BCPC 58th Annual Weeds Review - 2021

"IWM –it's not just about weeds"

Farming systems, soil management and weeds – holistic approaches in crop production

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"IWM –it's not just about weeds"

Farming Systems

- Mixed Organic Farming
- All-Arable Organic Farming (stockless rotations)
- Integrated Farm Management
- "Conventional" farming – maximising production
- Conservation Agriculture
- Regenerative Agriculture

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Mixed Organic Farming

Mixed Organic Farming – key principles

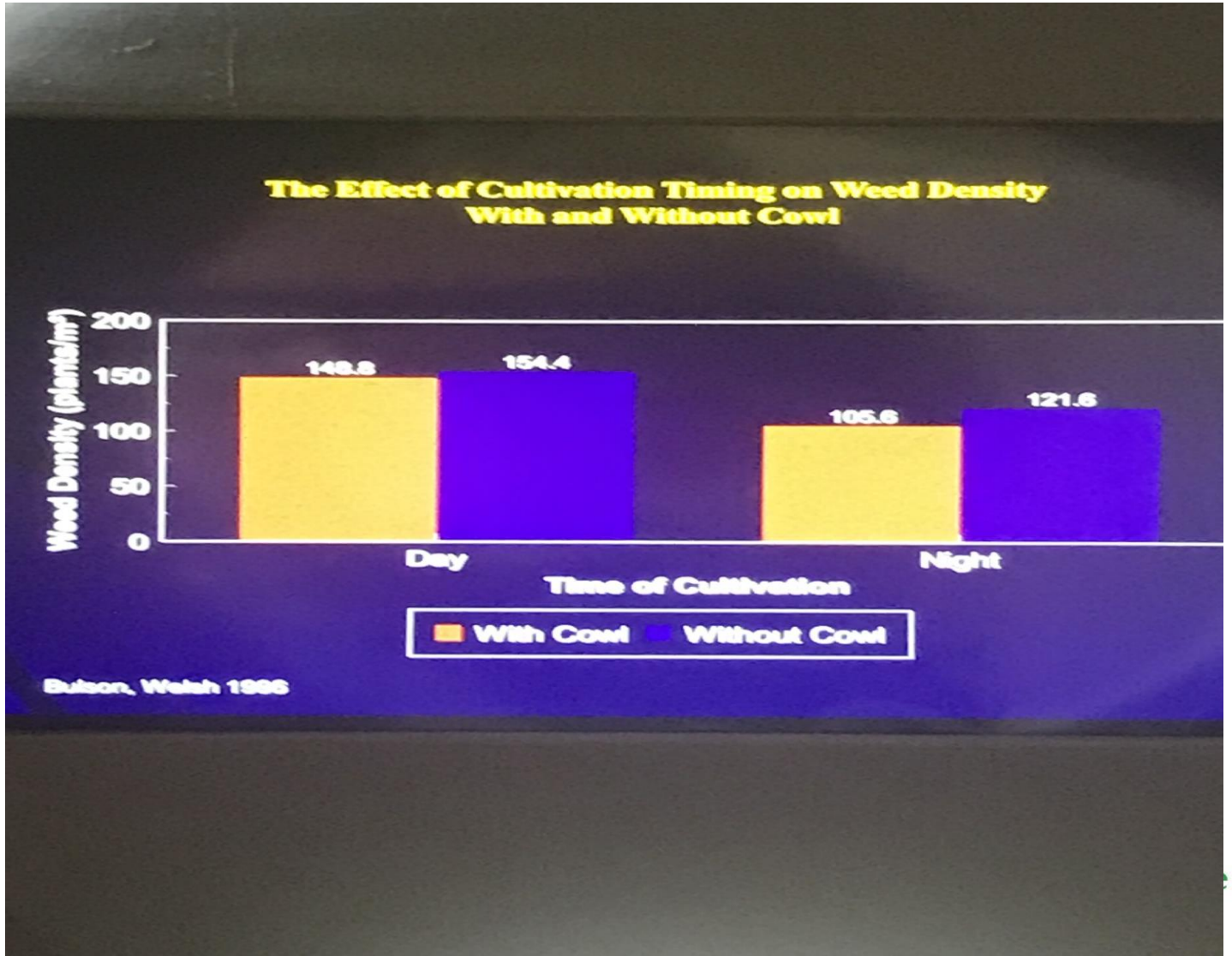
- Fertility restoring phases alternated with cash cropping (exploitative)
- Based around legumes in both phases
- FYM allows fertility to be shifted from the pastoral phase to the arable phase
- Soil type, condition and weed pressure determines the length of the arable phase

Mixed Organic Farming – weed control

- 3 years grass/white clover =>w.wheat => w.oats => w.beans => s.oats undersown grass/white clover
- Important to control docks and thistles in the ley period
- Sequential stale-seedbeds prior to drilling
- Delayed drilling of winter sown crops until mid-November
- Double seed-rate – up to 250kg/ha in WW
- Mechanical weeding in spring if conditions allow
- Photo control at drilling


