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ACA
AFRICAN CASHEW ALLIANCE

SUSTAINABLE CASHEW NUT SUPPLY THROUGH POLICY INVESTMENT AND PARTNERSHIP

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# Precise and Smart Manufacuring Tools

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# Introduction

- The control of pests and diseases in cashew trees is now evolving towards a more preventative and smart approach to agriculture ;

- The aim is no longer simply to wait for symptoms to appear, but to use data and new technologies to anticipate, detect and intervene with precision;

- Three key tools: **weather models, artificial intelligence and soil health sensors**.

- **Weather forecasting models** enable us to anticipate conditions conducive to pest and disease outbreaks;

# Introduction

- **AI and machine learning** can analyse images of leaves to detect certain symptoms at an early stage;

- **Soil monitoring sensors** enable us to monitor soil health and identify conditions that may lead to root rot and plant decline;

- **Objective:** to move from a predominantly **curative approach to a preventive, precise and sustainable one**, in order to effectively protect cashew orchards whilst minimising losses and the excessive use of pesticides.

# 1. Weather-based forecasting models

**What is a forecasting model?**

- *A tool that combines weather data and crop information to estimate periods when conditions become favourable for the development of diseases or pests.*

# 1. Weather-based forecasting models

*These models primarily use **rainfall, humidity and temperature** to identify conditions favourable to the development of cashew pests and diseases.*


- **Weather → Plant health risk → Warning → Action**

# 1. Weather-based forecasting models

- *For example, a hot and humid spell can increase the risk of certain diseases such as **anthracnose or downy mildew**.*

- *We no longer treat crops simply because a disease is already present; we use weather data to anticipate the risk and take action at the right time.*

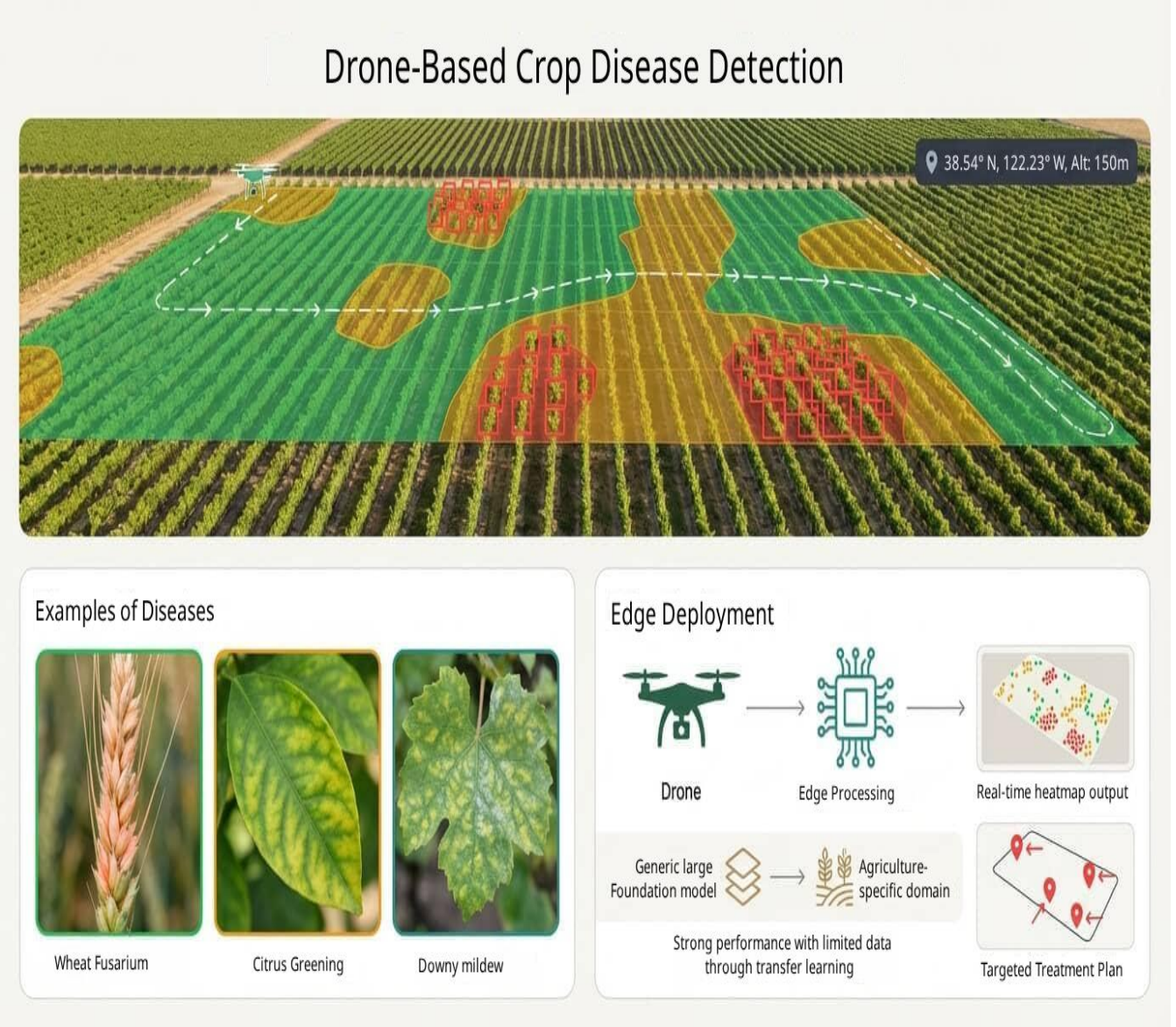
# 2. Artificial intelligence and machine learning


