# Intercropping in Scotland

## Why do it?

Alison Karley

The James Hutton Institute

# Intercropping research in Scotland

Funded by:

- The Scottish Government's Rural and Environment Science and Analytical Services Division
- The EU via the Horizon2020 Research and Innovation programme

# What is intercropping?

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**The practice of cropping two or more crops in close proximity**

Intercropping takes many forms and exploits the outcomes of beneficial interactions between diverse crop types

Often the approach combines legumes and non-legumes (e.g. cereals)

*A key aim of intercropping is to achieve yields greater than the monocrop, and with fewer inputs*

# Why intercrop?

The James Hutton Institute

Increasing crop diversity can allow:

- Higher crop productivity
- More efficient use of resources
- Weed, pest and disease suppression
- Attract beneficial organisms
- Improve soil quality
- Resilience to stress

Economic and environmental benefits:

- Lower input costs (fertilisers, pesticides)
- Reduced input losses to water, soil, air
- Enhanced ‘ecosystem services’

# Designing InnoVative plant teams for Ecosystem Resilience and agricultural Sustainability

The overall goal is to develop a novel system for sustainable food production by optimising crop species mixtures or 'plant teams' to improve yield stability, reduce pest and disease damage, and enhance stress resilience.

Focussing on cereal-legume plant teams and species-rich grassland DIVERSify will

- Identify novel crop/crop variety combinations
- Develop new knowledge and tools to develop suitable cultivars
- Devise agronomic specifications for novel cropping systems

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 727284

ReMIX
Species mixtures for redesigning European cropping systems

SRUC

Eric JUSTES (INRA, France)

***Coordinator***

The **overall goal of ReMIX** is to **exploit the benefits of species mixtures** to design **productive, diversified, resilient and environmentally friendly** agro-ecological EU cropping systems **less dependent on external inputs** and acceptable/economically-efficient for farmers and actors in the agri-food chain.

**ReMIX will study three types of species mixtures:**

- ✓ **Cereal-grain legume bi-specific cash crops**, harvested at the same time and producing grains for human and animal consumption
- ✓ **Cereal cash-crops associated with non-harvested companion crops**, which can substitute chemical inputs
- ✓ **Relay intercrops,** involving the under-sowing of annual or perennial legumes into a cereal cash crop to avoid cereal competition for the legume

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# ‘Crop diversification’ cluster of Horizon2020 funded EU projects

DIVERSify

**SFS-02-2016: Teaming up for good**: Exploiting the benefits of species diversity in cropping systems

ReMIX
Species mixtures for redesigning European cropping systems

TRUE

**SFS-26-2016: Legumes - transition paths** to sustainable legume-based farming systems and agri-feed and food chains

LEGVALUE

DiverIMPACTS

**RUR-06-2016: Crop diversification systems** for the delivery of food, feed, industrial products and ecosystems services – from farm benefits to value-chain organisation

DIVERFARMING

# Scottish Government funded projects

- **Workpackage 2.1 Crop and grassland production and disease control**
  - **Novel crops**: designing alternative legume and non-legume intercrops

- **Workpackage 2.3 Agricultural systems**
  - **Alternative approaches to sustainable land management**: effects of alternative cropping systems on nutrient management, biodiversity and ecosystem services