COMMERCIAL PHOTOS

Weed emergence day/night sown + with/without cowl



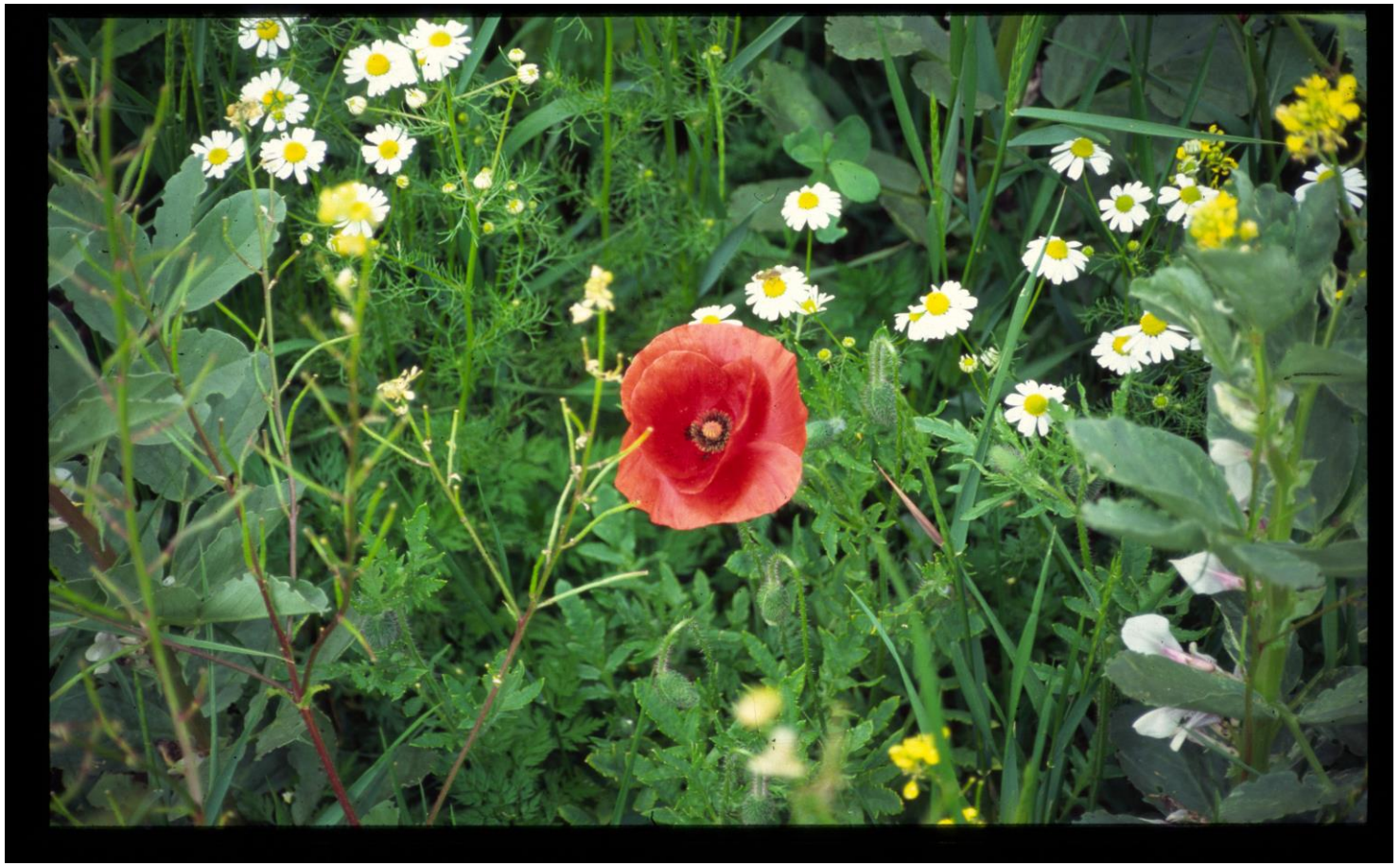
Chickweed infestation – 1st wheat after grass

Mechanical Control - Harrowcomb weeder

Mechanical Weeding – lessons learnt

- Only effective when soil surface is dry
- Cereals are resilient – broad leaved crops less so
- Nitrogen mineralisation useful
- Harrow-comb weeders are selective – trailing weeds susceptible, tap rooted weeds resistant
- Inter-row harrows are non-selective – including wildlife & the crop!
- Row spacing in cereals can increase to 20-25cm before yield is adversely affected

Tap rooted weeds in Winter Beans



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Mechanical Weeding – lessons learnt

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Inter-row hoeing

White Lupins – Inter-row hoe for weed control

Guided inter-row hoe

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Charlock in calabrese

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Fat hen in cauliflower

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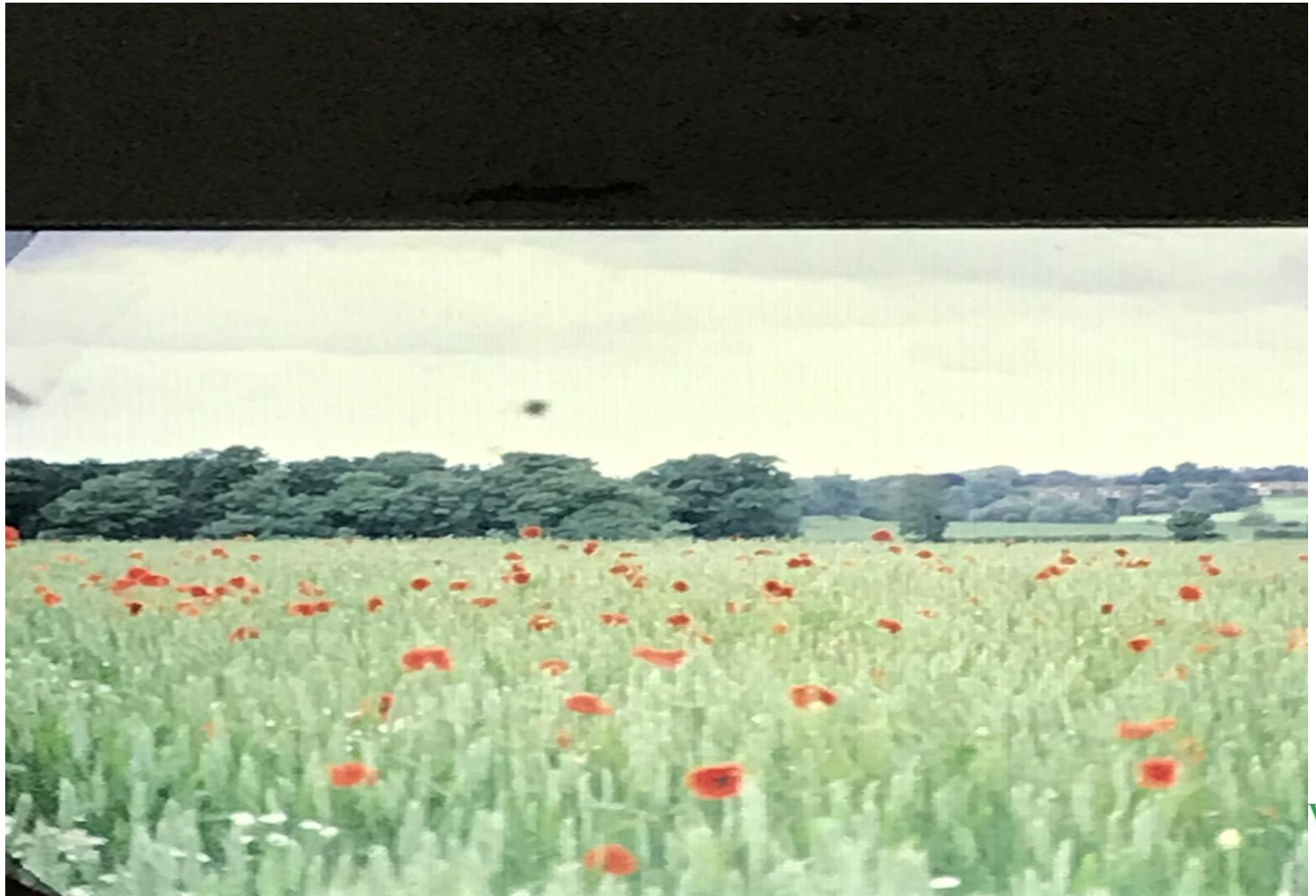
All-Arable Organic Farming (Stockless)

- Huge infrastructure and management barriers to bringing back stock to all-arable farms
- Strong market demand for organic cereals for human and livestock rations
- Mower/topper replaces the stock
- Rotational principles unchanged; Grass/Red clover => WW => WO => W.Beans => WW => S.Oats/Grass/Red Clover undersown => cut and mulched for 1 year

Stockless Organic Farming – weed control

- Cut and mulch to prevent seeding during fertility building
- Same techniques as in mixed farming
- Thermal control in potatoes
- Hand rogueing
- Crop destruction

Weed Management in stockless organic farming



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Increasing dock infestation

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Crop destruction – wild oat infestation

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Environmentally friendly weed control?