*AI acts as a diagnostic aid: it facilitates the early detection of health problems in cashew trees, but must be combined with the technician's expertise.*

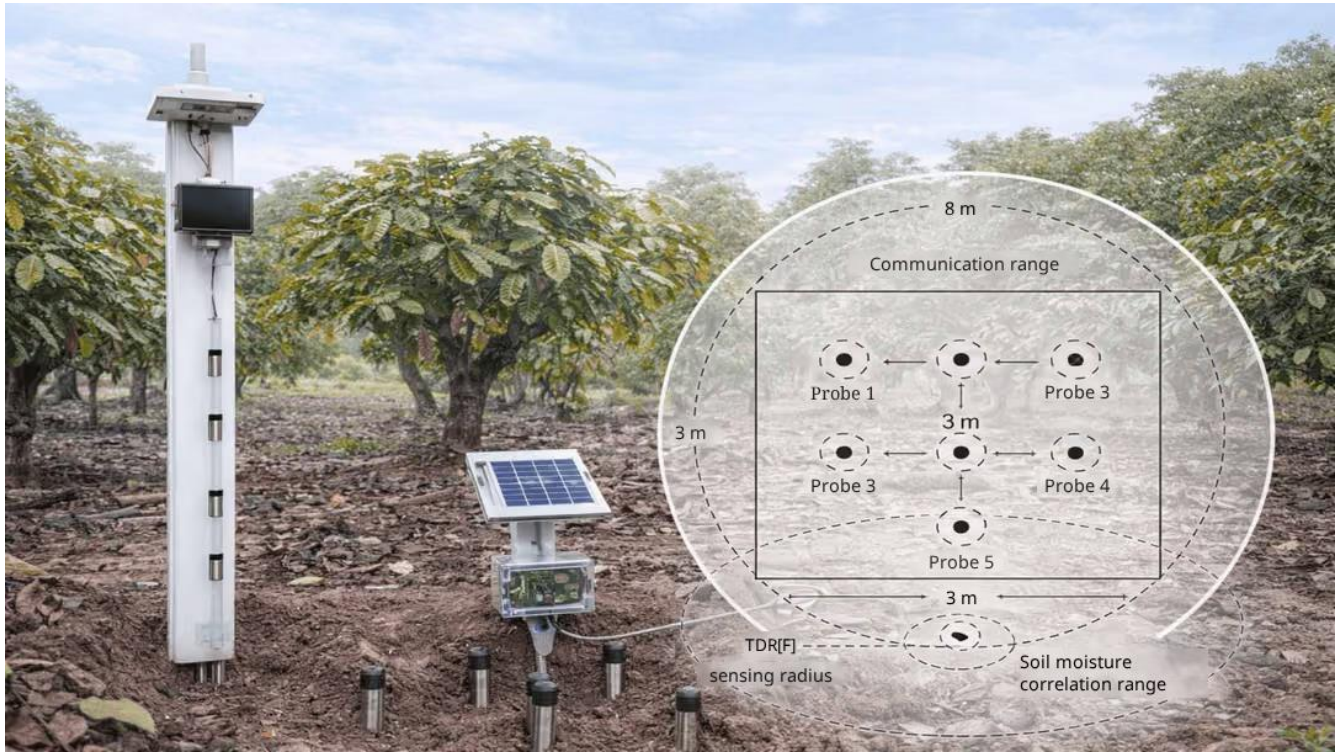
# 2. Artificial intelligence and machine learning

- *It therefore enables earlier and more targeted intervention, whilst reducing losses and the unnecessary use of pesticides.*