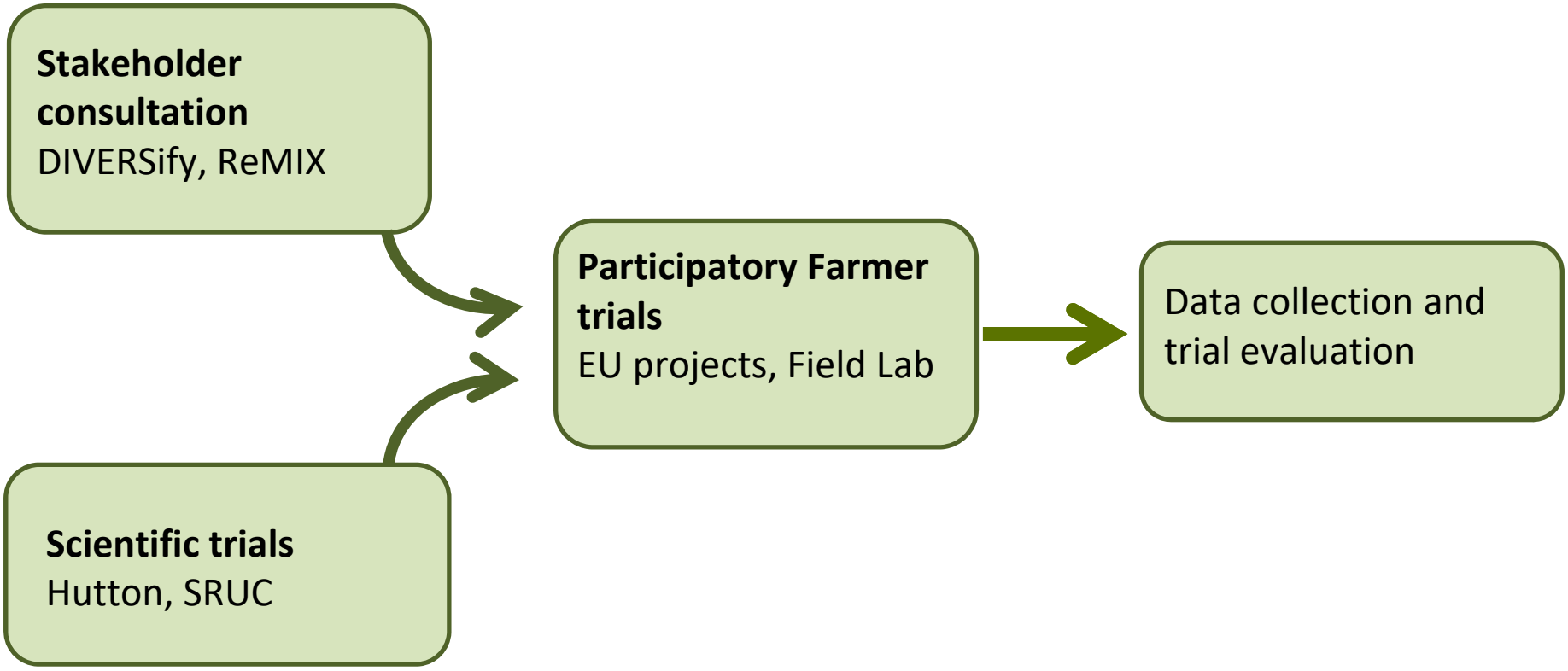
# Multiple actors and innovators

Define the ideal plant partners and practices for the best-performing intercrops or ‘plant teams’

**Scientists**
Experimental validation of scientific theory

**Practitioners**
Existing knowledge of innovative practitioners

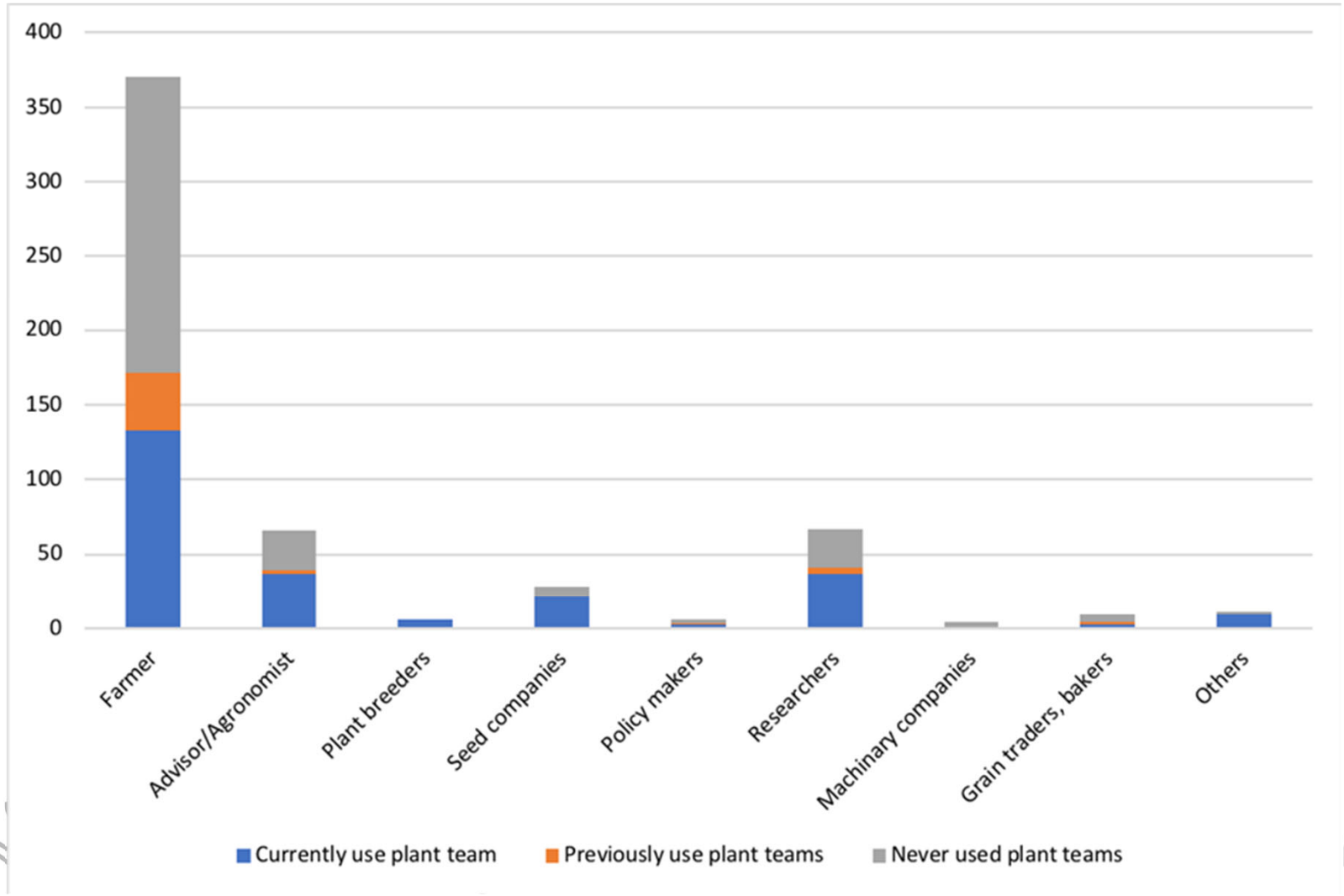
# Field lab: what is the benefit?



