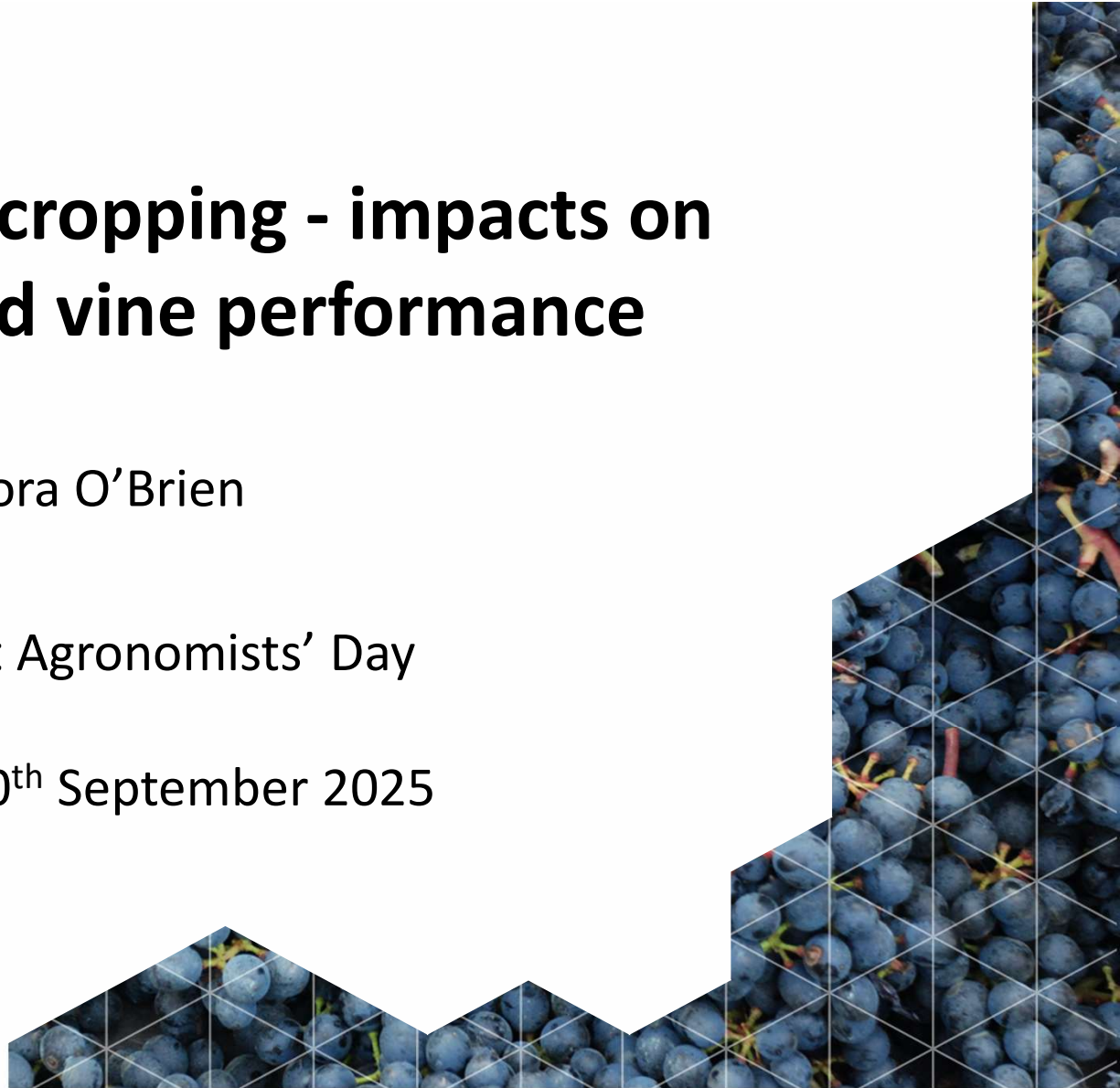


Vineyard cover cropping - impacts on soil health and vine performance

Flora O'Brien

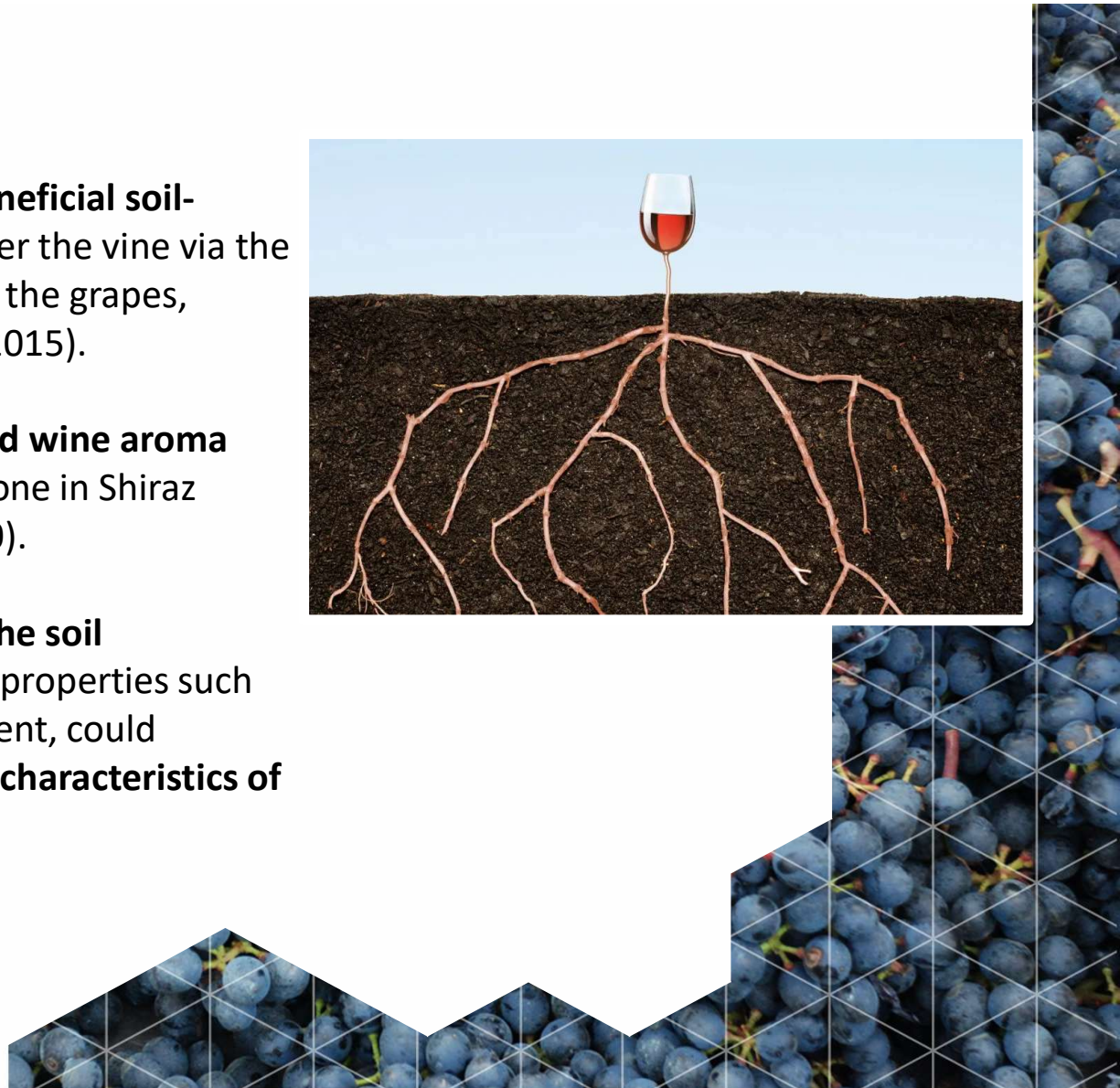
Niab Fruit Agronomists' Day

Tuesday 30th September 2025



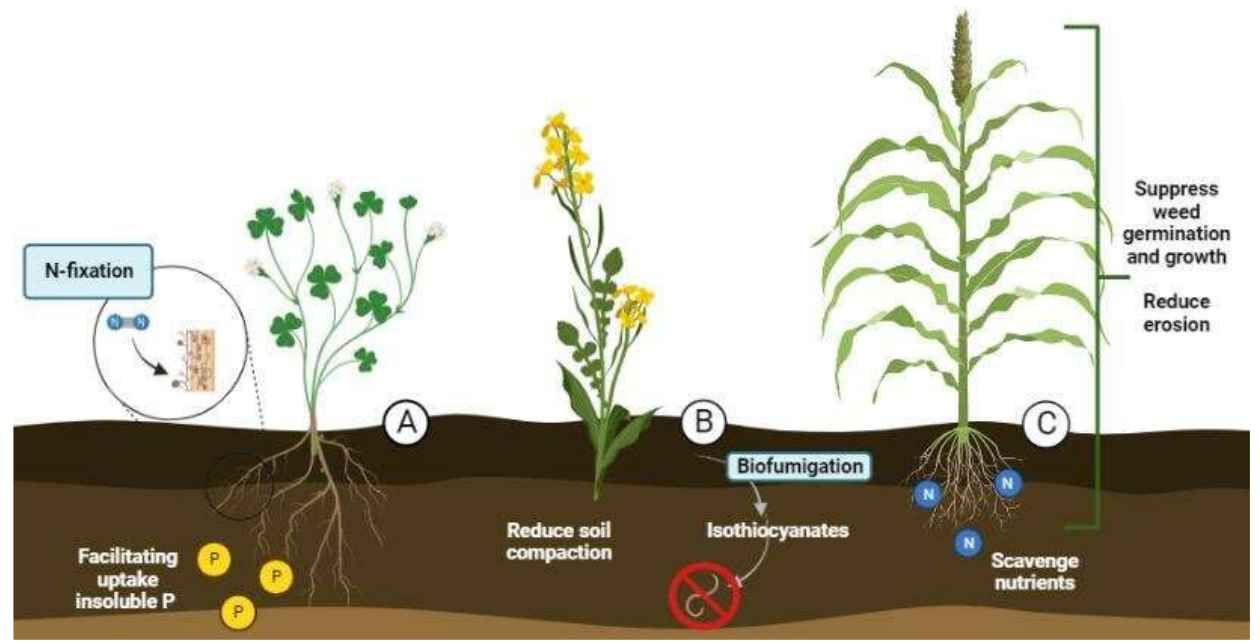
The *terroir* effect

- Grapevines can **actively select certain beneficial soil-dwelling microbes** that subsequently enter the vine via the root system and form the microbiome on the grapes, leaves and flowers (Zarraonaindia et al., 2015).
- The grape microbiota can **affect grape and wine aroma profiles**, including the compound rotundone in Shiraz grapes (Gupta et al., 2019; Liu et al., 2020).
- Therefore, **vineyard practices that alter the soil microbiome** through their impact on soil properties such as pH and soil organic matter (SOM) content, could indirectly have a significant **effect on the characteristics of wine** (Hendgen et al., 2018).