Integrated Farm Management

- “combining cultural, biological and mechanical control techniques with judicious use of chemical control”
- Modified herbicide dose rates
- Threshold approaches?
- Reduced tillage

Threshold approaches?

Traditional crop establishment

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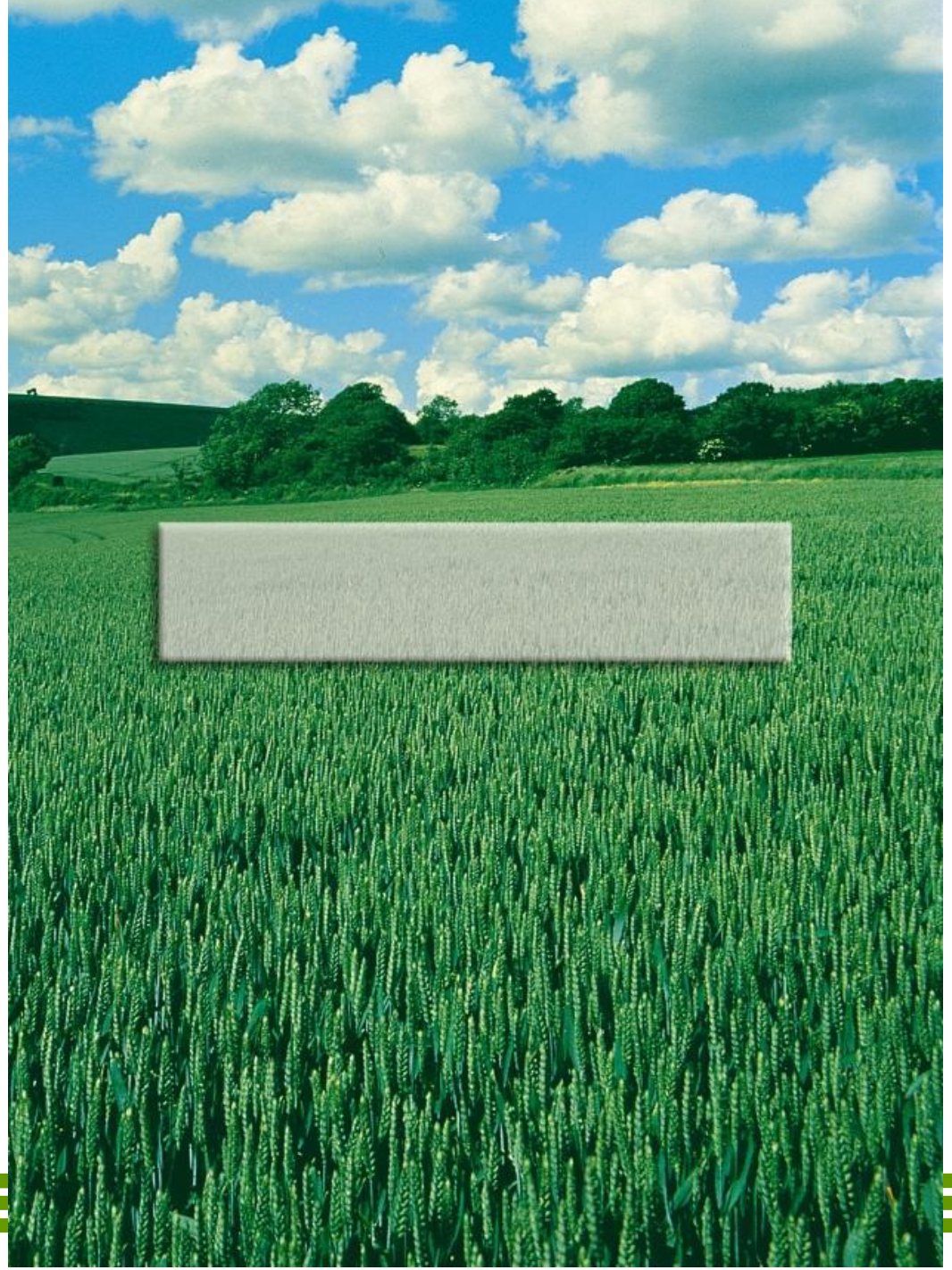
Work rate (Min/Ha)

- Primary Cultivation
- Springtine/ Power Harrow
- Roll
- Drill
- Spray

Savings 52min/ha

RESEARCH: LIFE, *LINK*-IFS
DEVELOPMENT: FOFP, RPMS
DEMONSTRATION: LEAF
ADVICE: FWAG, TIBRE
FARM



SMI Soil Management Initiative


H268 JFL
Ferrag
ROTOSEM
RAU

SMI Soil Management Initiative

Minimising Soil Disturbance

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Trash Rake

Trash Raked Stubble

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Trash Raked Stubble

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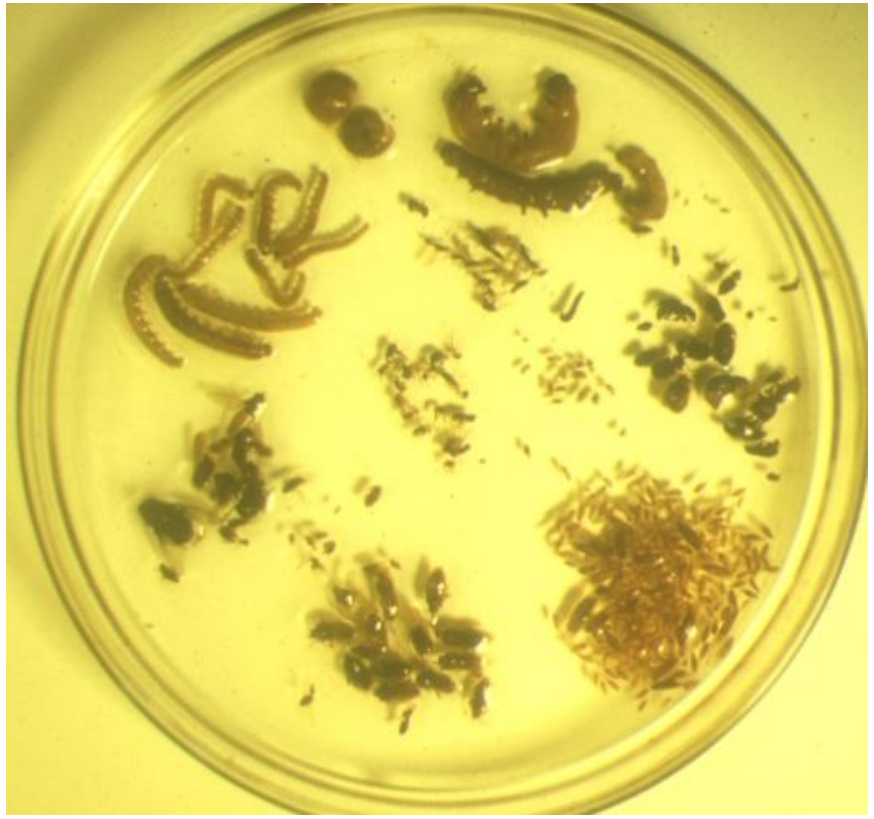
Improving the cropped environment for wildlife
Grey partridge chick diet

