Evaluating efficacy of carbon capture based organo-mineral fertilisers (OMF) to meet crop demands

Introduction

As global agriculture pushes towards carbon neutrality, a change in the production methods of mineral fertilisers to reduce their greenhouse gas (GHG) emissions or carbon neutral alternatives will be a necessity. CCm Technologies have produced a carbon-neutral OMF derived by both recovering key nutrients from digestates and carbon dioxide captured from point sources. By locking atmospheric carbon dioxide into the fertiliser, there is the potential to sequester carbon stocks within agricultural soils.

Objectives

1. To assess efficacy of OMF to meet crop demand.
2. To evaluate soil carbon changes from OMF applications.

Methodology

A field trial was setup, in 2021, with a randomised block of 4 replicates and 17 treatments including 3 separate OMF formulations (5% nitrogen (N), 10%N, 15%N), 1 mineral fertiliser, each with 4 dose rates (50% recommended, 100%, 150%, 200%) and a control (0 nitrogen applied).

Results

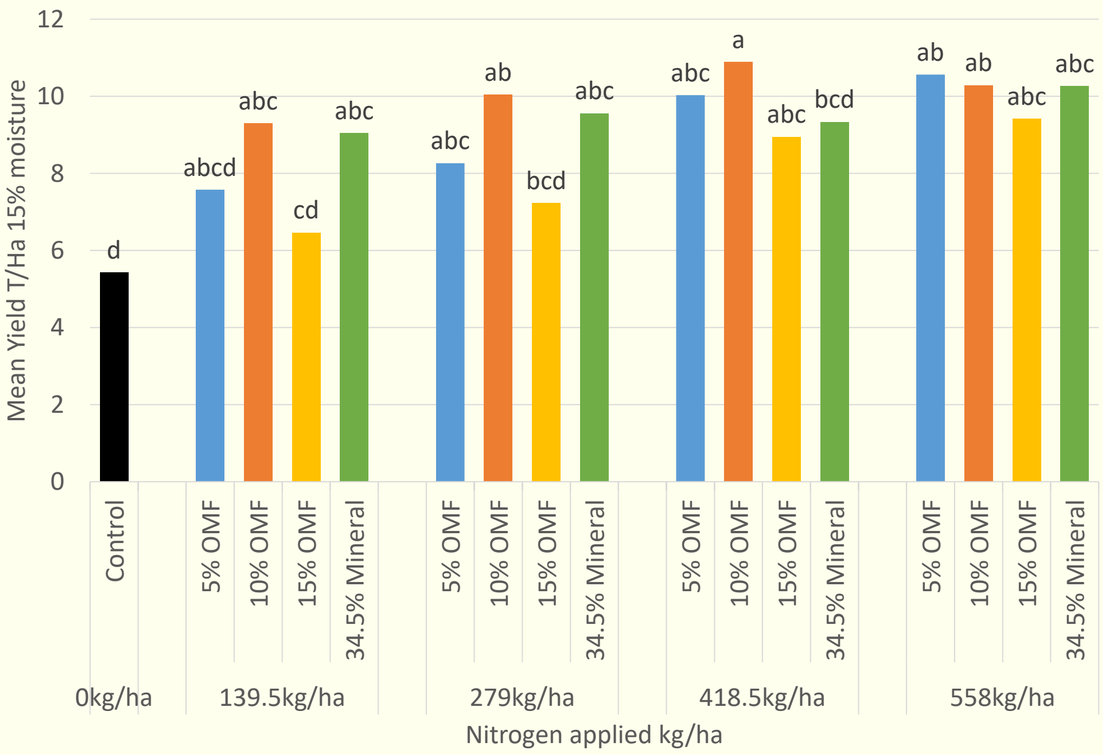

Figure 1. Mean yield of winter wheat 2023 in t/ha including significance testing.

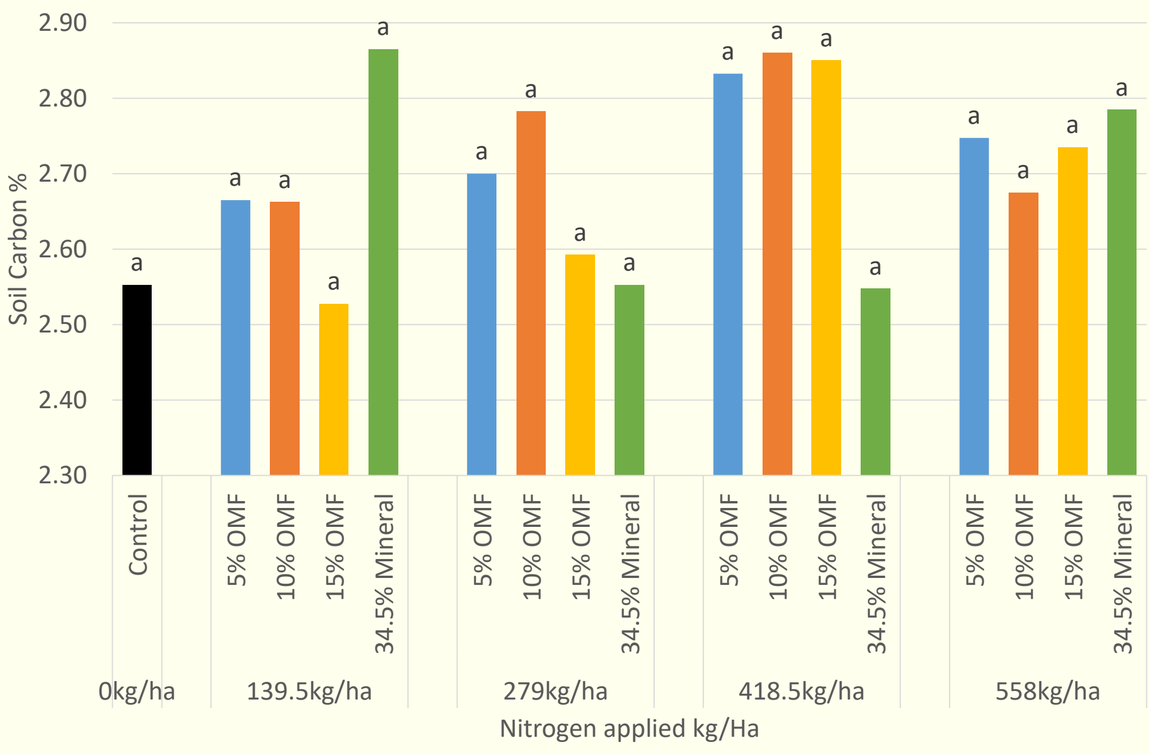

Figure 2. Mean soil carbon % post harvest 2023.

- OMF treatments were comparable to mineral alternatives in maintaining crop yield in winter wheat.
- At the recommended dose rate (279kg/ha), both 5%N and 10%N OMF's significantly increased yield compared to no nitrogen control.
- No significant differences were observed in soil carbon % across all treatments.

Conclusion

- OMF formulations can produce yields that are higher or comparable to mineral fertiliser alternatives indicating that pellets are releasing nutrients as efficiently as the mineral fertilisers.
- Further study into the bioavailability and environmental fate of captured carbon from the OMF will add more insight into their future usage.

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