

Effect of Azotobacter and fertilizer combinations on soil and maize yield

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Introduction

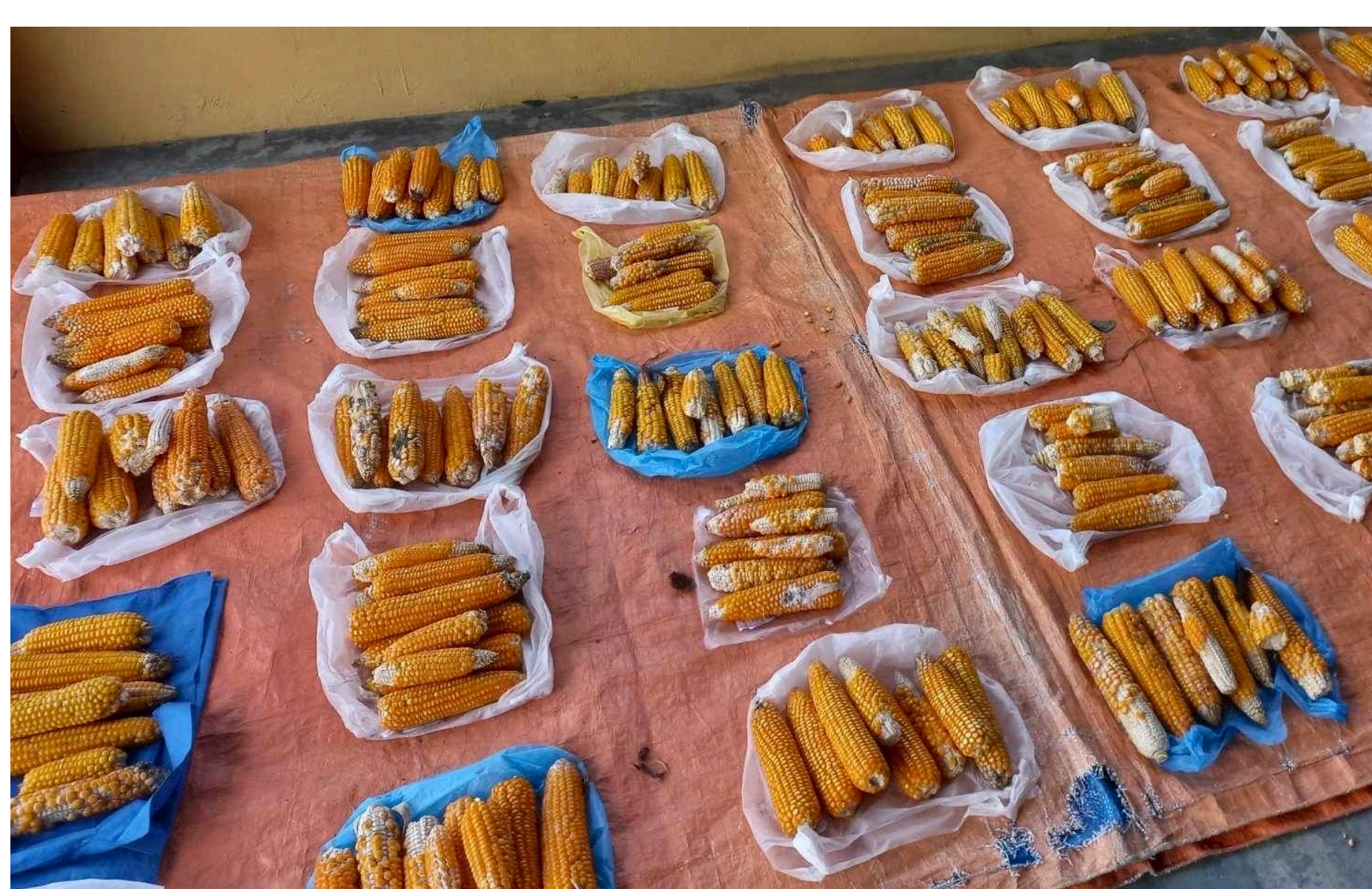
Nitrogen (N) is crucial for maize production and a key determinant of grain yield. Modern intensive agriculture's heavy reliance on chemical fertilizers not only degrades soil quality but threatens the ecosystem as a whole. Azotobacter, a biofertilizer, serves as a potential alternative to minimize chemical fertilizer use.

