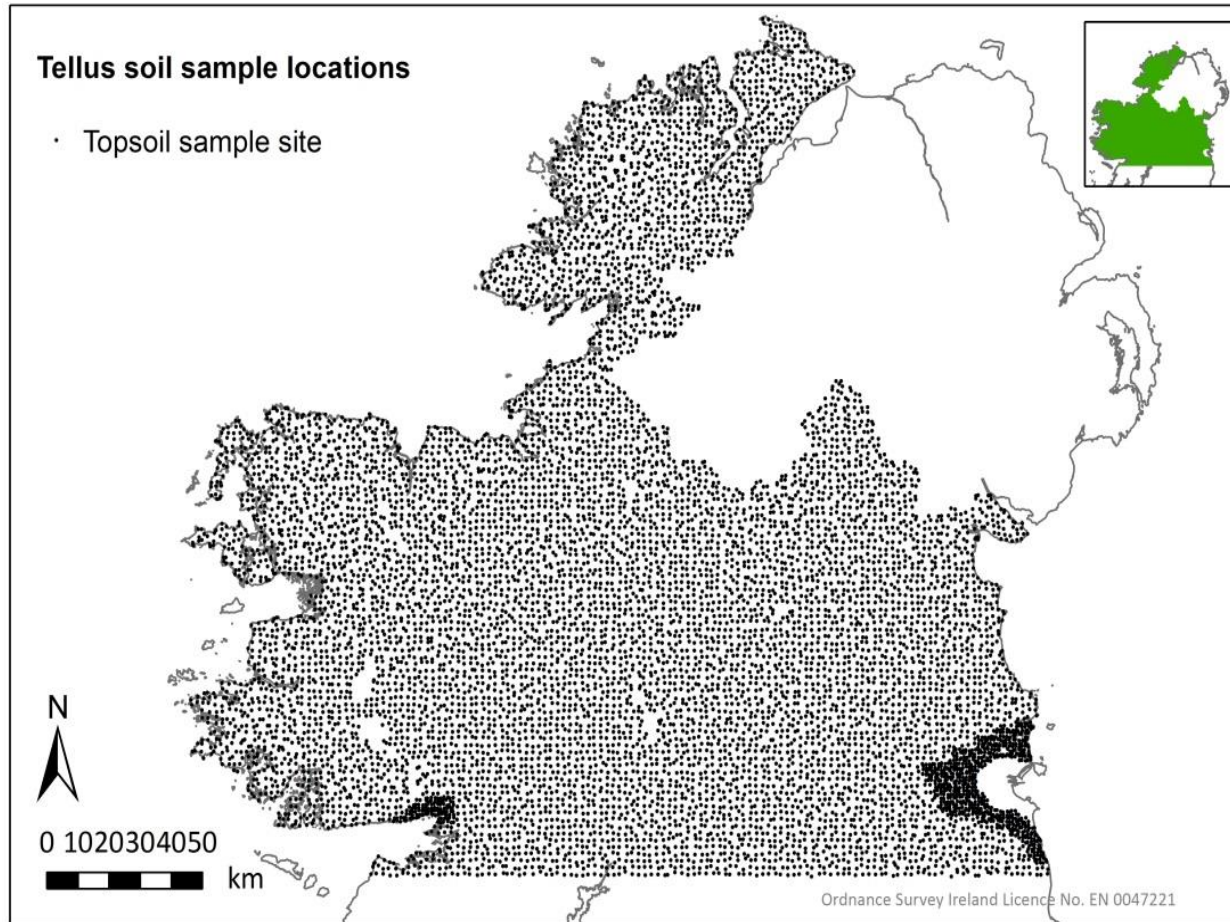


# Emerging technologies to improve indicators of soil health



# Attributes & Indicators



4 km<sup>2</sup> grid N=10,000 A & S samples

## Soil Attributes

- Particle size/texture
- pH
- Cation exchange capacity
- Carbon, % Organic matter
- Nutrient status

## Soil Health Indicators

- Lime requirement
- P sorption capacity
- Carbon stocks
- Heavy metal/trace element

# Spectroscopy

## Soil Health Law



## Nature Restoration Law- link to soil



## Soil Attributes

- Particle size/texture ✓
- pH ✓
- Cation exchange capacity ✓
- Carbon, % Organic matter ✓
- C stocks ?
- Nutrient status x

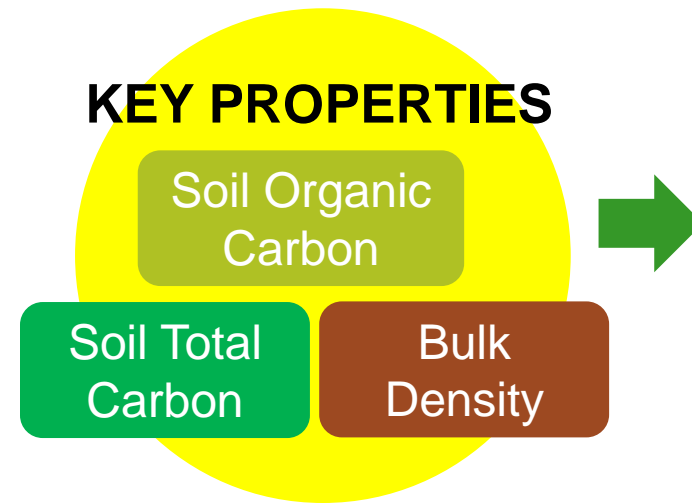
## Soil Health Indicators

- Lime requirement ✓
- P sorption capacity ✓
- Carbon sequestration?
- Heavy metal/trace element (XRF)

# Soil Carbon

## Predicted soil health indicator

- Carbon, % Organic matter ✓
- Carbon saturation potential ?
- Carbon sequestration ?
- Bulk density class ?

