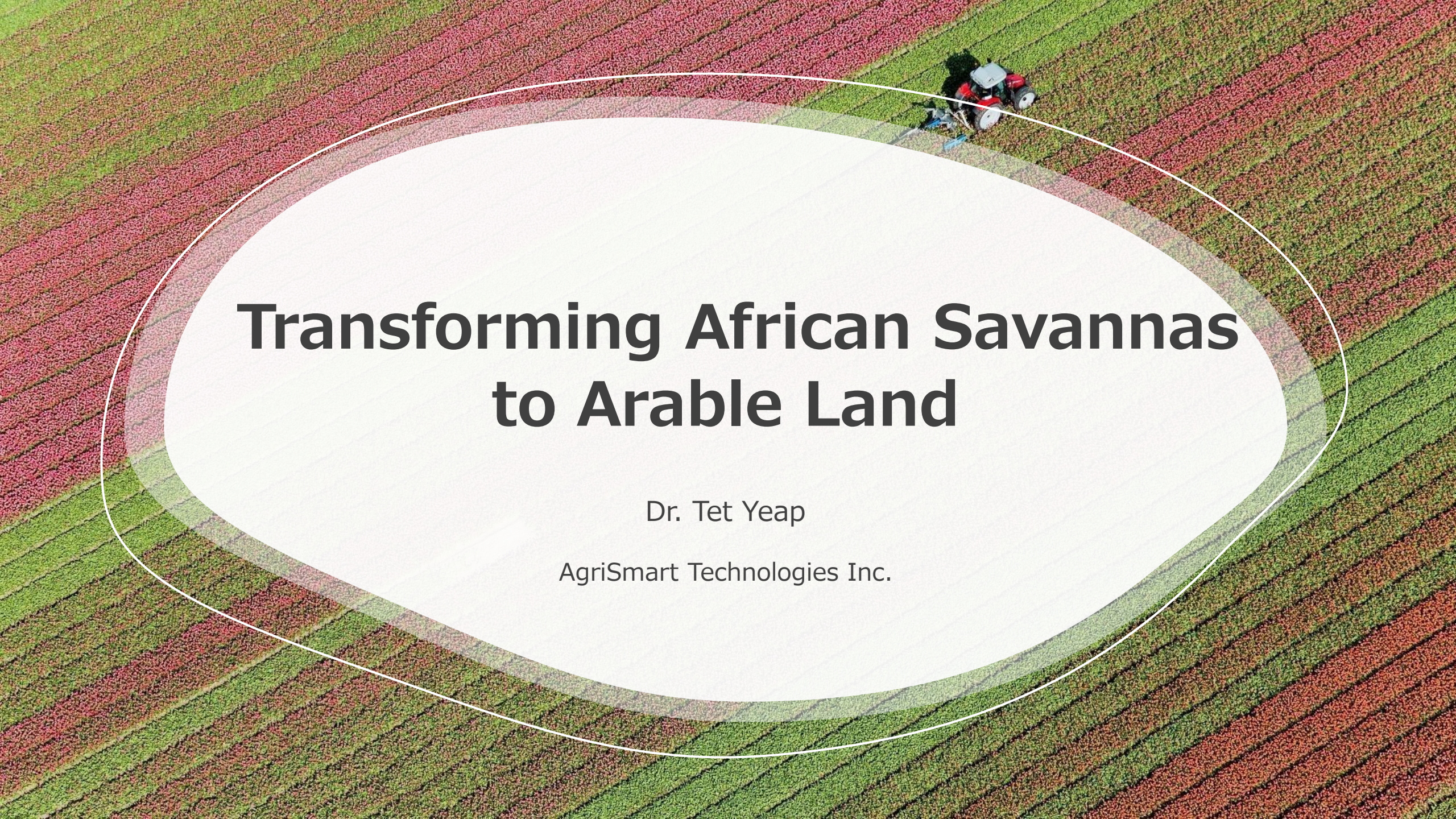


Transforming African Savannas to Arable Land

Dr. Tet Yeap

AgriSmart Technologies Inc.

Agenda

- Introduction
- New Arable Land Creation
- Comprehensive Africa Agriculture Development Programme - CAADP
- Sustainable Precision Farming
- Final tips & takeaways

Introduction

- As the global population approaches 10 billion by 2050, ensuring food security has become one of humanity’s most pressing challenges.
- Even if we can increase current food production by 30% by 2050, the population is expected to increase from 7 billion to 10 billion, 42% increase.
- As global arable land becomes increasingly scarce, the African savannas have emerged as a new frontier for sustainable agricultural development.
- This talk explores ways to increase food production and security.