The benefits of Cover cropping

- Increase SOM
- Improve infiltration
- Improve soil structure & alleviate compaction
- Soil microbial community effects (e.g. PGPR)
- Biofumigation (brassica spp.)
- Increase soil fertility (legumes)
- Weed suppression
- Food source for pollinators



Quintarelli et al (2022) *Agriculture* 12

Project title

Increasing productivity and sustainability in UK viticulture: investigating the potential impact of groundcover management practices on soil health, yields and juice quality, and emissions

Funding

Innovate UK/Defra - Farming Innovations Programme – Feasibility study

Project partners

GUSBOURNE



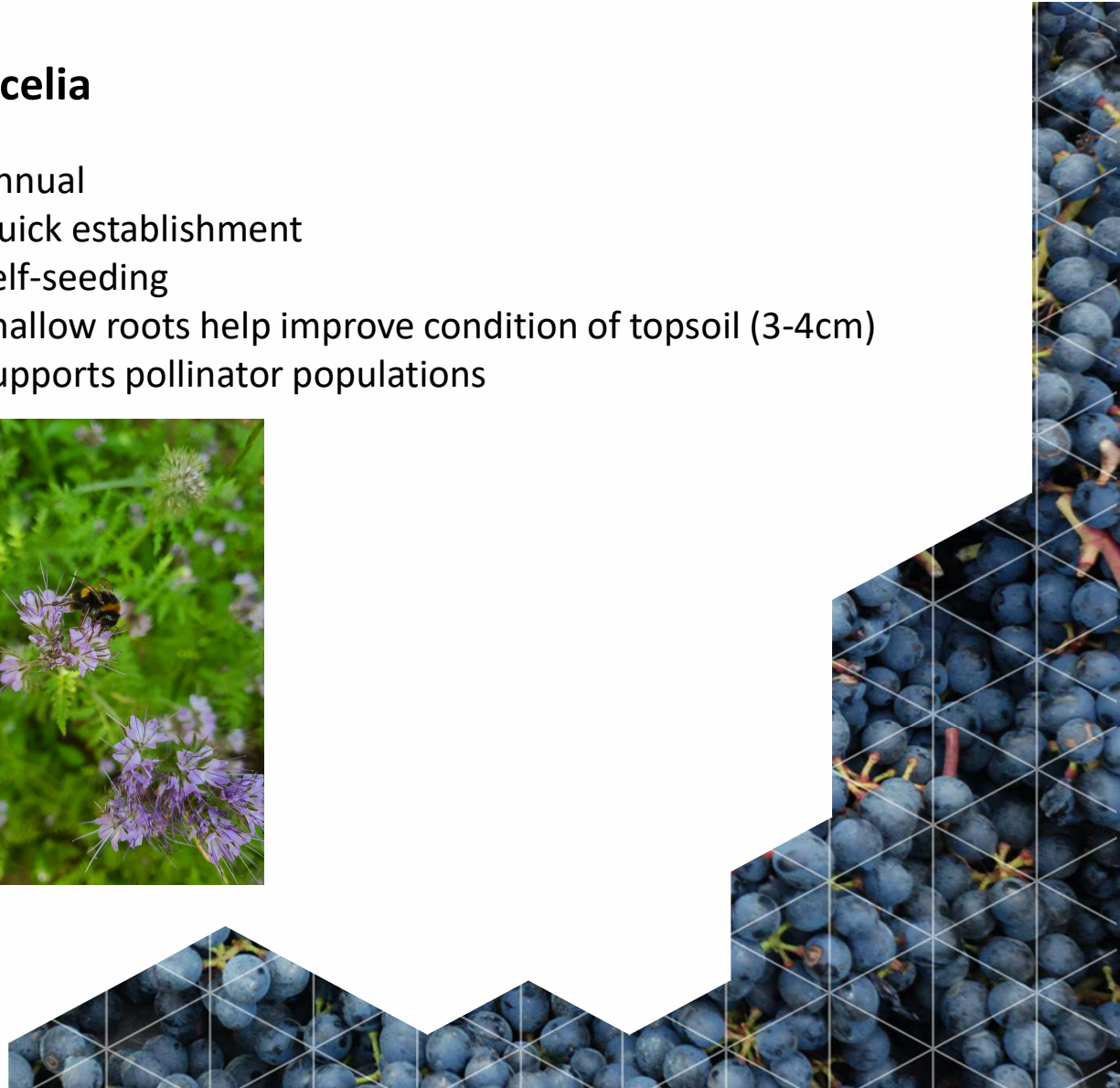
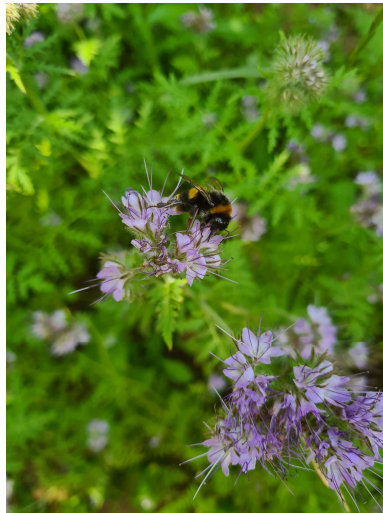
- Three vineyard sites: Chapel Down (Boxley), Gusbourne (Appledore) and East Malling.
- Spring and Autumn sowing (direct drill/broadcast).
- A variety of cover crop species and mixes.
- Chemical vs mechanical ground prep.
- Soil analysis: nutrient content, microbial biomass, organic matter content, compaction, infiltration.
- Leaf analysis: nutrient content, chlorophyll measurements.
- Vine performance: canopy area index, grape yield and juice quality.





