SOIL AND AGRONOMIC MONITORING STUDY (SAMS)

THE MORLEY AGRICULTURAL FOUNDATION

The Morley SAMS project, delivered by NIAB, undertakes comprehensive crop and soil monitoring across 30 monitoring sites across The Morley Agricultural Foundation's farm in Norfolk. This long-term study focuses on soil health and its effects on yield, profitability, and resilience, complementing the TMAF's existing long-term trials. Initiated in 2018, the first five years of monitoring was completed in Autumn 2023.

Linking soil health to crop performance

Soil health measurements vary spatially and temporally, making it essential to measure across rotations to identify trends and interactions. For example, earthworm numbers, which are strongly influenced by sampling time and conditions, show a notable pattern when averaged over five years. Sites with the highest historic yields often have the highest earthworm counts.

This correlation suggests that soil properties that contribute to higher yields, such as soil organic matter, improved soil structure and higher plant-available water, also support larger earthworm populations. Earthworm numbers can be a useful indicator of soil health trends over time.

Soil and agronomic assessments taken under SAMS (*assessed rotationally)

AGRONOMIC MONITORING	SOIL MONITORING
Plant and ear populations + Green Area Index (GAI)	Visual Evaluation of Soil Structure (VESS)
GAI	Penetration resistance
Ear numbers	Aggregate stability
Grass weed head/broad leaf weed population	Earthworms
Disease levels	Soil mineral N
Yield	Soil organic matter
Harvest index	pH, extractable phosphorus, potassium, magnesium, calcium, sulphur
Specific weight	Bulk density*
Thousand grain weight	Water release characteristic curve*
Grain protein, nitrogen, and nutrient contents/sugar content for sugar beet	Exchangeable micronutrients*
	Respiration assay (CO_2 burst)*
	Potentially mineralisable N*

Leveraging data sets for focused research

The study design and data sets are being utilised in various extension projects:

- managing spatial variability in nitrogen use efficiency (AHDB Strategic Cereal Farm East)
- validating cropping system models to support on farm management (Cranfield University, PhD)
- linking grain nutritional quality with soil health (Royal Agricultural University, PhD)
- understanding wheat varieties under regenerative agriculture (TMAF/NIAB)
- soil health through soil carbon profiling and proxies of below-ground diversity (UEA, PhD).

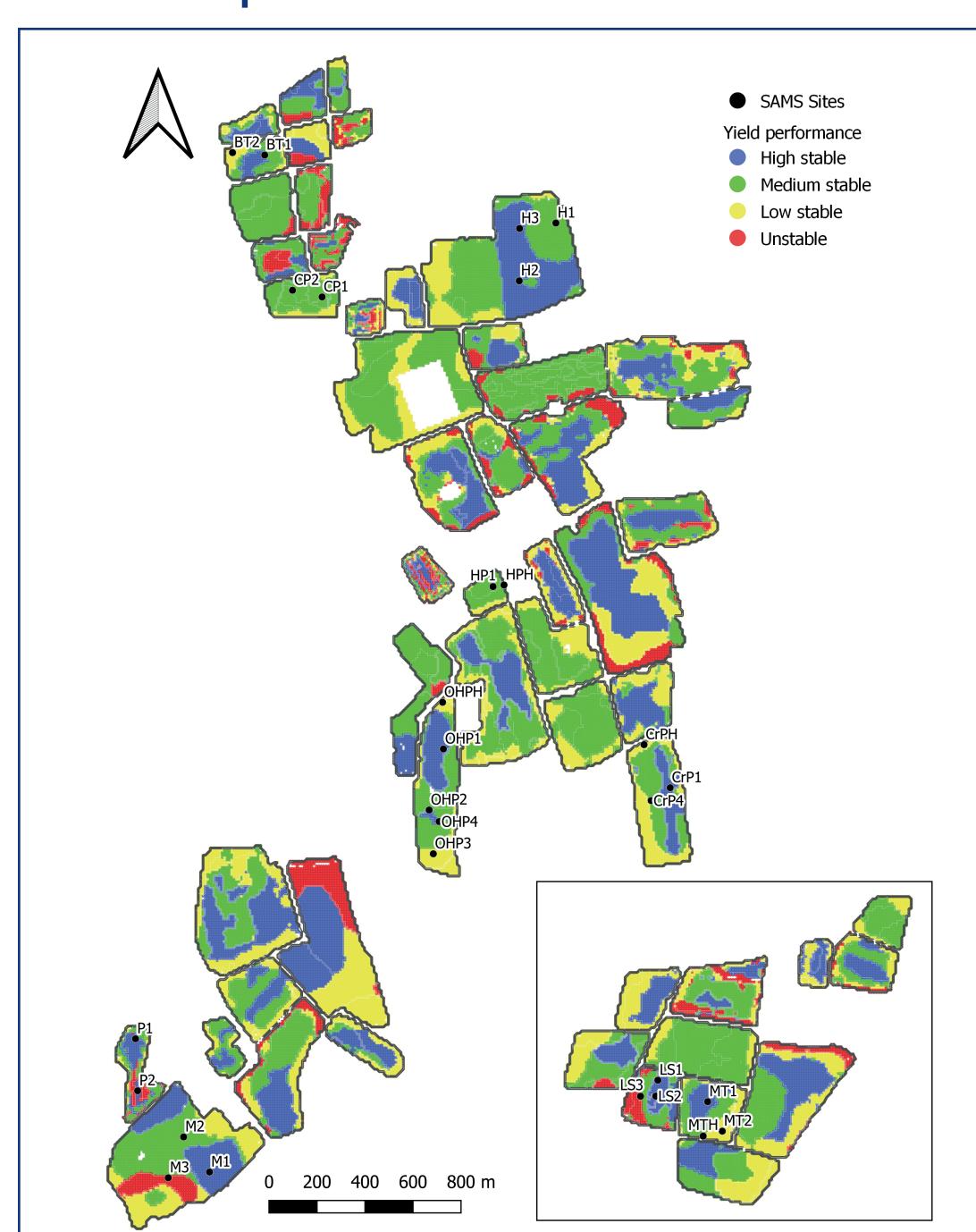### Figure 1. Yield performance across the SAMS sites

Figure 2. SAMS site standardised earthworm numbers (2019-2023) compared to site long-term standardised yield performance (0 = field mean)