# Stakeholder consultation

- 15 National Stakeholder Workshops in 11 different countries
- The aim of each workshop was to identify:
  - Best practice examples
  - Barriers to the take-up of plant teams
  - Plant teams and research topics for scientific trials

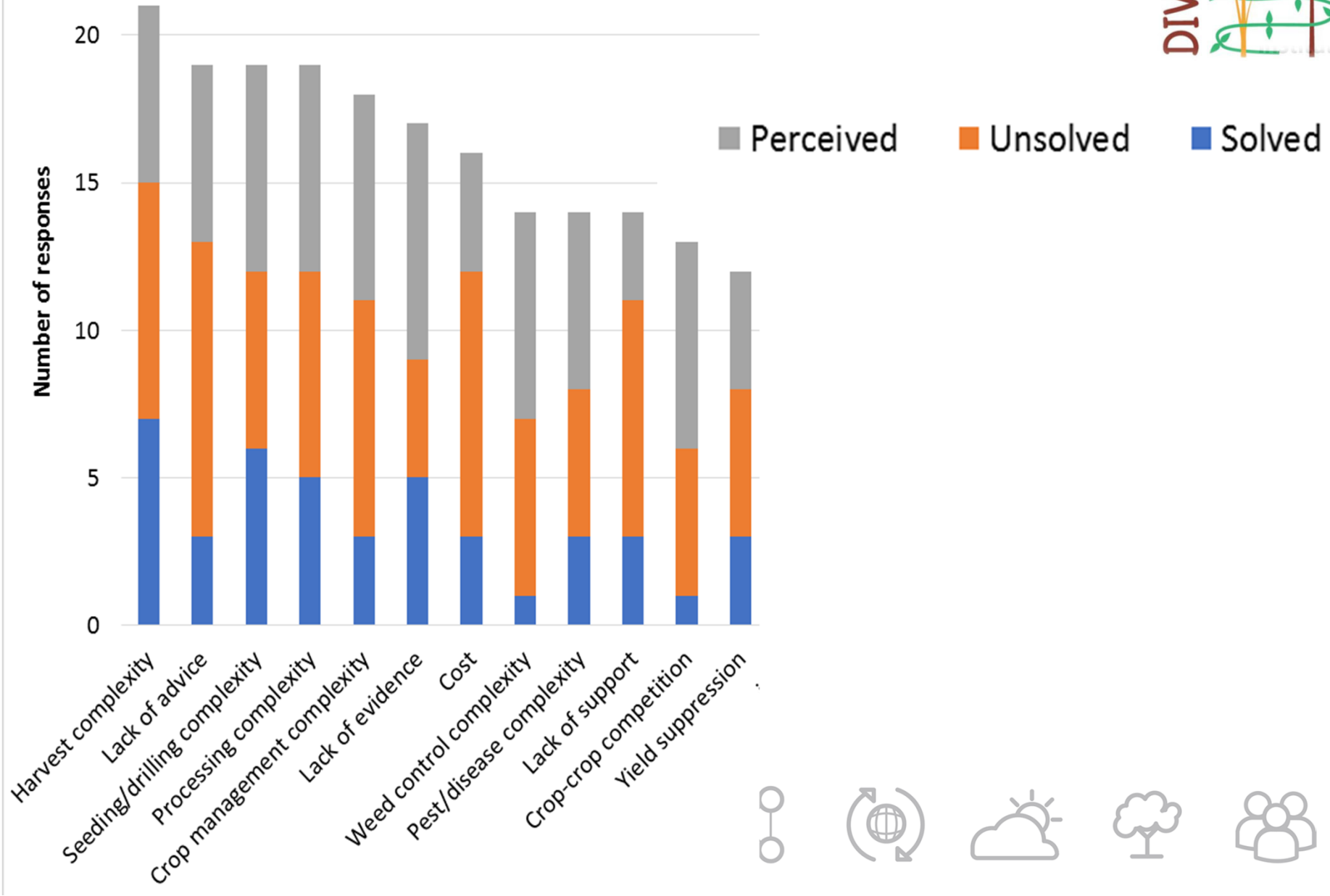

# Who attended



# Plant teams identified

- Attendees identified nearly 130 different plant team combinations (two or more crops):
    - 71 with cereals as the main crop
    - 17 with pseudo grains as the main crop