First week

- 95% insects

First & second week

- 80% insects



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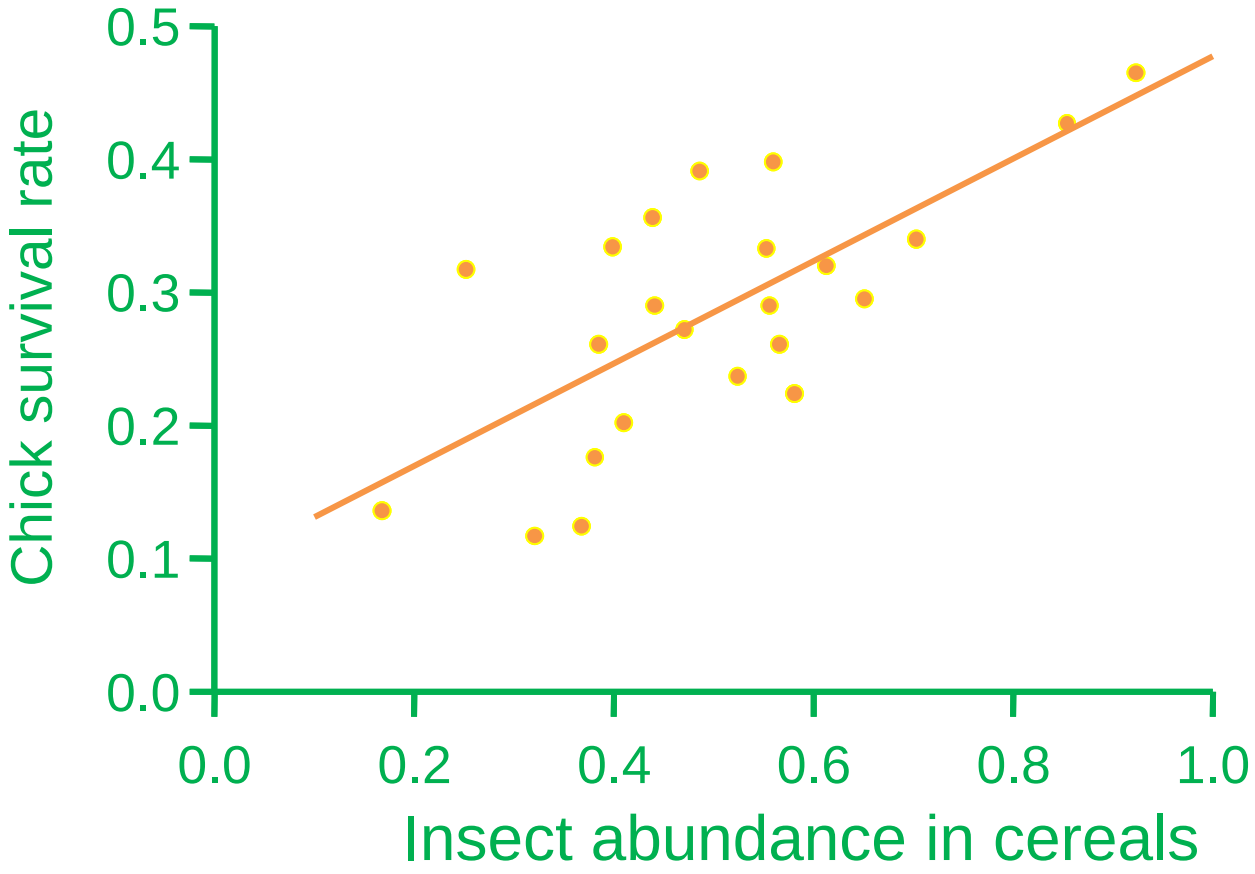
Grey partridge chick survival *v*. insects

(each point is a year)



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Enhancing habitat within the crop – spring germinating weeds

Enhanced In-crop habitat for insects

Yield compromised

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Conservation Agriculture – guiding principles