Research questions

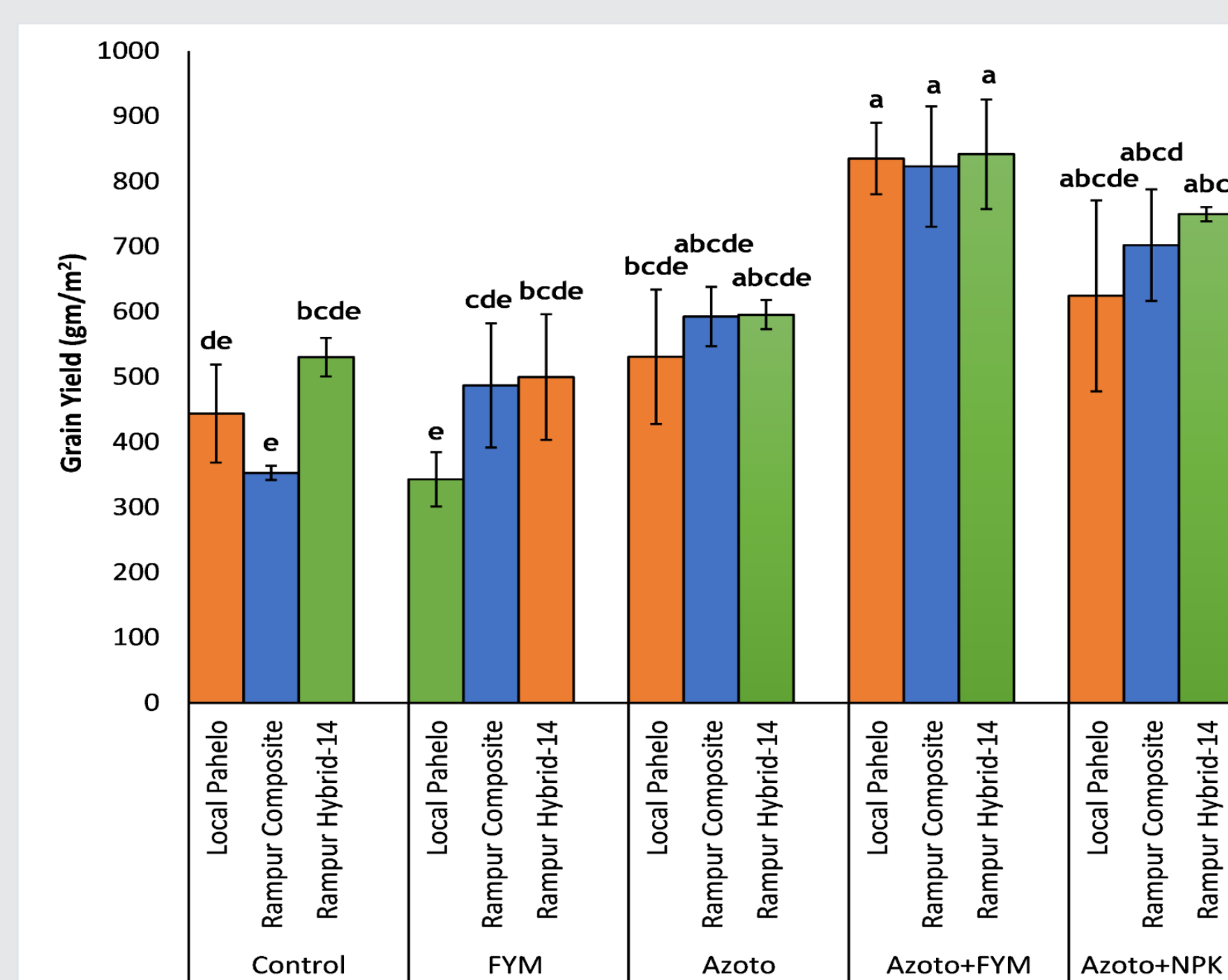
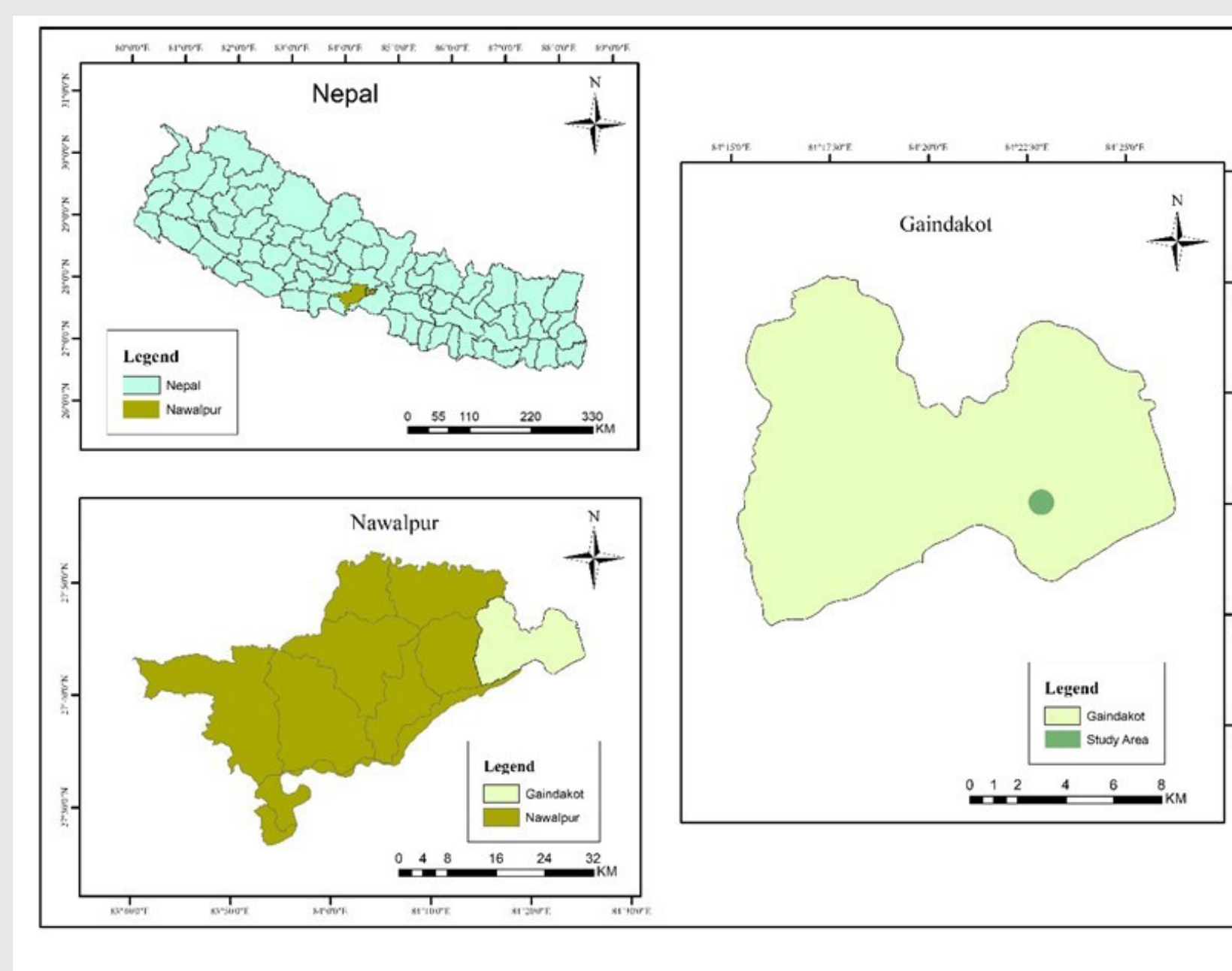
- How do different maize varieties respond to Azotobacter inoculation in yield and soil health?
- Can Azotobacter replace chemical fertilizers?
- Does Azotobacter improve nutrient uptake efficiency