Phacelia

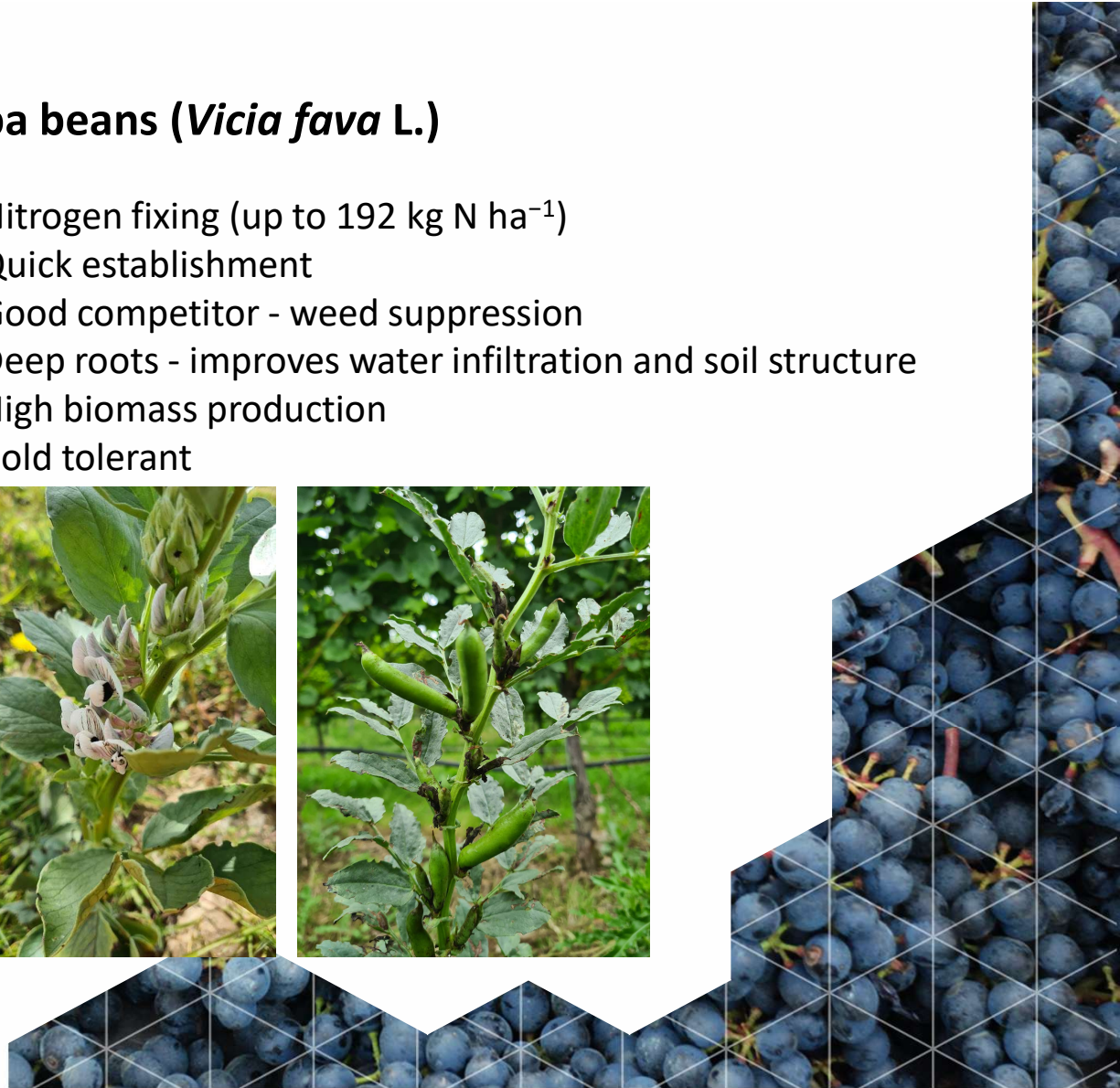
- Annual
- Quick establishment
- Self-seeding
- Shallow roots help improve condition of topsoil (3-4cm)
- Supports pollinator populations





Faba beans (*Vicia fava* L.)