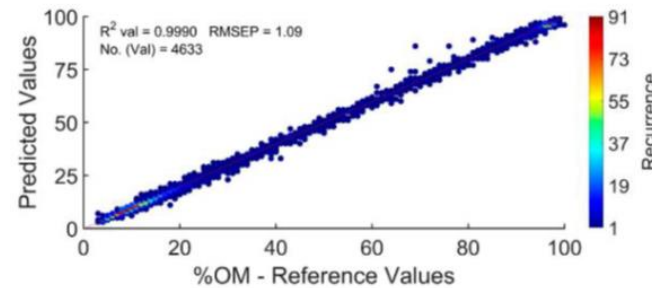


## LECO Carbon Analyser

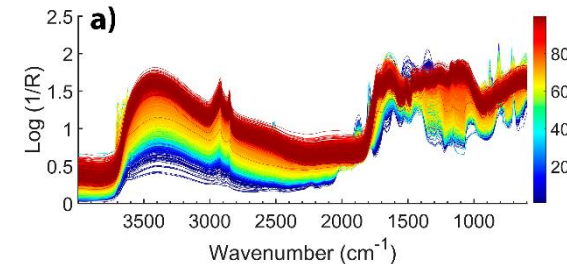


Reference data

## Chemometric Modeling/Machine Learning Algorithms



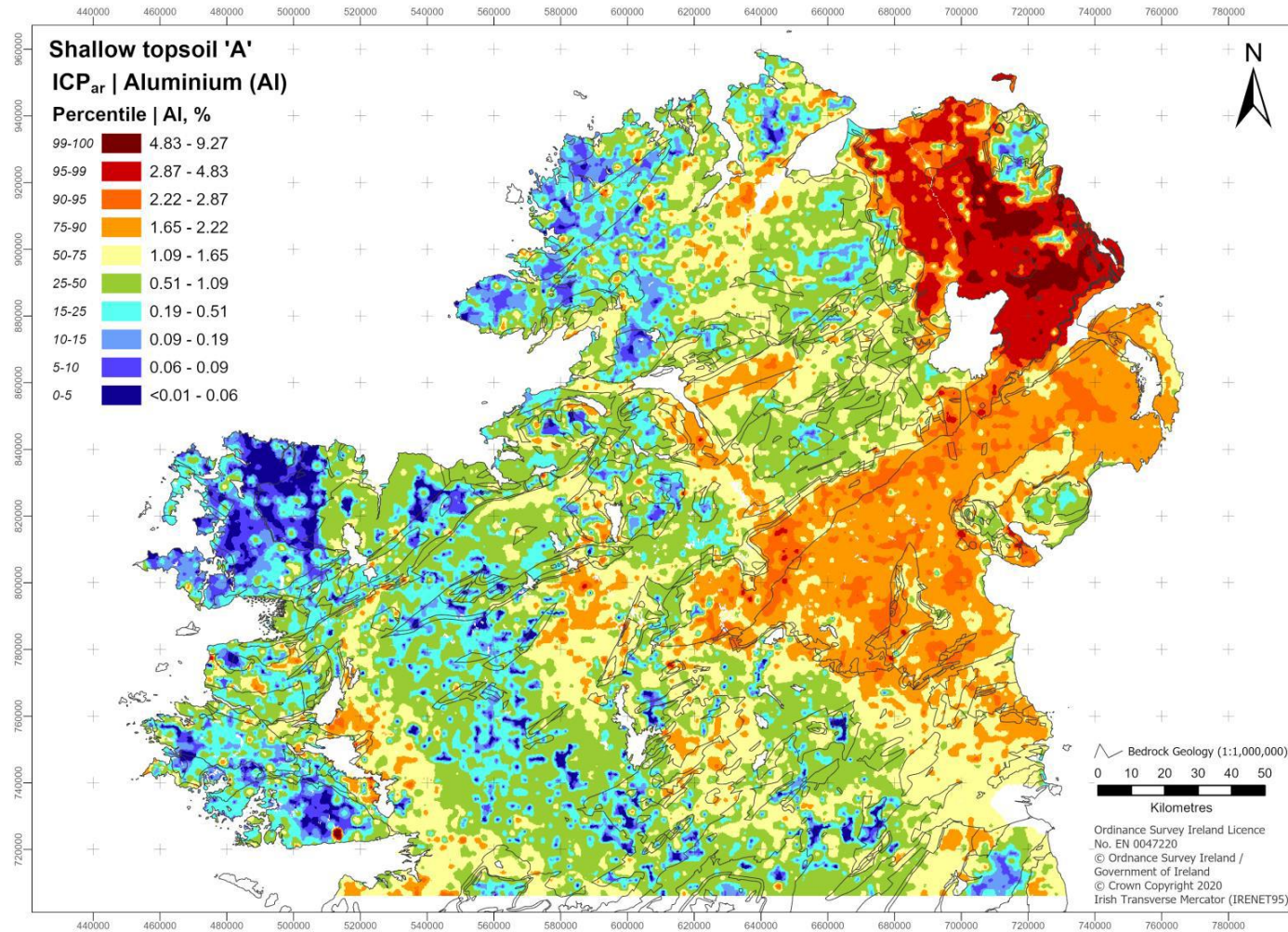
+



MIR/NIR spectral data



# From Benchtop to Handheld



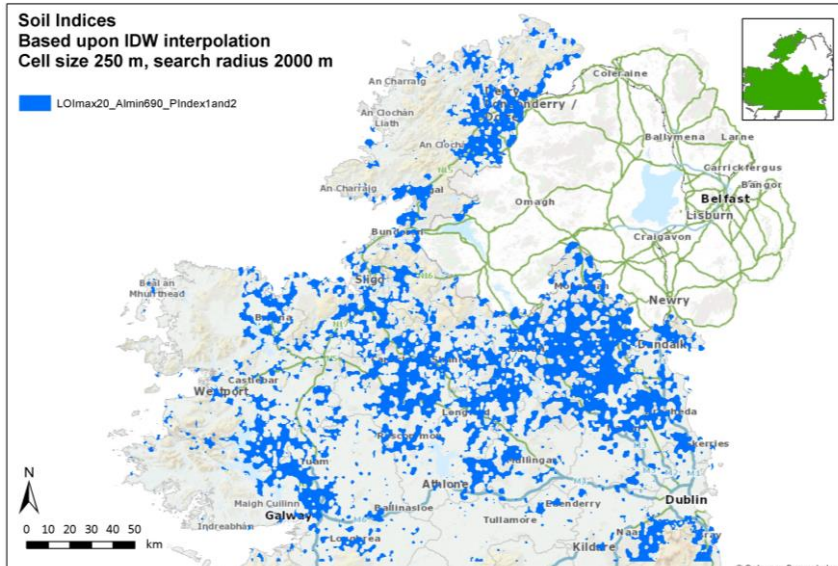
## Soil Attributes

- Particle size/texture ✓
- pH ✓
- Cation exchange capacity ✓
- Carbon, % Organic matter ✓
- C stocks ?
- Nutrient status x ←

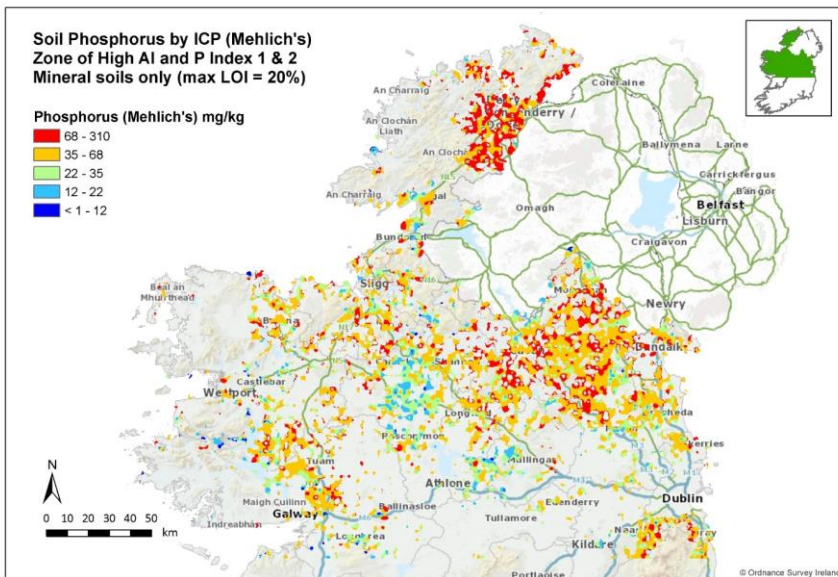
## Soil Health Indicators

- Lime requirement ✓
- P sorption capacity ✓
- Carbon saturation potential ✓
- Heavy metal/trace element (XRF)

# Geospatial analysis of soil nutrients

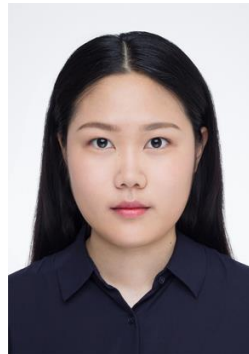


- XRF Multi-element
- Nutrient interactions
- Al concentration and soil index
- Regional trends of P fixation
- Machine learning & geospatial statistics





# Thank you...



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Food Engineering



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