New Arable Land Creation

Increase Crop Production

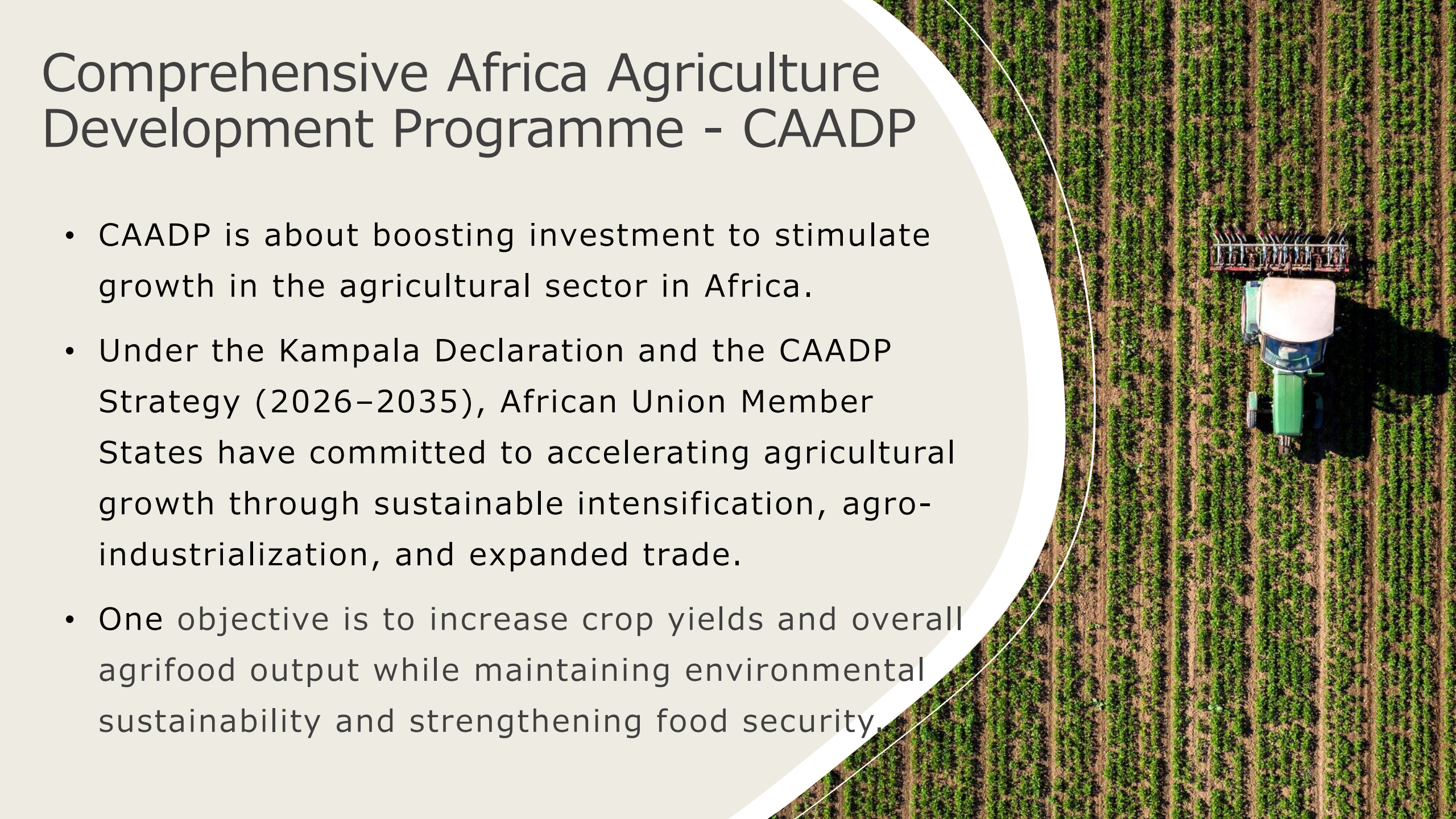
- Fertile arable land becomes scarce.
- Increasing efficiency is not sufficient.
- Global food security becomes an increasing concern.
- We need more arable land!

Opportunities?

- The African savannas are among the world’s most iconic ecosystems, known for their expansive grasslands punctuated by scattered trees and a remarkable diversity of flora and fauna. These vast landscapes, primarily found in tropical and subtropical regions of the continent, support not only wildlife but also the livelihoods of hundreds of millions of people who depend on them for grazing, fuelwood, and subsistence farming.
- Can we transform these savannas into arable land?

Comprehensive Africa Agriculture Development Programme - CAADP

- CAADP is about boosting investment to stimulate growth in the agricultural sector in Africa.
- Under the Kampala Declaration and the CAADP Strategy (2026–2035), African Union Member States have committed to accelerating agricultural growth through sustainable intensification, agro-industrialization, and expanded trade.
- One objective is to increase crop yields and overall agrifood output while maintaining environmental sustainability and strengthening food security.



CAADP Visions

- Dynamic agricultural markets within countries and between regions in Africa;
- Farmers taking part in the market economy and enjoying good access to markets, so that Africa becomes a net exporter of agricultural products;
- A more equitable distribution of wealth for rural populations - in terms of higher real incomes and relative wealth;
- Environmentally sound agricultural production and a culture of sustainable management of natural resources as a result of better knowledge, more information, and the application of technology.

AgriSmart Technologies

(www.agrismarttech.ca)

Mission

- Democratizing climate-smart farming technologies to improve global food security through cost-effective precision solutions

- Making advanced, sustainable, and data-informed farming practices accessible, cost-effective, and scalable

Two Patent-pending Technologies

- **Precision planter**
  - enables seed-placed banding with practical deployment — without dual-antenna GPS systems or specialized soil levelers. Built on three years of field validation.