- Nitrogen fixing (up to 192 kg N ha⁻¹)
- Quick establishment
- Good competitor - weed suppression
- Deep roots - improves water infiltration and soil structure
- High biomass production
- Cold tolerant



Creeping red fescue



Cereal rye



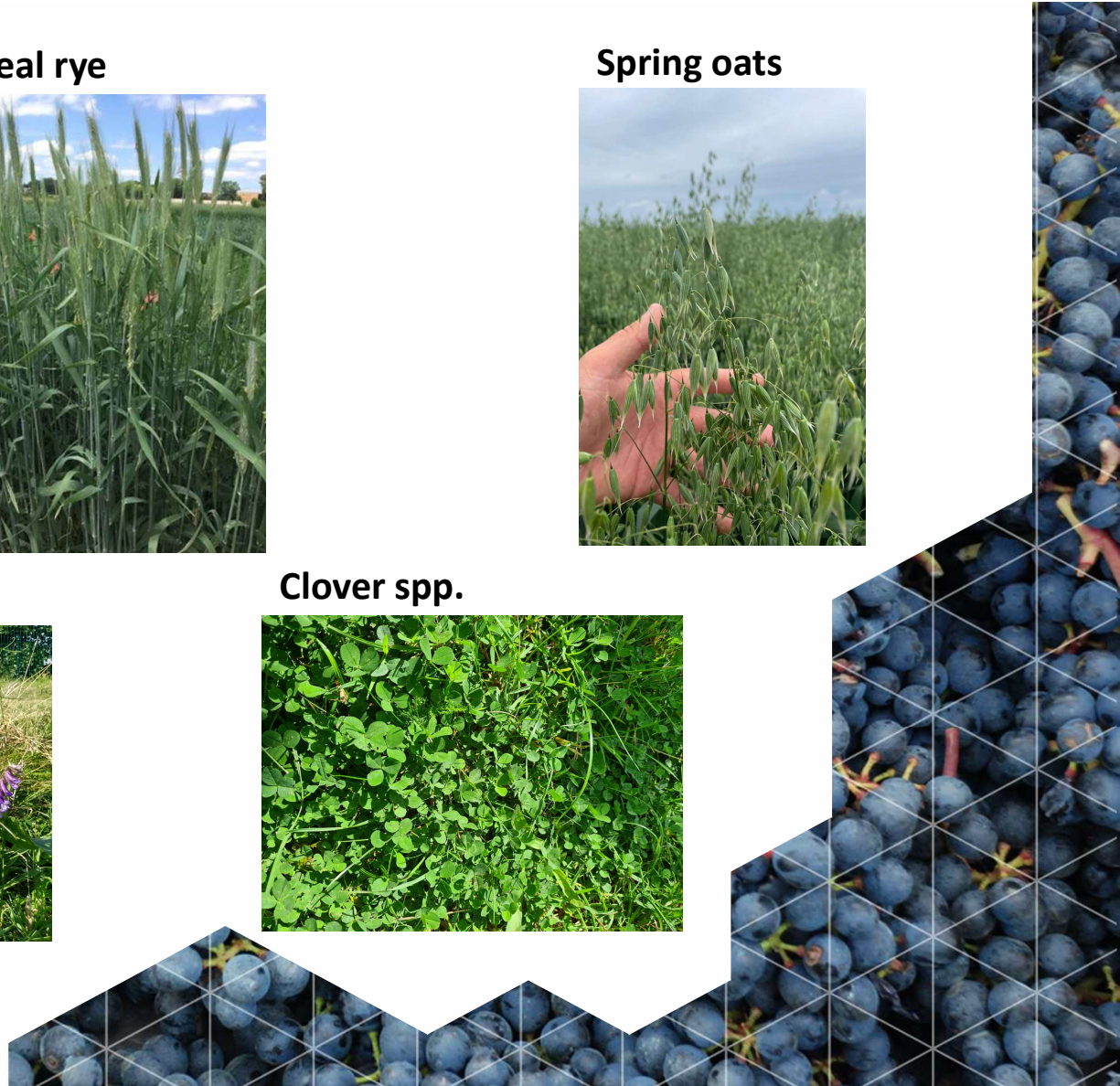
Spring oats



Vetch

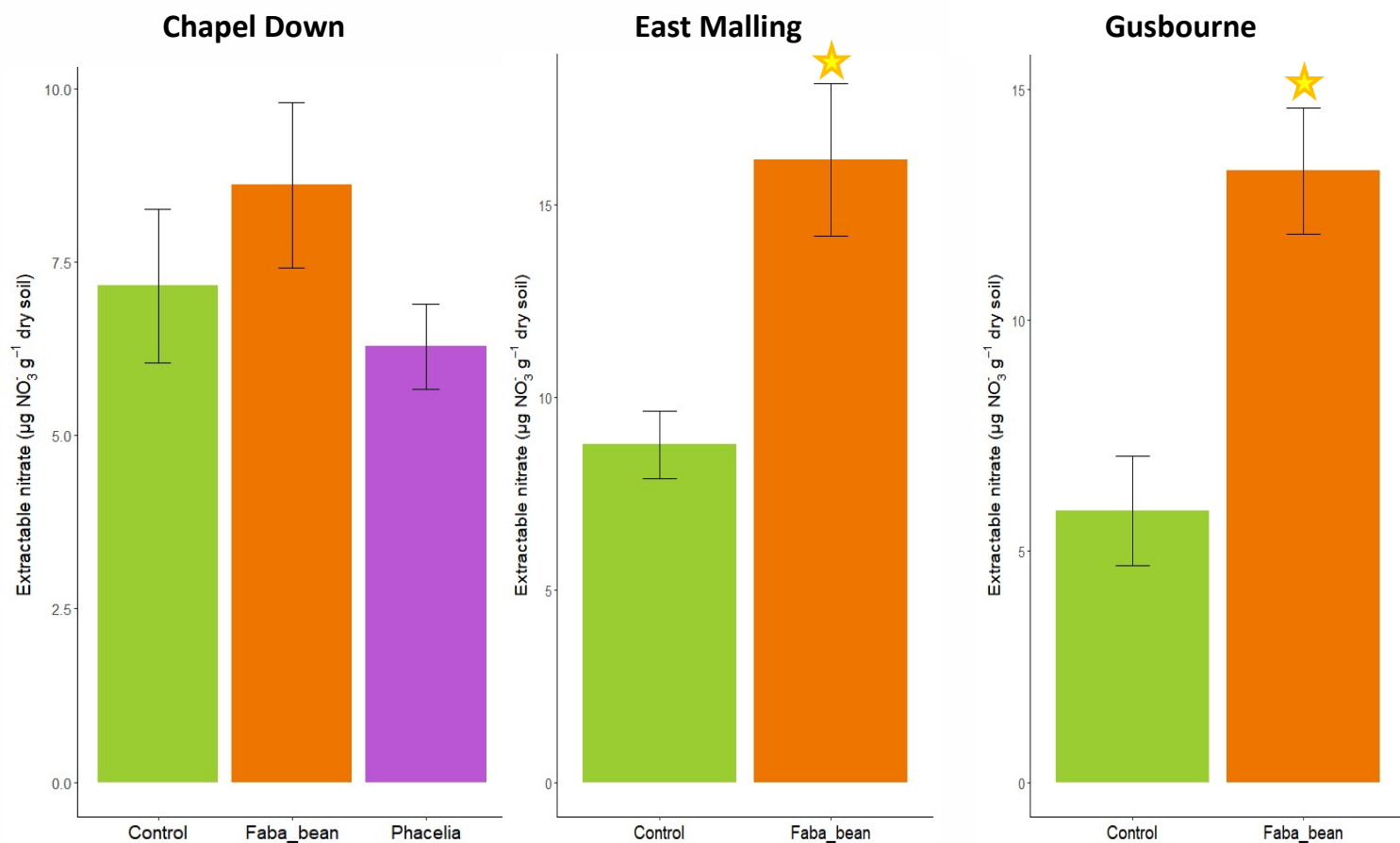


Clover spp.



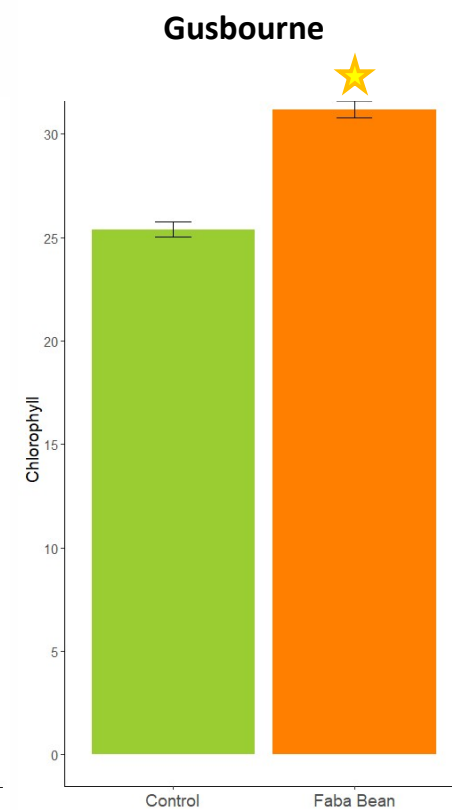
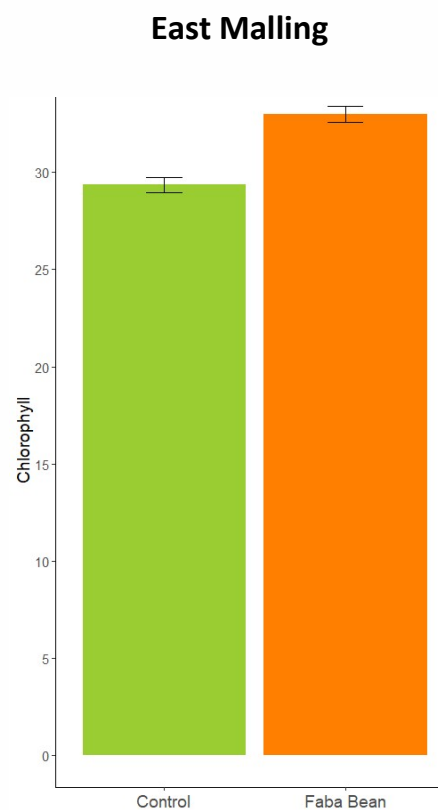
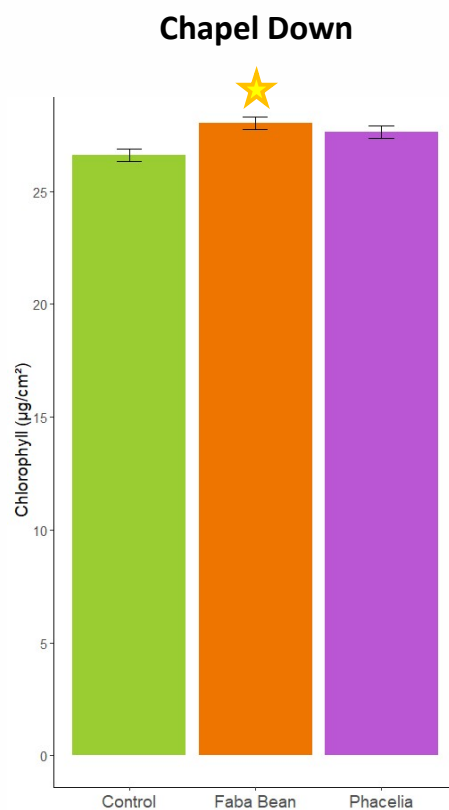
Soil Nitrate