- Minimum soil disturbance
- Maximum soil cover
- Diverse crop rotation

European Conservation Agricultural Federation 1999
7 National Associations => 15

ECAF
European Conservation Agriculture Federation

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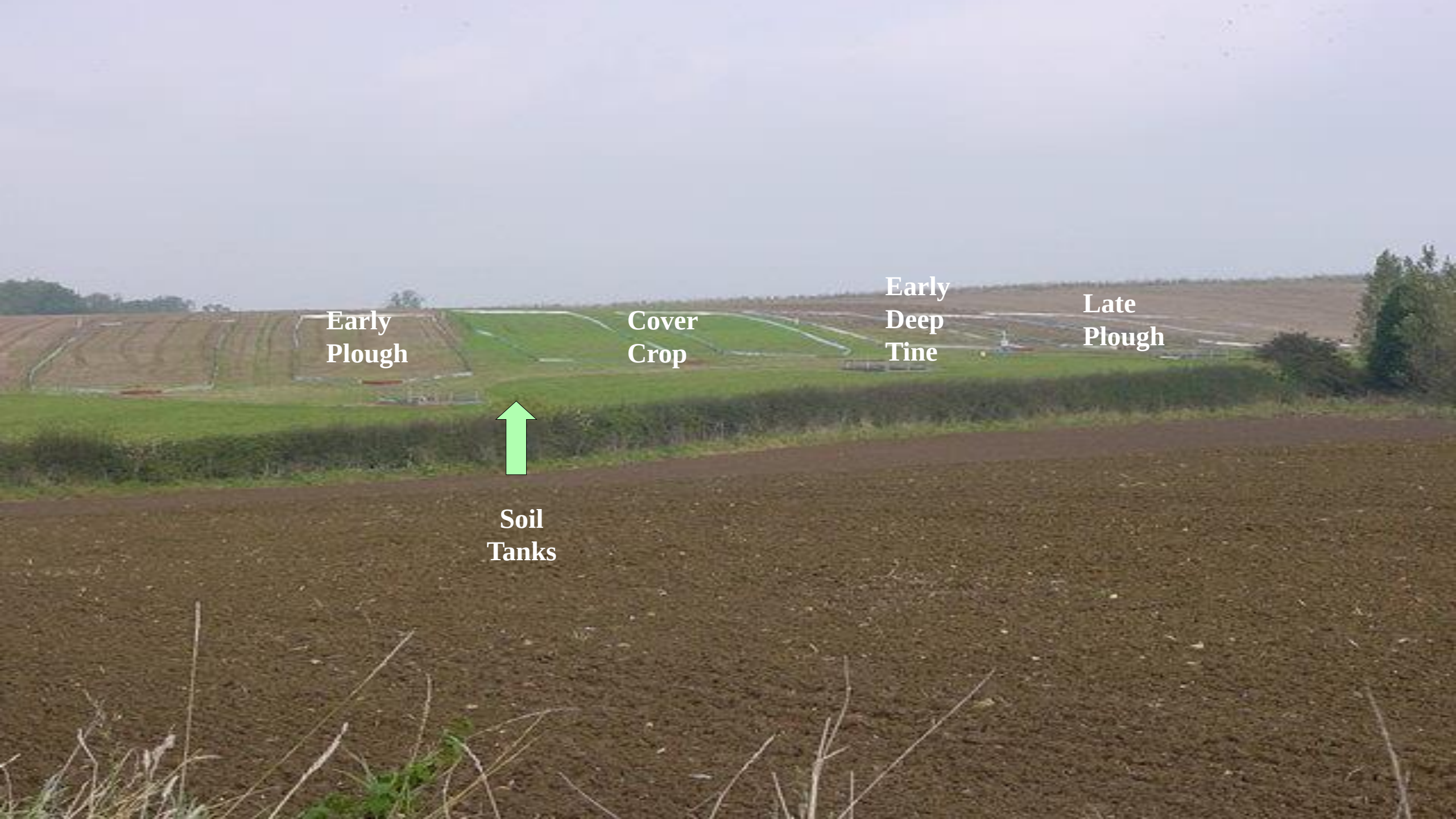
SOWAP