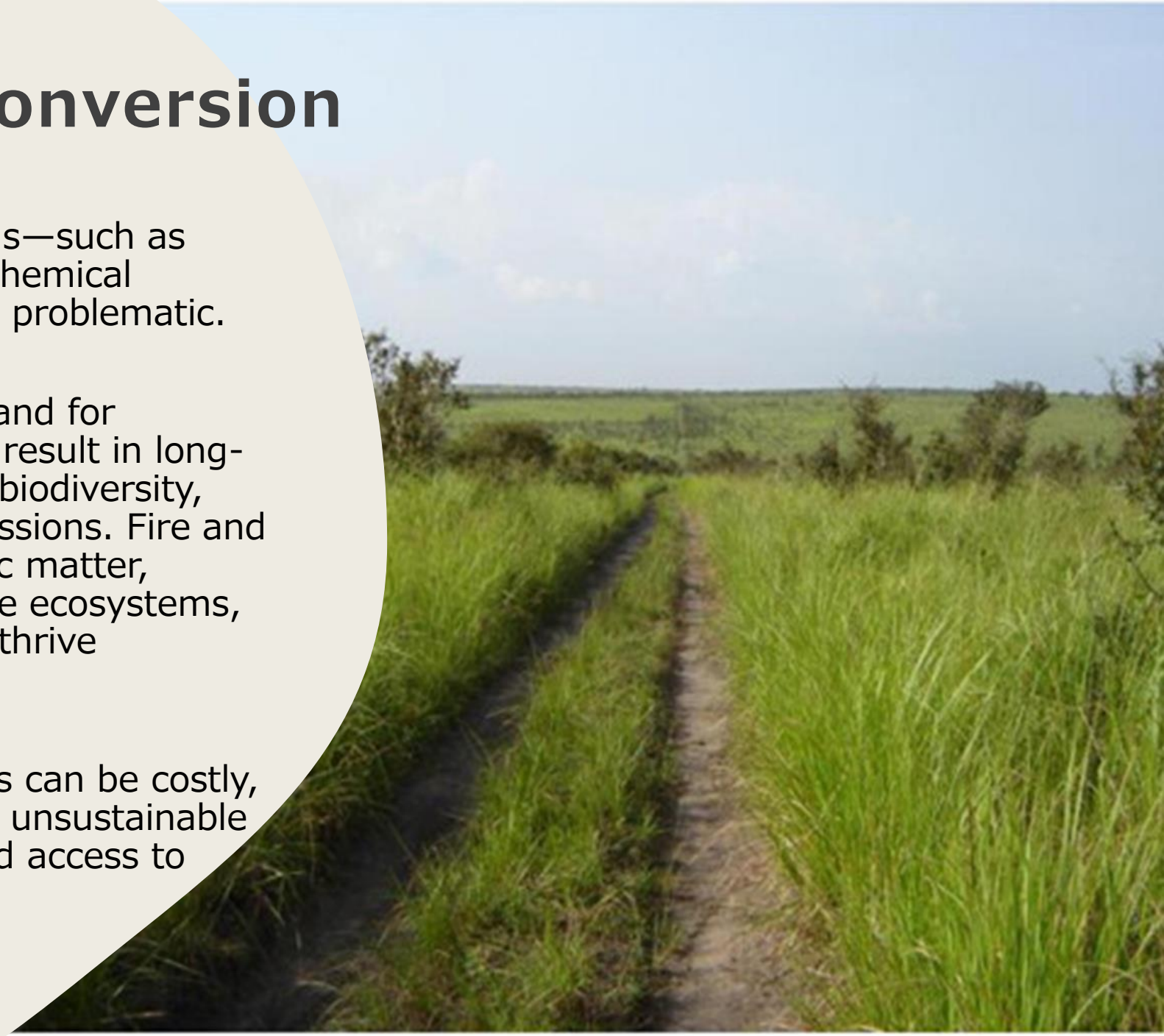
- **Advanced roller/crimper**
  - a novel land-preparation system designed to suppress weeds, reduce tillage intensity, and support regenerative practices — developed in collaboration with the National Soil Dynamics Laboratory (USDA), Auburn, Alabama.

Traditional Land Conversion

- Traditional land conversion methods—such as burning, mowing, full tillage, and chemical herbicide application—have proven problematic.

- While effective in quickly clearing land for cultivation, these techniques often result in long-term soil degradation, a decline in biodiversity, and increased greenhouse gas emissions. Fire and intensive tillage destroy soil organic matter, compact the soil, and disrupt native ecosystems, making it harder for agriculture to thrive sustainably in the long run.