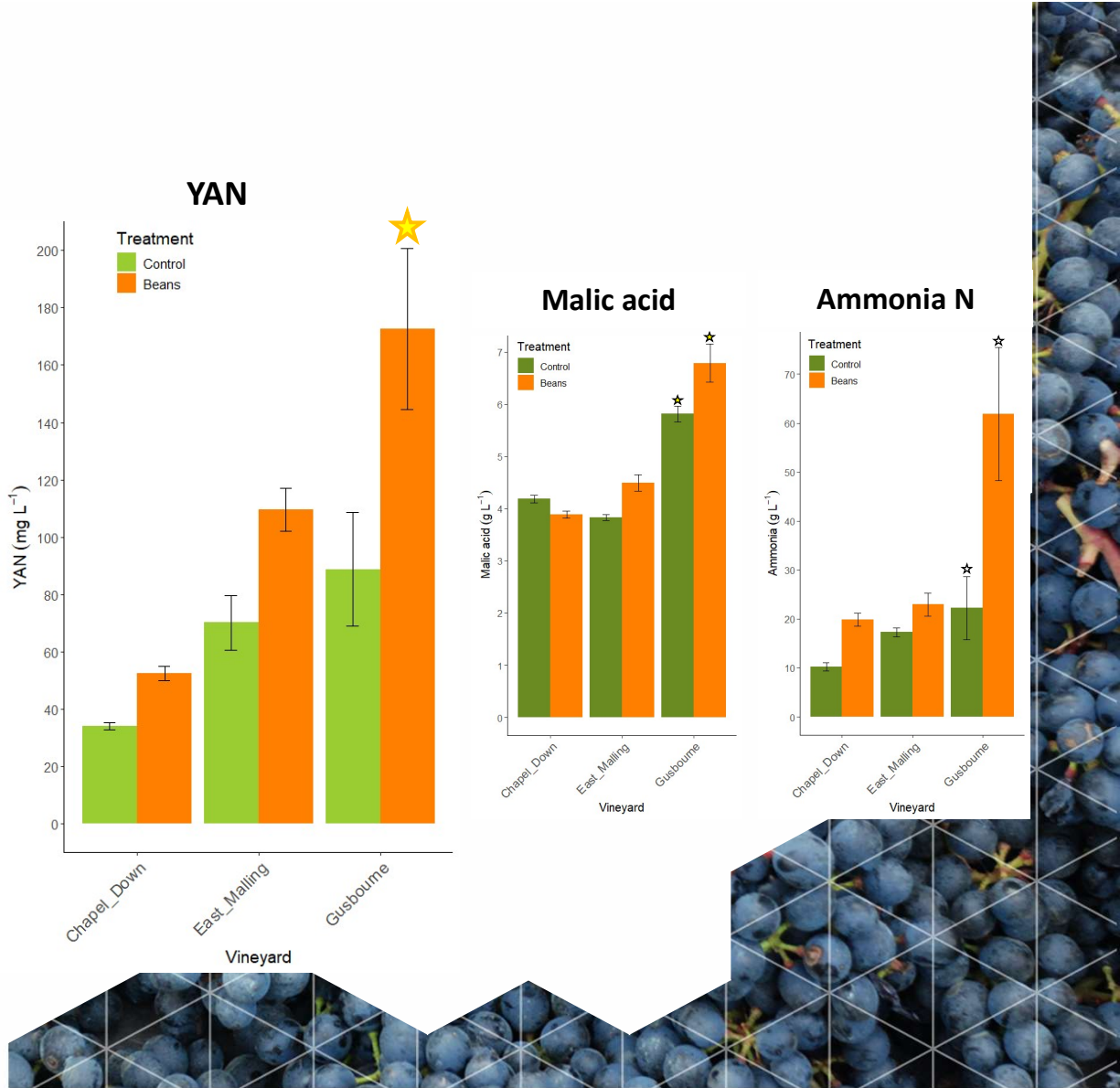
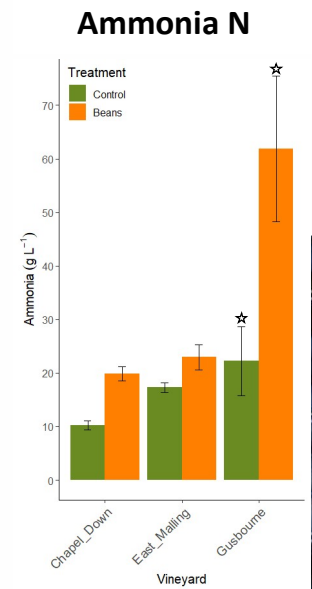
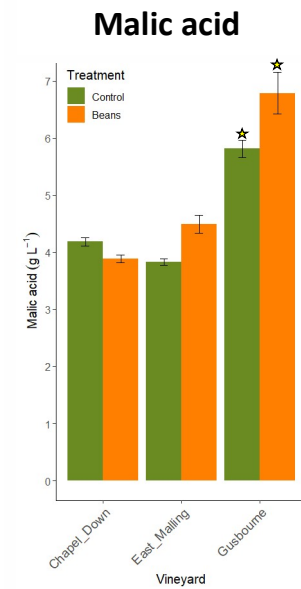
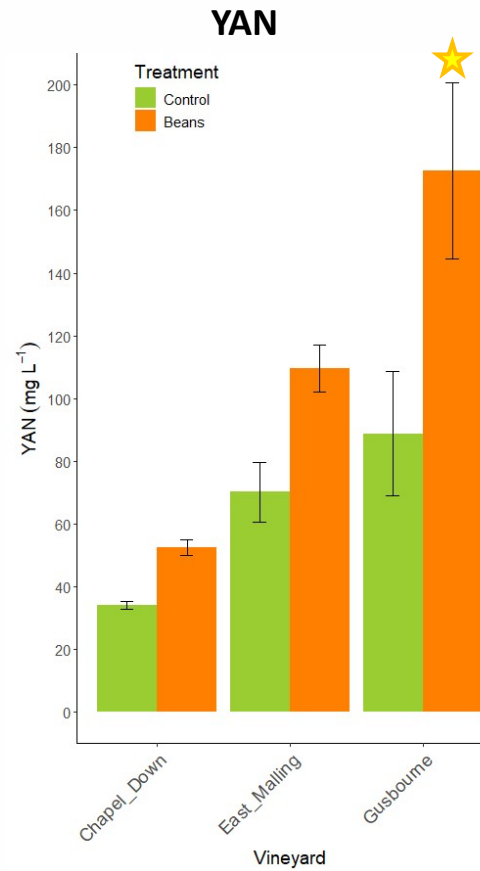
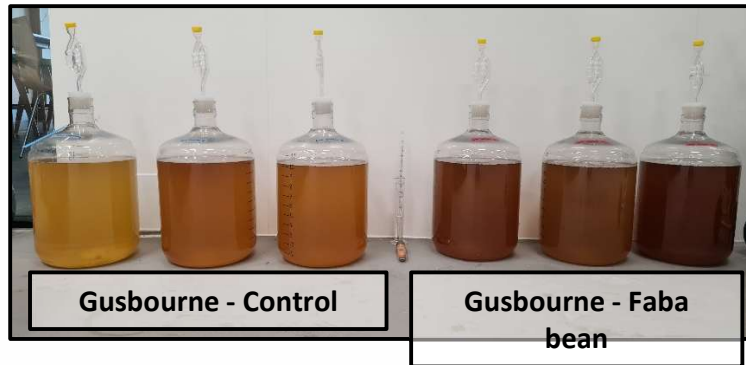
Extractable nitrate was significantly **higher in the bean treatment** relative to the control treatment at both Gusbourne and East Malling.



