

Yield in double cropping system as affected by N fertilization rate with pig slurry in a Catalonia dryland region

Jonatan Ovejero García
Carme Casas Arcarons
Xavier Serra Jubany



Project abstract

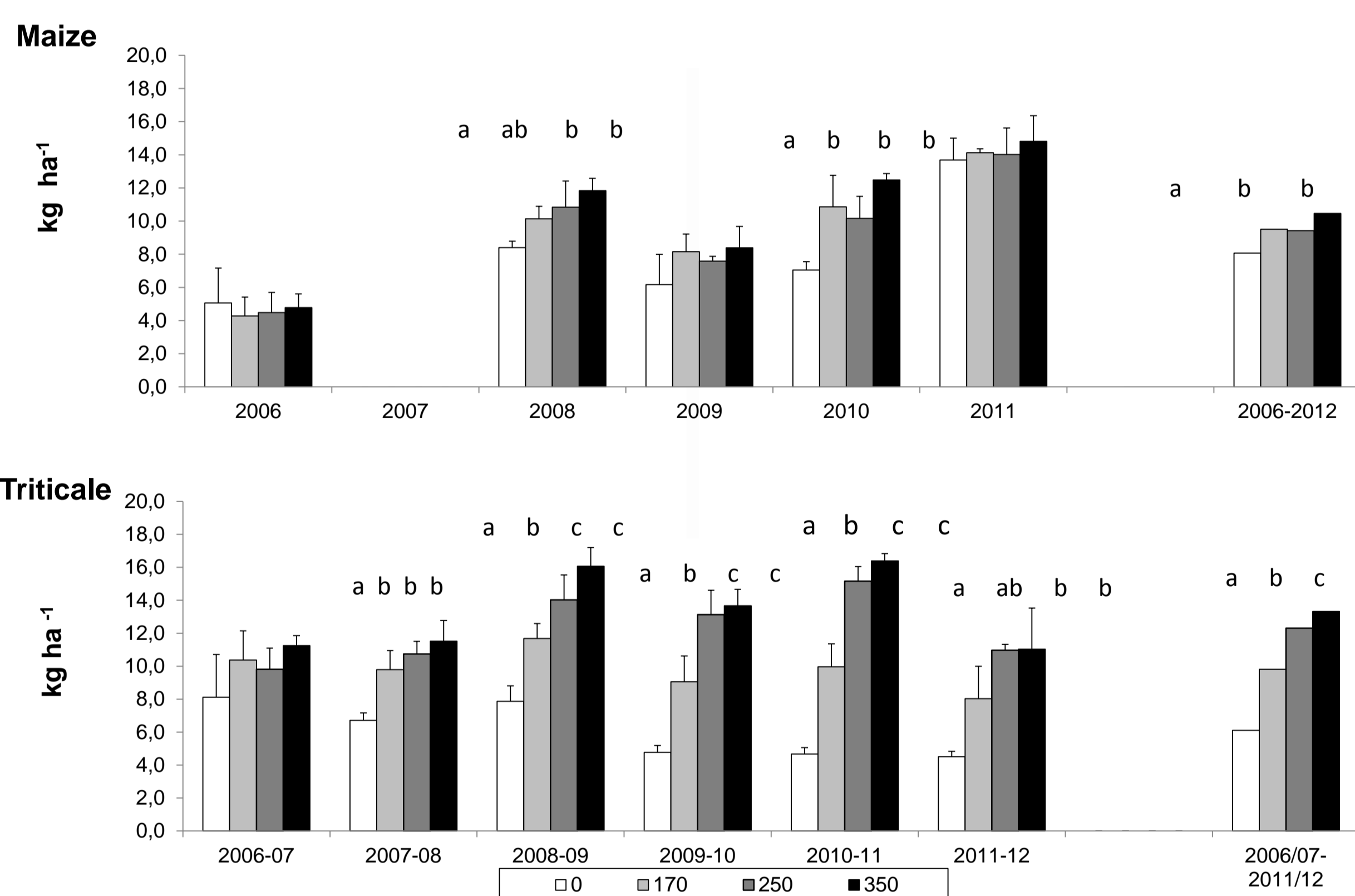
Intensive swine production is an important agricultural and economical activity in Europe. The high availability of pig slurry (PS) lead to attractive fertilization strategy to reduce costs, therefore is mainly applied as fertilizer in agricultural systems. The optimization N fertilization in these areas should be taken in into to avoid nitrates losses by lixiviation and to achieve maximum efficiency in crop nutrition. Many studies have shown that PS applications can achieve satisfactory yields in different crops by partially or completely replacing synthetic fertilizers. In addition, for the last years, in Northeast Spain (Catalonia) has been widely extended the double-cropping forage system.

Objetives

The aims of this study was evaluate the response to different N fertilization rates on biomass yield and to analyze the optimization N fertilization during six consecutive years on a double cropping system representative of the common farming practices in the area, where winter cereal is usually planted in October- November and summer cereal in June, under rainfed subhumid conditions in northeastern Mediterranean Spain.

Methodology Materials

The study was performed at Torelló in a rainfed subhumid Catalonia region. A triticale–maize double cropping rotation was grown between 2006 and 2012. Four different rates of PS obtained from a fattening pig farm (0, 170, 250 and 350 kg N ha⁻¹ per year) were applied following a randomized complete-block design with three replications. The 250 and 350 kg N ha⁻¹ treatments were split into two applications, with two-thirds being broadcast before maize seeding, and one-third before triticale seeding. The 170 kg N ha⁻¹ rate was applied entirely before cereal winter.



Findings / Research update

In our 6-years study of continuous triticale–maize double cropping rotation system under rainfed subhumid Mediterranean conditions, the maximum yields varied greatly from year to year depending fundamentally on the climatic conditions and the soil initial NO₃⁻-N of each crop. The optimal N rate necessary to achieve maximum yields was 250 kg N ha⁻¹. Because of in both crops the sum of N optimal rates was 250 kg ha⁻¹ year⁻¹, in double cropping forage systems could not achieve maximum yields if 170 kg ha⁻¹ year⁻¹ according to Nitrates Directive are applied during seasonal growing crops.



Conclusions

Due to the large variations in rainfall, yields in maize and triticale fluctuated greatly throughout 6-year experiment. In both crops yield did not respond to N applications in the first year of experiment due to probably similar soil NO₃⁻-N content either in fertilized or unfertilized treatments. Either maize or triticale the average crop yield showed a positive response of yield to N fertilization. Maximum yields are achieved for both crops of the rotation when 250 and 350 kg ha⁻¹ year⁻¹ respectively are applied. Taking into account that there was an important supply from N mineralization, we suggests there was N losses in soil-plant- atmosphere system that no were quantified.

Bibliography

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