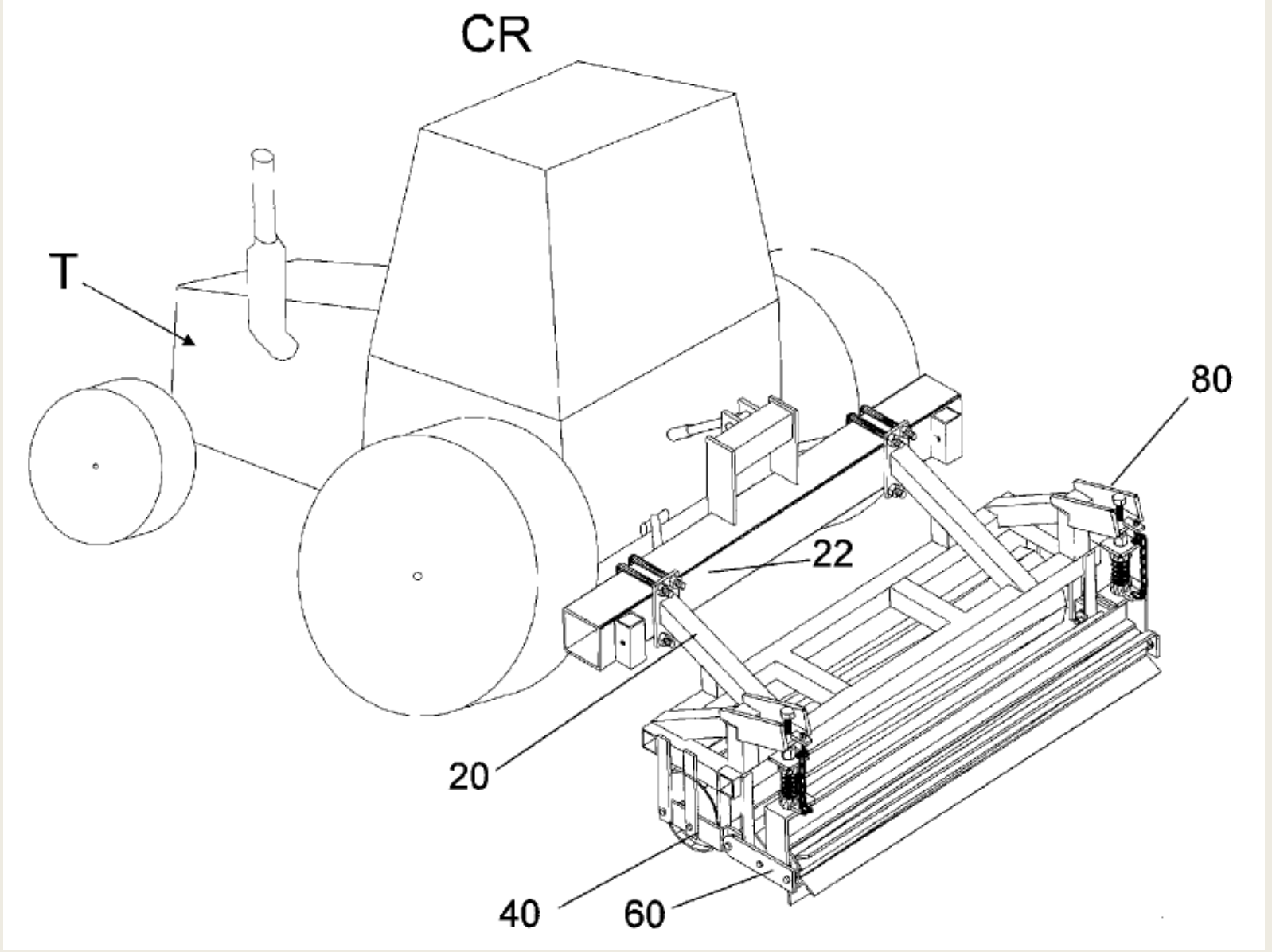
- Furthermore, reliance on herbicides can be costly, harmful to non-target species, and unsustainable for smallholder farmers with limited access to inputs.



USDA Roller/Crimper Technology

- A multi-stage crop termination system with two types of rollers.
- A smooth front roller that flattens crops
- A plurality of rear crimping rollers with bars that crush the plant stems. A compression frame applies downward force on the crimping roller for effective termination.
- A pivot joint between the rollers reduces vibration and ensures consistent ground contact, even on uneven terrain.

USDA Advanced Roller/Crimper



Taken from US7987917

Farming Practices

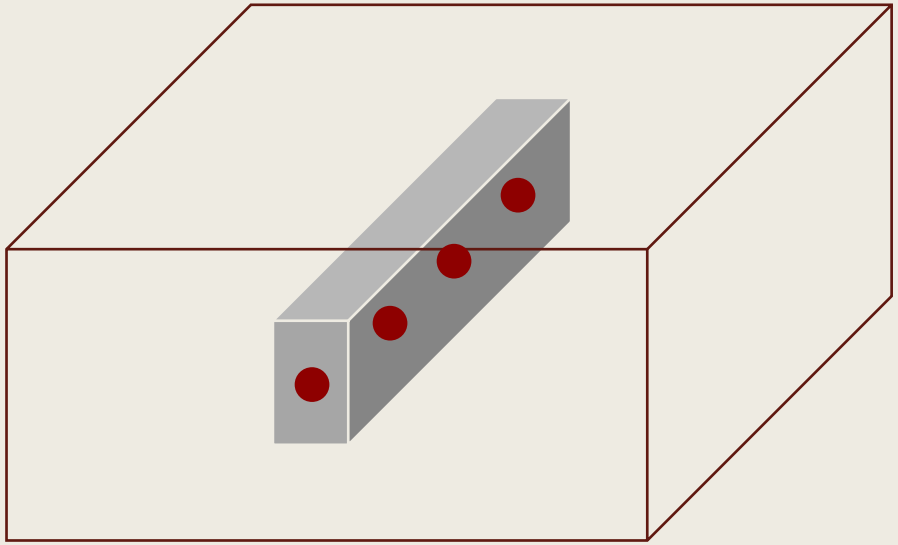
Three farming practices are considered:

- Fertilizer Broadcast
- Vertical Fertilizer Banding
- Seed-placed Fertilizer Banding

Plants are planted in rows

Taken from Getting the Most Out of Commercial Fertilizer Applications, www1.agric.gov.ab.ca

Seed-placed Fertilizer Banding



Fertilizer placement

Seed placement

Farming Practices and Root Mass

Fertilizer Broadcast

Seed-placed

Corn From Different Farming Practices

Fertilizer Applied

150 kg/ha →

225 kg/ha →

225 kg/ha →

← Seed-placed
Mass per cob: 345g
Yield: 9194 kg/ha

← Vertical Banding
Mass per cob: 235g
Yield: 7315 kg/ha

← Fertilizer Broadcast
Mass cob: 190g
Yield: 6923 kg/ha

Corn Harvest (2021-2023)