    - 5 forage/grass
    - 22 vegetable systems
    - 14 Agroforestry and other

# Barriers to plant team uptake



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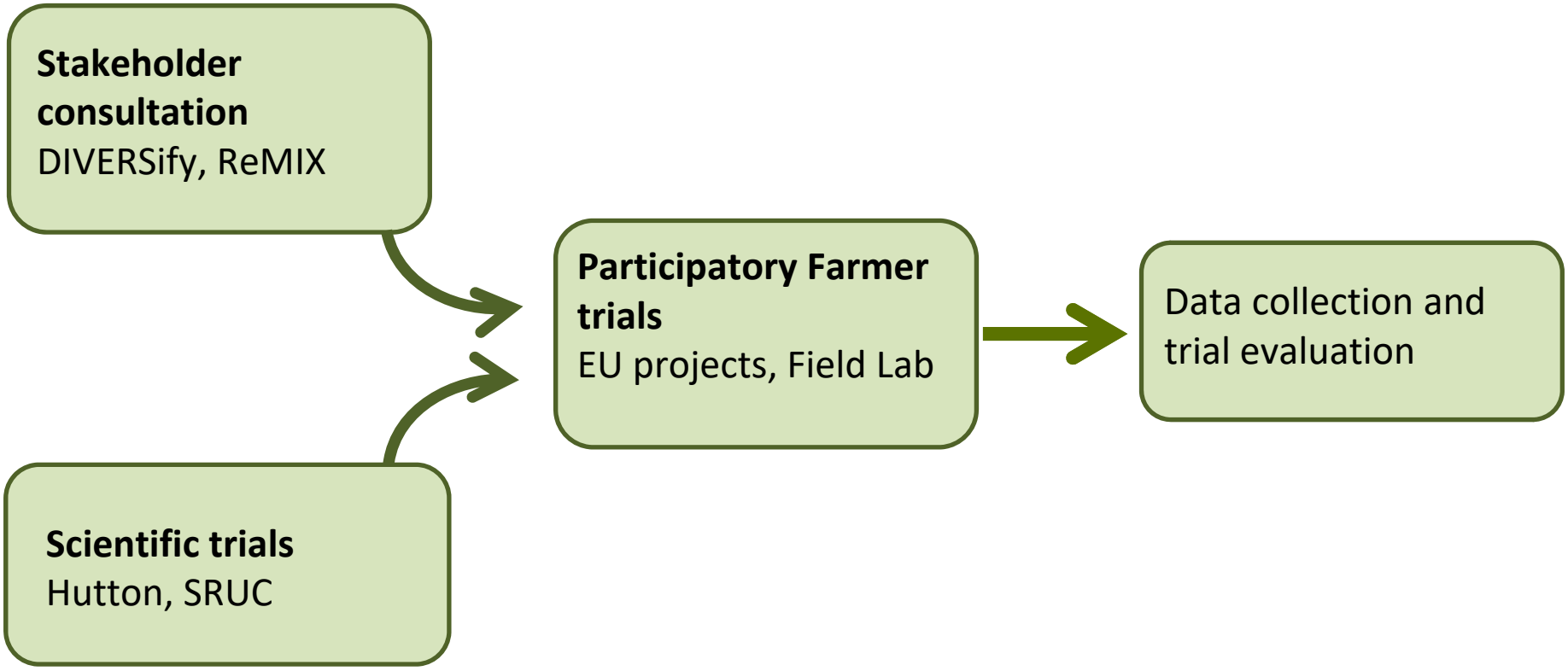

# Field lab aims

- What types of intercrops are relevant to you?
- What information do you need to select intercrop species?
- What are the practical considerations?
- What solutions exist to overcome hurdles?
- Provide support and advice through the crop growing cycle