Methodology

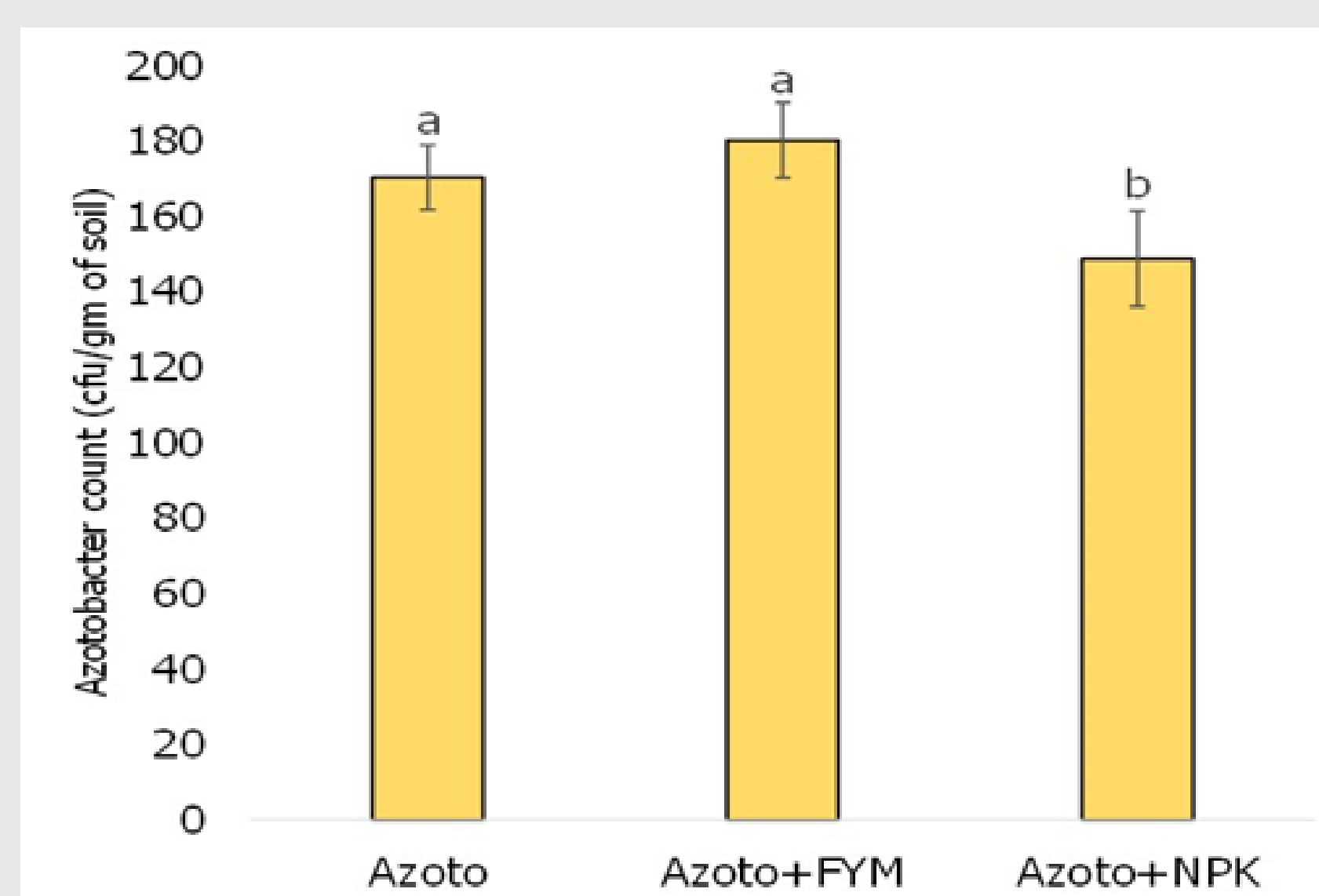
A two-factorial field experiment (RCBD) was carried out in Gaindakot, Ward No. 8, Nawalpur district. It consisted of 15 treatments (3 maize varieties and 5 different nutrient sources) with 3 replications. We studied the effect on soil fertility parameters, residual count, growth, and yield attributes.