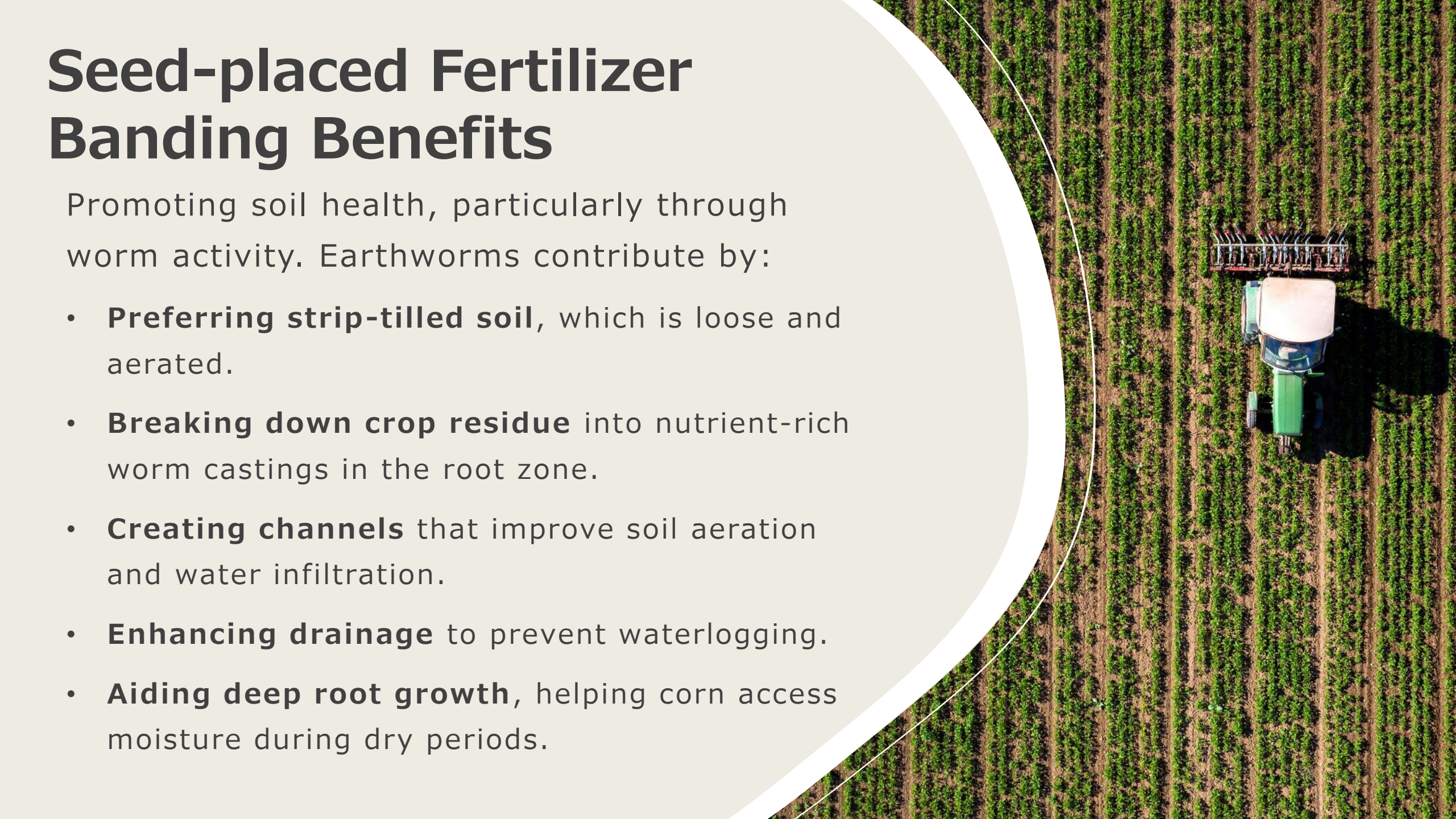
Switching from Fertilizer Broadcast to Seed-placed Fertilizer Banding

Year	Fertilizer Decrease (%)	Yield Increase (%)	Nitrous Oxide Emissions Decrease (%)
2021	33	33	>85
2022	33	17	>85
2023	33	33	>85

Seed-placed Fertilizer Banding Benefits

Promoting soil health, particularly through worm activity. Earthworms contribute by:

- **Preferring strip-tilled soil**, which is loose and aerated.
- **Breaking down crop residue** into nutrient-rich worm castings in the root zone.
- **Creating channels** that improve soil aeration and water infiltration.
- **Enhancing drainage** to prevent waterlogging.
- **Aiding deep root growth**, helping corn access moisture during dry periods.