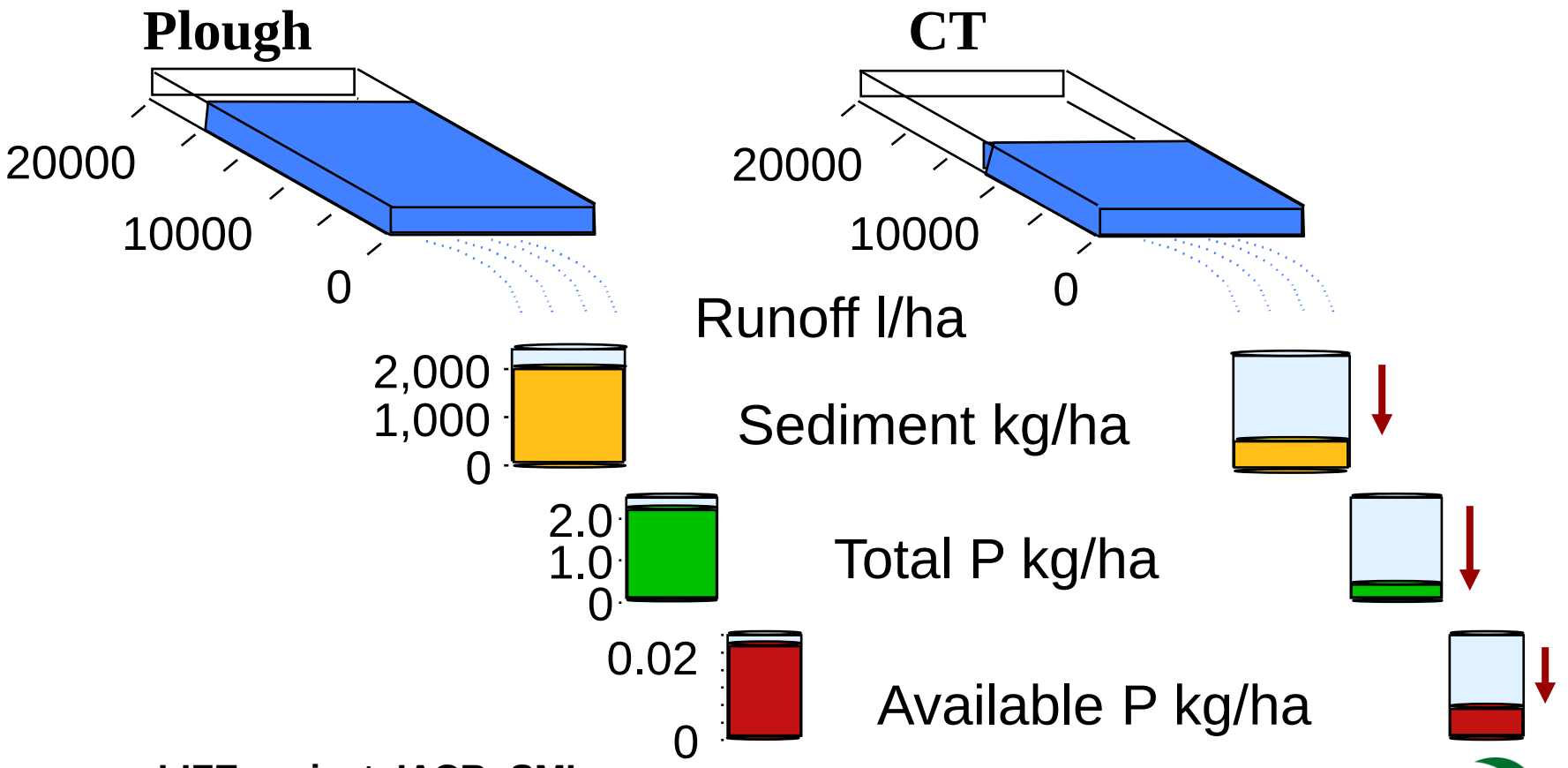
Soil and Water Protection

European Collaborative Study

SOWAP
SOIL & WATER PROTECTION

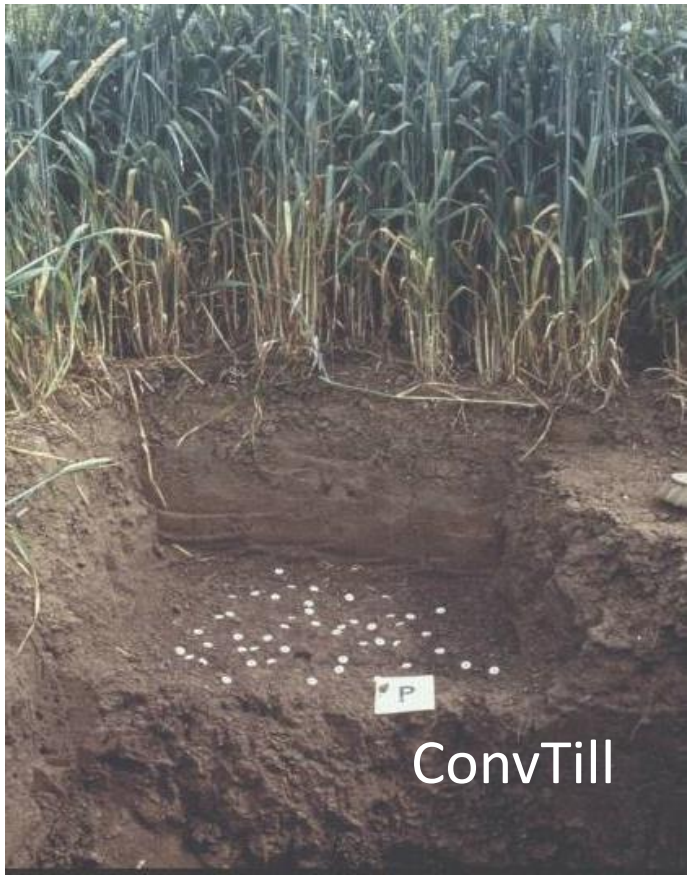

Early
Plough
Cover
Crop
Early
Deep
Tine
Late
Plough
Soil
Tanks

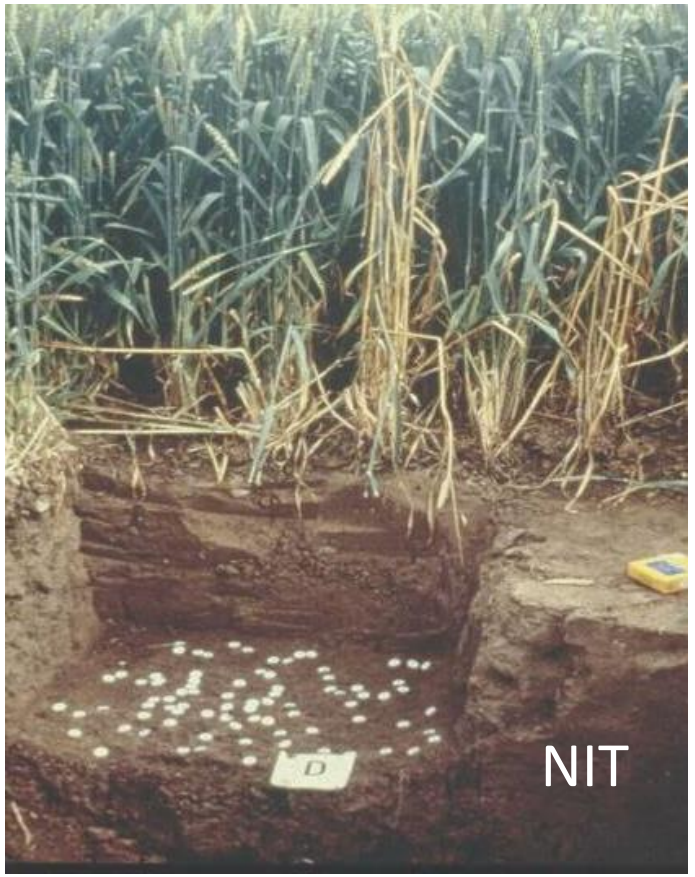
Switch cultivation for benefit



LIFE project, IACR, SMI

Earthworm Tubes of Conventional and Conservation Tillage





Min-till Sugar Beet, SOWAP

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Ploughed Sugar Beet, SOWAP

Cover Crops

- Grown through autumn/winter
- Green cover all year
- Retain nutrients
- Increase organic matter
- Reduce soil erosion
- Stabilise environment
- Buffer extreme weather
- Reduce weed problems (Blackgrass)
- Provide pollen/nectar/cover

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Direct Drilled Cover Crop

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Impossible Field!

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Impossible Field- Problem Solved!

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Radish & Oat Cover Crop

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Early Sown Crops

Direct Drilling into green covers

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Direct Drilling into Cover Crop

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Herbicide Application

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Six Weeks from Drilling

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Little Weed Emergence

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Stem Extension

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Retained Moisture

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Dry Soil

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Wheat Direct Drilled Into Grass Ley

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Conservation Agriculture and Sustainable Farming Systems project

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The Allerton Project

NIAB

ECAF
European Conservation Agriculture Federation

syngenta

syngenta

European Conservation agriculture project: 2017-2022

Purpose of study

Develop an understanding of a cereal cropping system based on Conservation Agriculture principles so when moving towards a more sustainable cropping system, adoption can be quicker and more reliable for growers and the wider agricutural industry.

NIAB

S.A.R.L. EJVN

ECAF
European Conservation Agriculture Federation

SAJA SEVILLA

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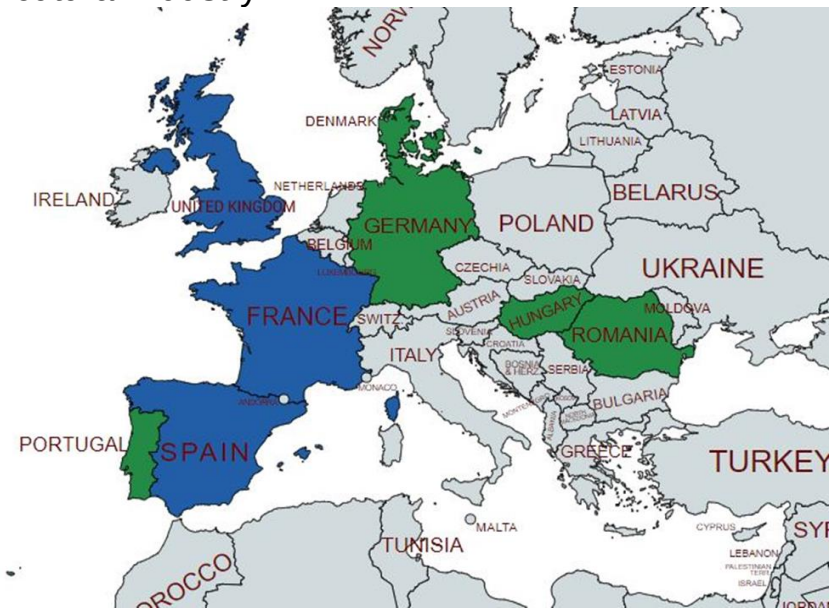
AEAC.SV
Asociación Española Agricultura de Conservación Suelos Vivos