- *However, a technician remains essential to confirm the diagnosis.*



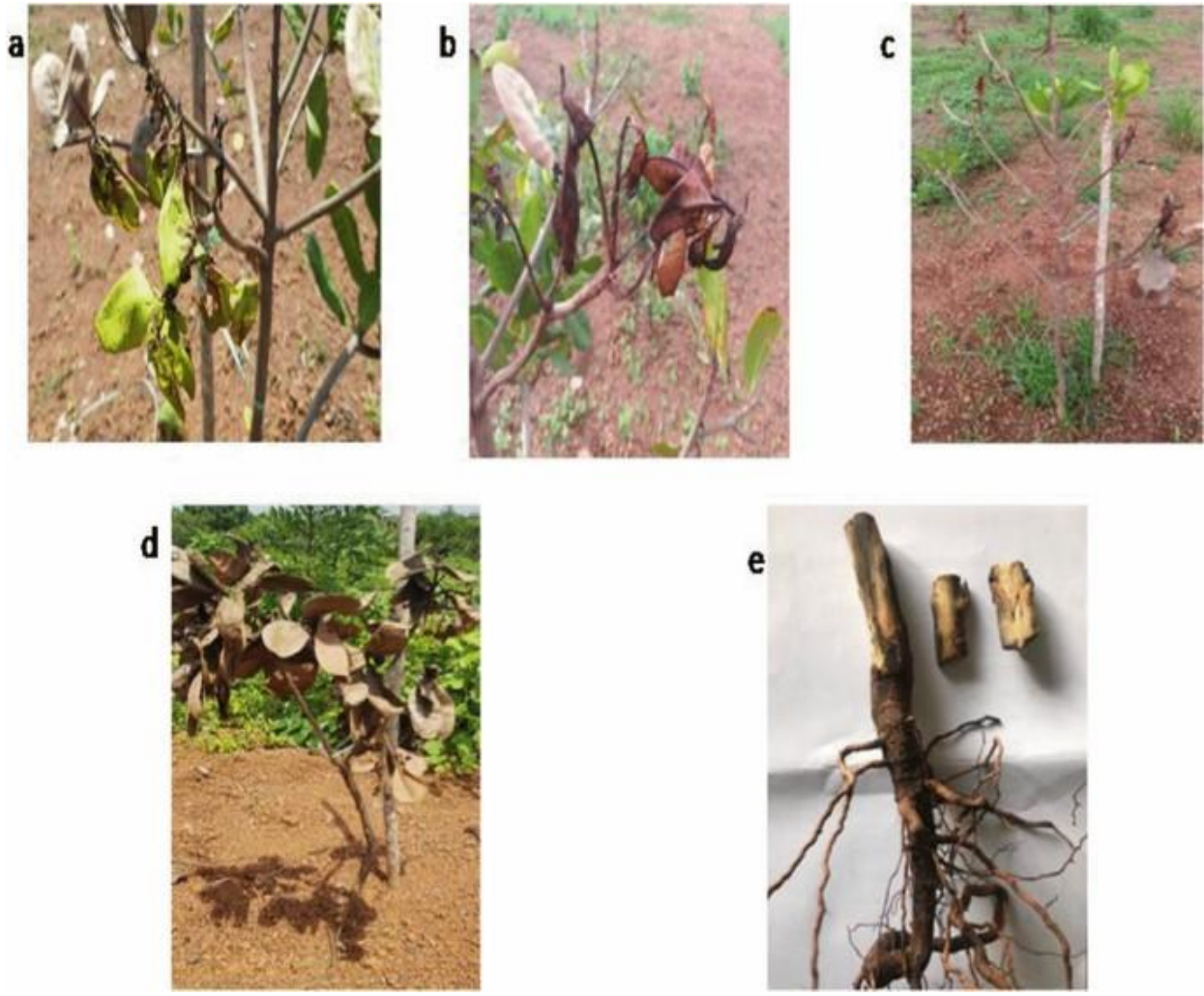
# 3. Soil health monitoring sensors


*Sensors to monitor the root zone of cashew orchards and track soil conditions around the roots*

# 3. Soil health monitoring sensors

- *The aim is not to suggest that the sensor directly diagnoses root rot;*
- *Rather, it enables the detection of soil conditions that may be associated with an increased risk.*
- *This information can then trigger a field inspection and enable early intervention, before the decline becomes significant*.



# Conclusion

- **Weather forecasting models** enable us to anticipate conditions conducive to pest and disease outbreaks;

- **Soil health** sensors offer an opportunity to move from a predominantly reactive approach to a more preventative one.

- By monitoring conditions, we can better anticipate high-risk situations, protect the health of cashew trees and help maintain their productivity and resilience.”

# Conclusion

In conclusion, these three technologies are complementary.

The **weather models** help answer the question:

**‘When will the risk increase?’**

**Artificial intelligence** then enables us to answer:

**‘Where is the problem and what might it be?’**

And the **ground sensors** enable us to understand:

**‘What environmental conditions might be causing the tree to experience stress or decline?’**

# Conclusion

- This approach can therefore be summarised in four steps:
- **FORECAST → DETECT → DECIDE → INTERVENE.**
- It is this combination of **meteorology, artificial intelligence, sensors and agronomic expertise** that represents one of the key trends in smart cashew protection.
- The ultimate aim is not to treat more, but to **treat more effectively: at the right time, in the right place and with the necessary amount.**