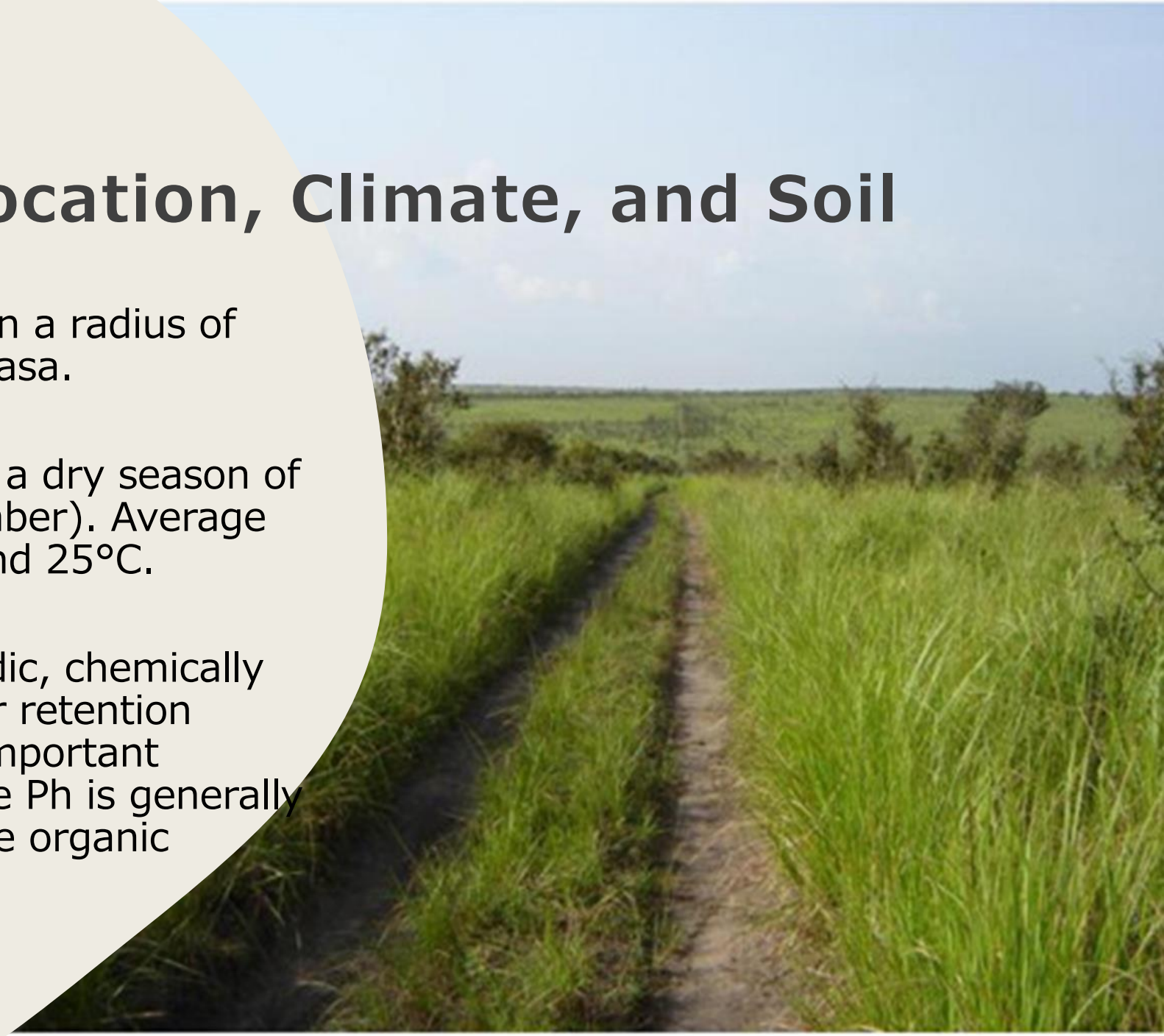
Organic Rich Soil

Pilot Operations

- 100 acres at Area X.O, Ottawa
- 5 acres in collaboration with the National Soil Dynamics Laboratory of the USDA, Auburn, Alabama
- 10,000 – 100,000 ha of savannas near Kinshasa (DR Congo), with unique sandy terrain, presents an ideal environment to test our planter and roller/crimper technologies (in collaboration with the U. of Kinshasa)

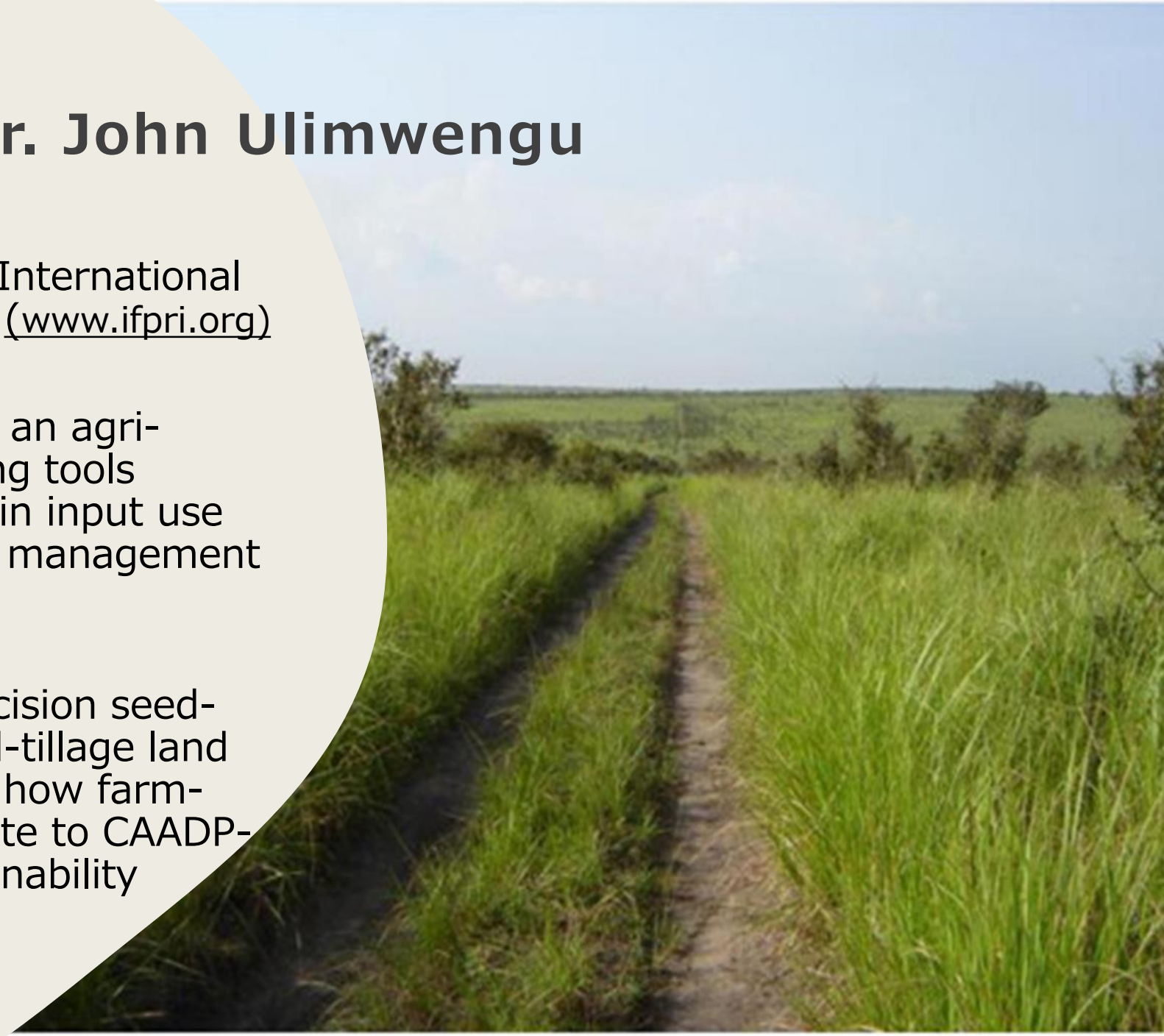
Bateke Plateau: Location, Climate, and Soil