syngenta

Conservation agriculture project
Three systems

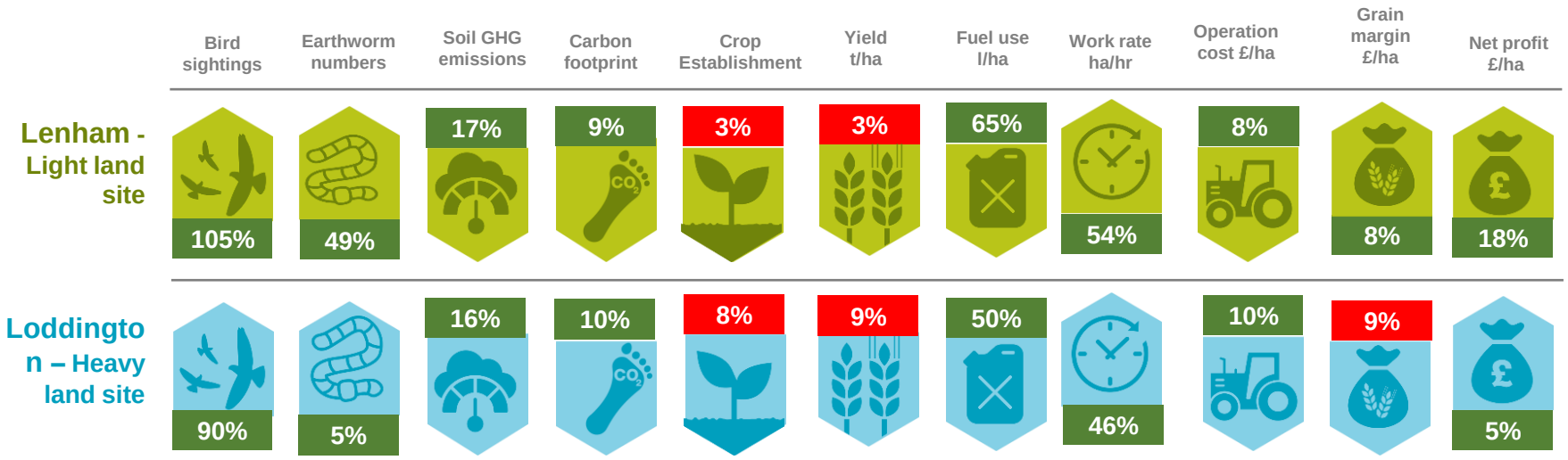
Conventional:
15-20 cm depth inversion cultivation

Sustainable System 1:
10-15 cm depth non-inversion cultivation

Sustainable System 2:
0-10 cm depth light cultivation

In summary:

All results are comparing Sustainable System 2 (direct drill / light till) against the Conventional System (plough) averaged across the seasons (Lenham 2 years and Loddington 3 years)