Chlorophyll

Chlorophyll levels were significantly higher in the bean treatment at Gusbourne and Chapel Down.





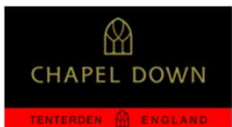
The significantly higher YAN in juice produced from grapes adjacent to Faba bean alleyways at Gusbourne could be related to several factors, including:

- **Nitrogen inputs from the beans** (Steiner et al, 2021).
- **Impact of the reduction in competition** between vines and alleyway vegetation following glyphosate application prior to drilling.
 - [Raffa et al \(2022\)](#): pigeon beans did not significantly affect YAN when compared to the conventional tillage treatment (which was performed 3 times a year), but both treatments had significantly higher YAN than the spontaneous cover in the second year of the experiment.
 - [Greiesser et al \(2022\)](#): also found that bare soil (by tillage or herbicide) resulted in significantly higher YAN, as well as chlorophyll content and pruning weight, in comparison to alleys had permanent vegetation cover. They also found that the higher YAN content did not correlate with soil N (in some cases there was a negative relationship).
- **Specific plant-plant interactions** (possibly mediated by microbes or AM networks).



Acknowledgments

GUSBOURNE



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Belinda Kemp (*NIAB*)



Karen Everitt (*NIAB*)

NIAB East Malling – CSPA technical team