- A savanna plateau located within a radius of 150 km east and north of Kinshasa.
- The **climate** is hot tropical with a dry season of 4 months (from June to September). Average annual temperatures vary around 25°C.
- The **soils** are mainly sandy, acidic, chemically poor, and have a very low water retention capacity. Kaolinite is the most important material in the clay fraction. The Ph is generally less than 5.5 and varies with the organic matter content.



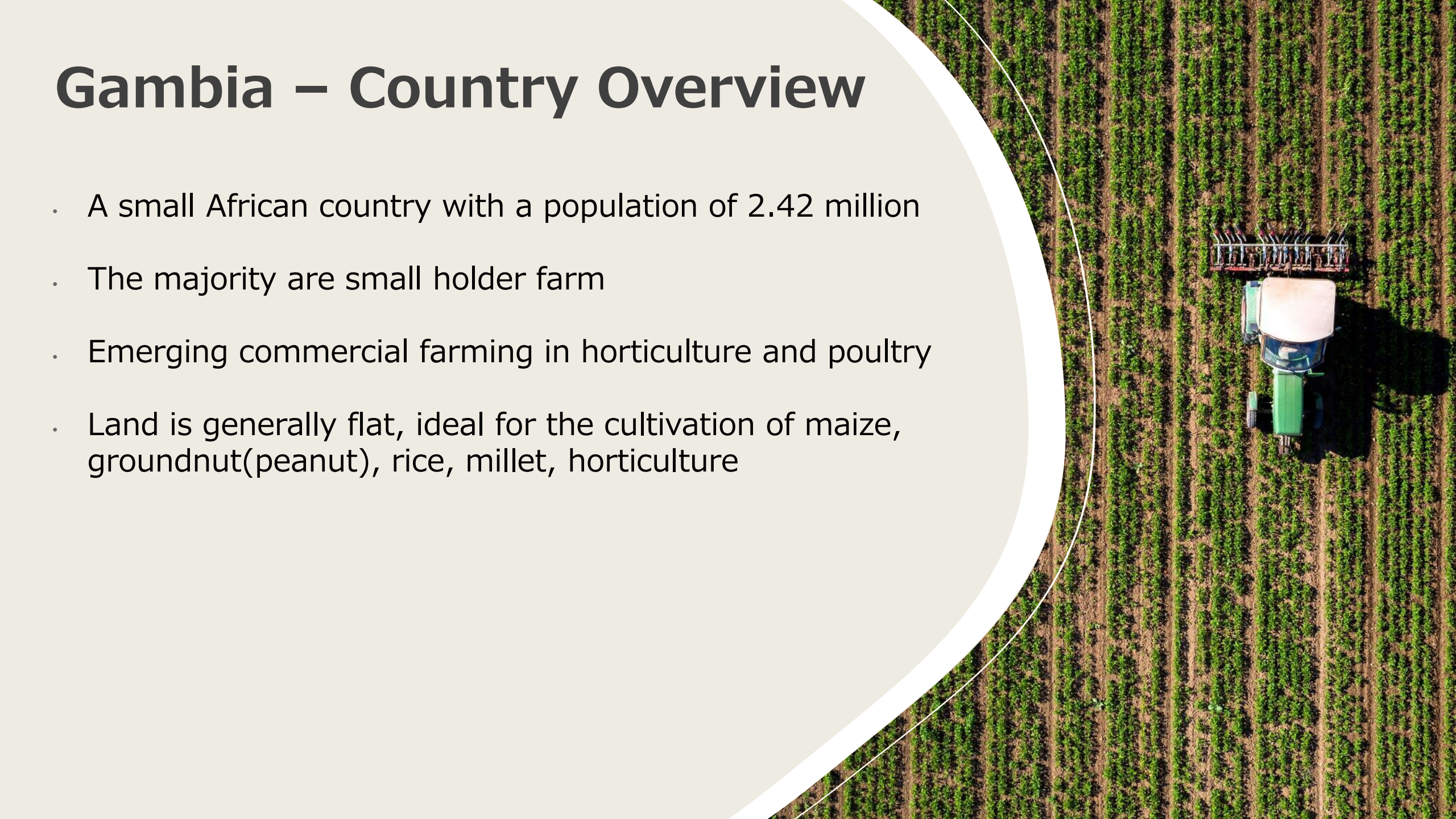
Observations from Dr. John Ulimwengu

- Senior Research Fellow of the International Food Policy Research Institute (www.ifpri.org)
- AgriSmart Technologies Inc. is an agri-technology company developing tools intended to improve precision in input use and support regenerative land management practices.
- Two of its technologies—a precision seed-banding planter and a reduced-tillage land preparation system—illustrate how farm-level innovations may contribute to CAADP-aligned productivity and sustainability outcomes.