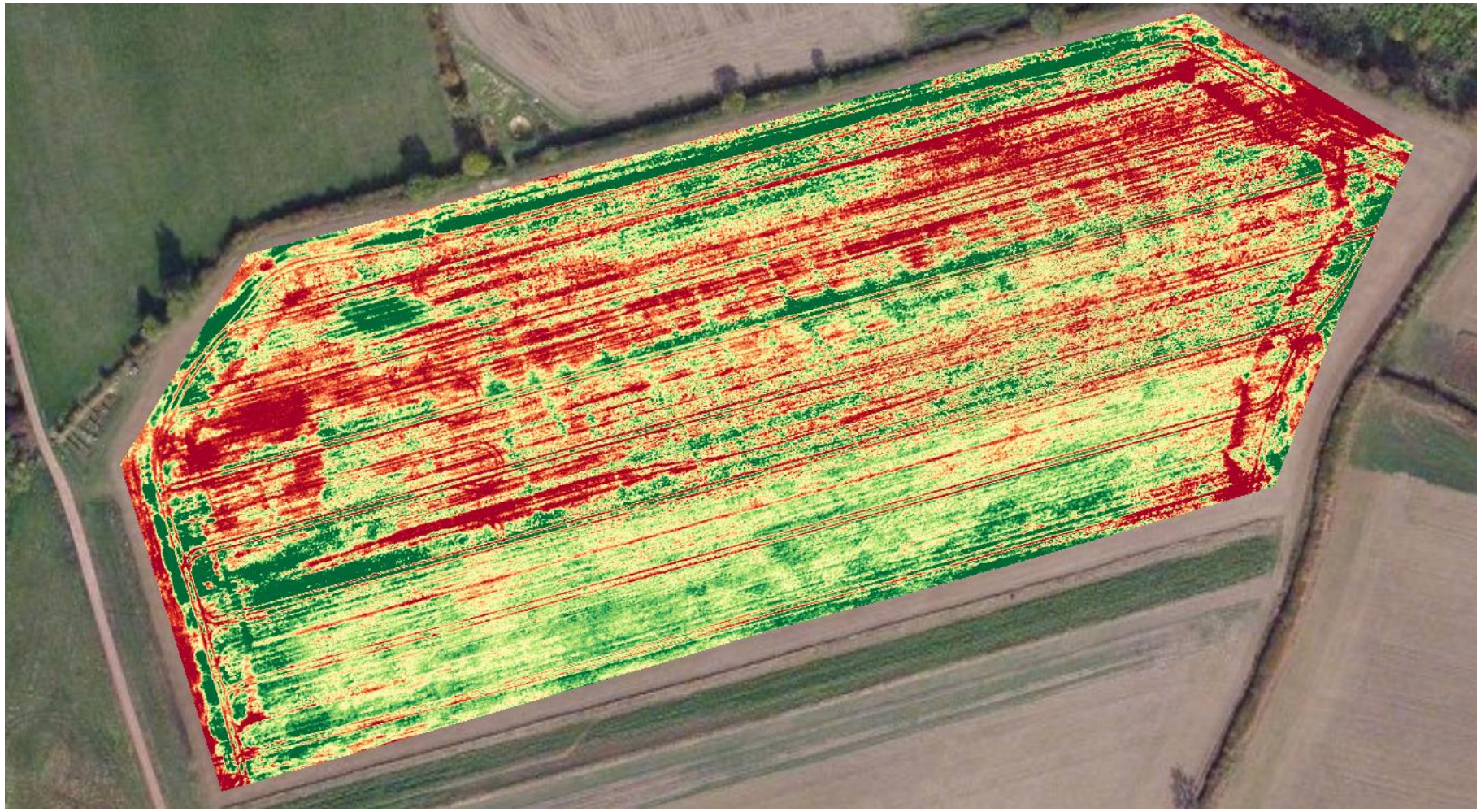


20 years on MinTill – blackgrass saturation

Blackgrass emerging after ploughing

Ploughed after 20 years – abundant charlock

- Upper Pond North 7.9ha



Pests, disease and weed issues with reduced tillage

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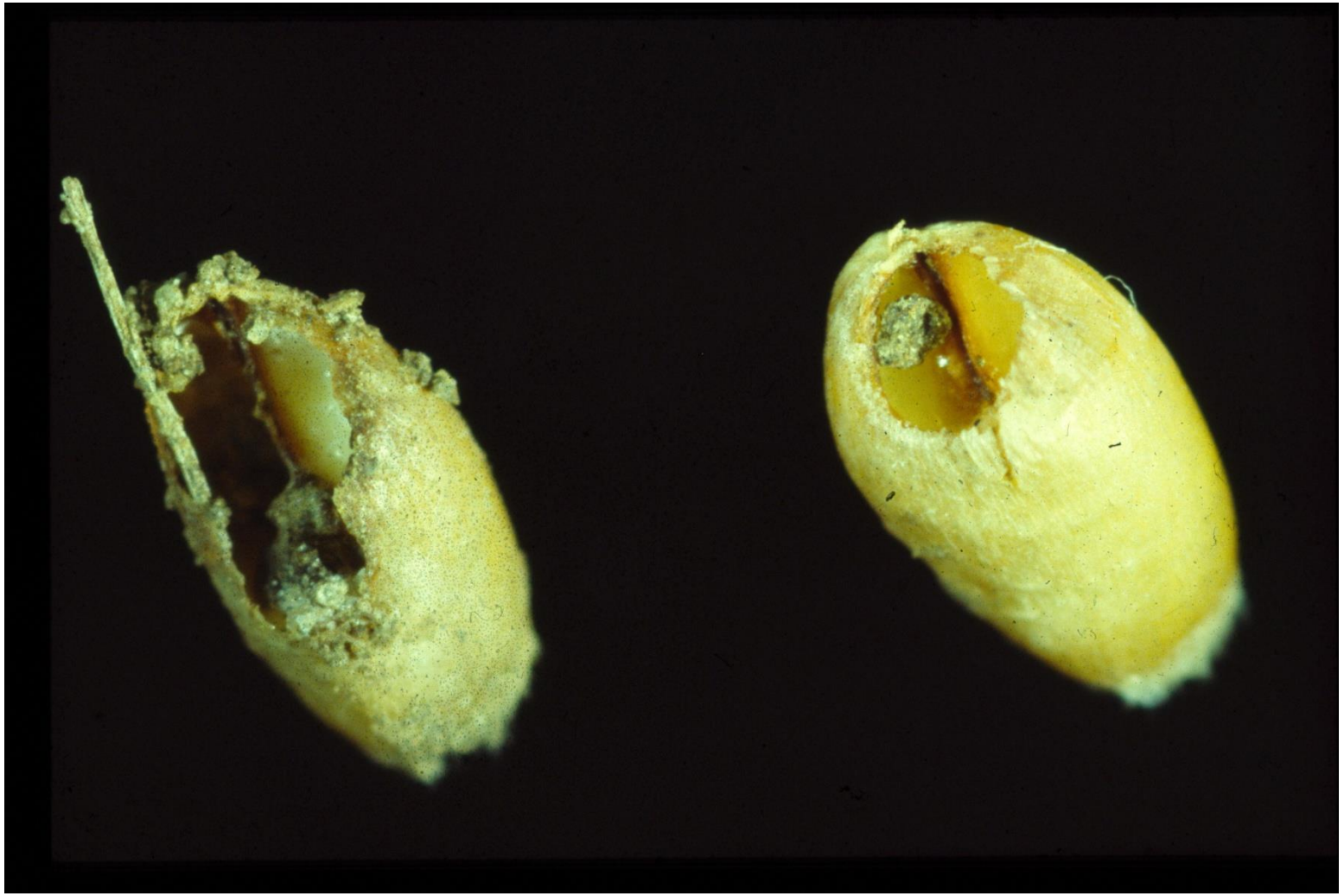

Rough seedbed after ploughing

LT

MT

PL

Suction sampling insects

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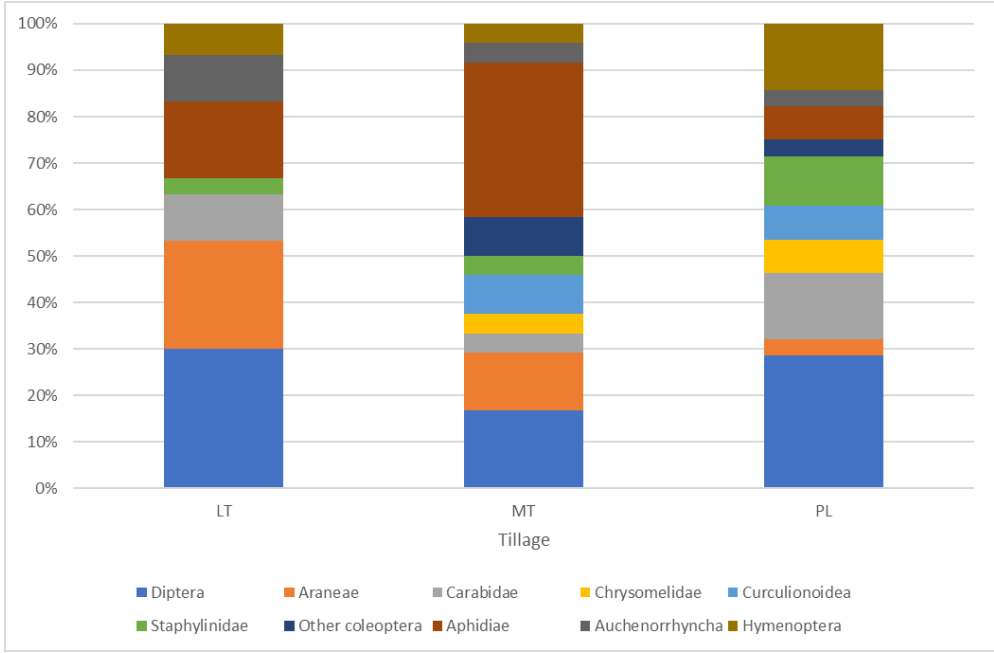
Biological control in OSR



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Regenerative Agriculture – guiding principles

- Diversity in cropping
- Protection of the soil
- Maintain living roots
- Minimise soil disturbance
- Integrate livestock

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Transition from ley to arable – direct-drilled hybrid barley

Conclusions

- Diverse crop rotations assist in crop management
- Weed populations interact with rotation and soil cultivations
- Field history is an important determinant of weed pressure
- Ley periods are a valuable tool in depleting short lived arable weeds
- Employing multiple control strategies enables a progressively step-wise approach to weed management
- Short-term changes in cultivation strategies can assist containment