Key findings

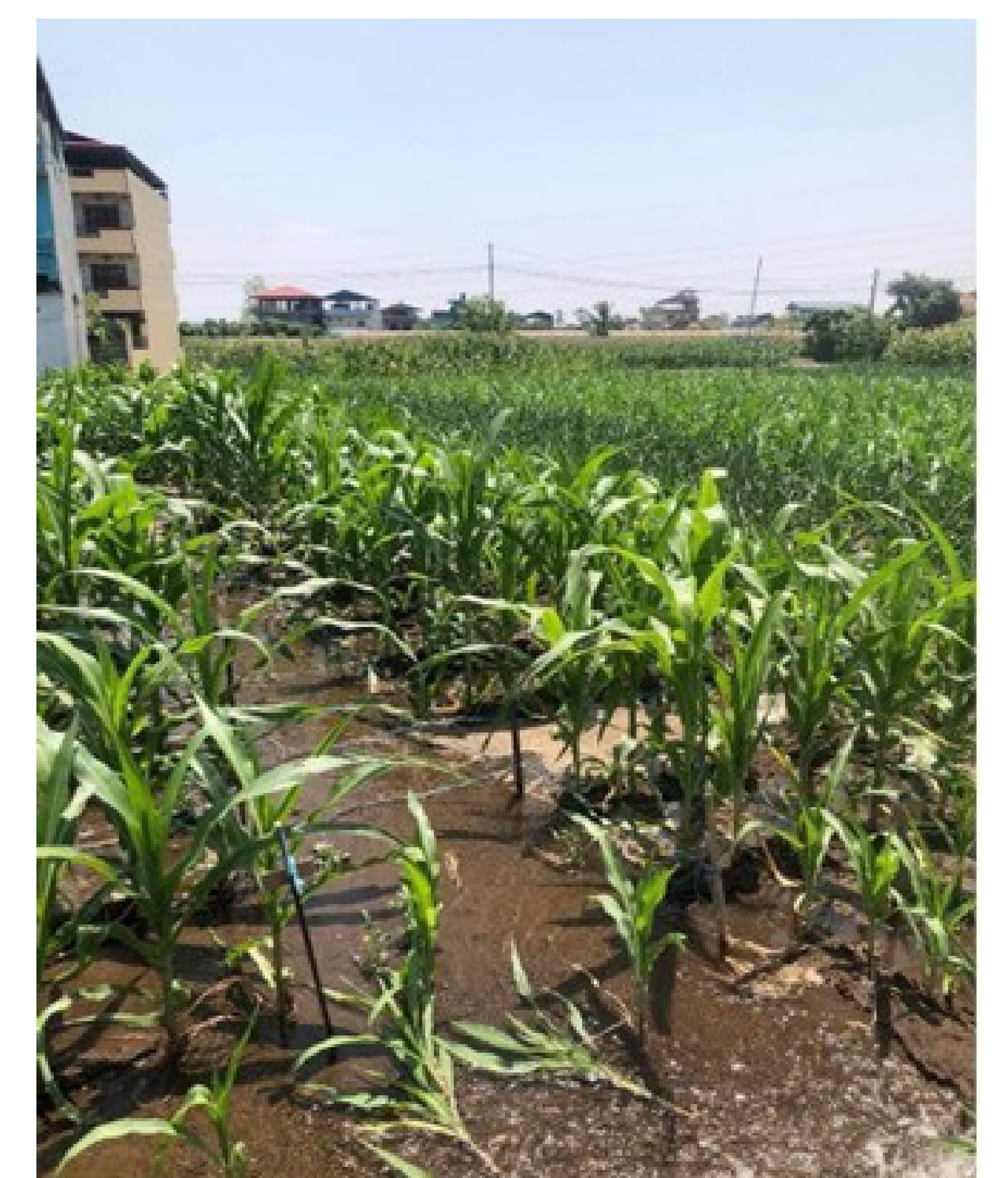


Average grain yield of maize as influenced by different nutrient sources. Error bar indicates the standard error of the mean. The lowercase letter above standard error bar indicates that mean values are not significantly different at 0.05% significance.



Residue of *Azotobacter* singly and in separate combination with FYM and NPK. Error bar indicates the standard error of mean. Same lowercase letters above the standard error bar indicate that mean values are not significantly different at 0.05% significance level (n=3).

The results showed that Rampur Hybrid-14 performed best with treatment of Azotobacter + FYM, yielding 0.841 kg per square meter. Also, FYM significantly influenced population of Azotobacter residue (180.2×10^{-3} cfu/gm), and Azotobacter application positively improved organic matter, nitrogen, phosphorus, potassium, and pH levels in the soil.



Irrigation in peak vegetative stage



Colony formation



Conclusion

The study suggests, the use of Azotobacter with FYM in Rampur Hybrid-14 could result in higher yield, reduce excessive use of chemical fertilizers, and enhance nutrient availability. Bio-fertilizers benefit commercial maize production and improve conditions for succeeding crops, promoting sustainable agriculture.