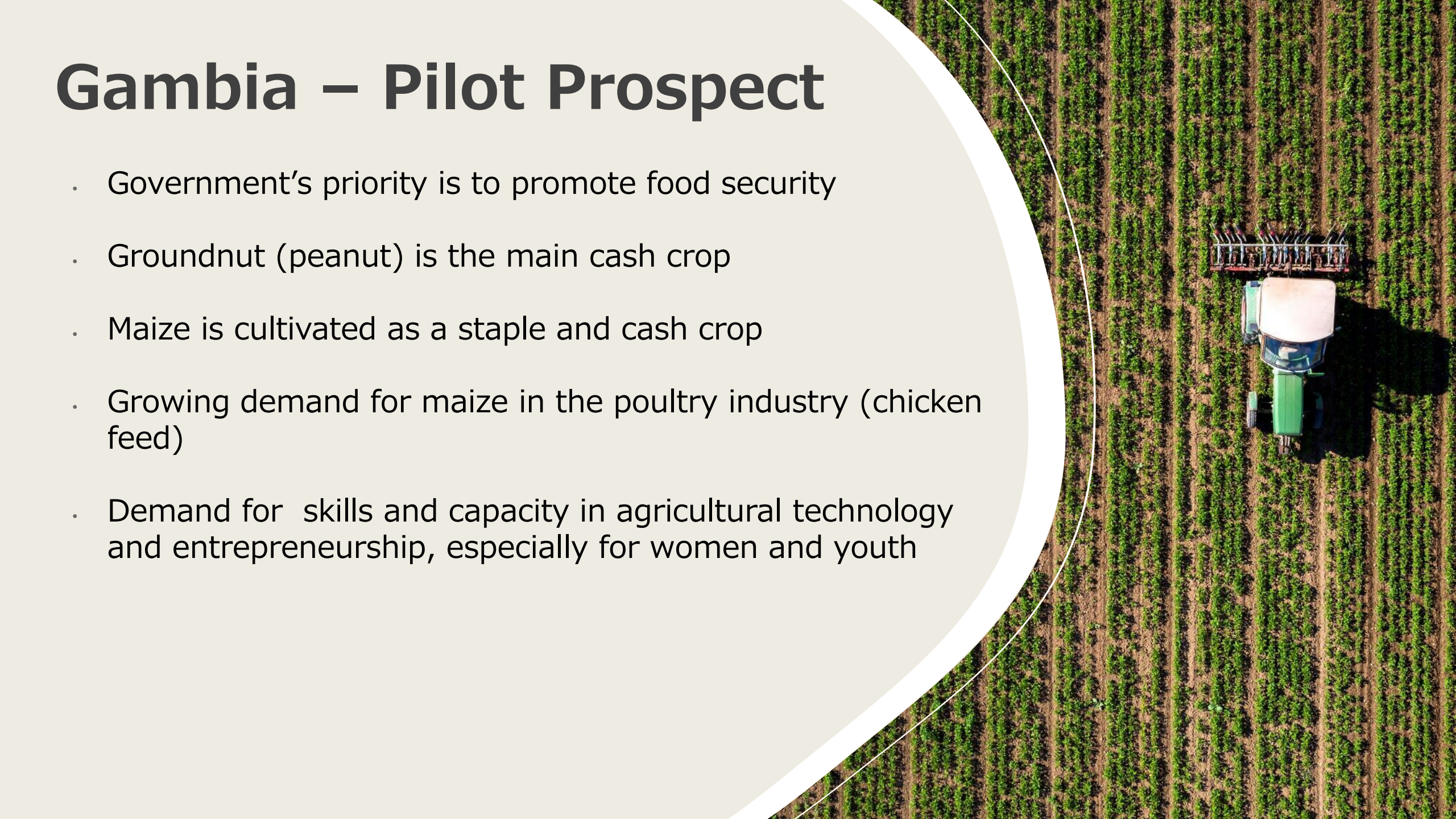
Gambia – Country Overview

- A small African country with a population of 2.42 million
- The majority are small holder farm
- Emerging commercial farming in horticulture and poultry
- Land is generally flat, ideal for the cultivation of maize, groundnut(peanut), rice, millet, horticulture



Gambia – Pilot Prospect

- Government’s priority is to promote food security
- Groundnut (peanut) is the main cash crop
- Maize is cultivated as a staple and cash crop
- Growing demand for maize in the poultry industry (chicken feed)
- Demand for skills and capacity in agricultural technology and entrepreneurship, especially for women and youth



Conclusions

- As the world arable land becomes increasingly scarce, the African Savannas can emerge as a frontier for sustainable agricultural development
- R/D is needed on planter equipment to support a one-pass, low-till farming practice that is sustainable and cost-effective to adopt by many farmers in developing countries.
- R/D is needed on roller/crimper technology to convert current savannas to new arable land to ensure food security in the future.
- As a novice in farming, I find that the WSCSE conference is very helpful. Therefore, as we gather here, we should work together to solve the world’s food security problem.

Thank You

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