

Nitrogen nutrition index and leaf:stem ratio of maize crops in early and late sowings

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Introduction

Nutritional N status of maize crops can be determined by N nutrition index (NNI). This index is estimated from actual N concentration (%Nact) of aerial biomass (B) and the critical N concentration (%Ncrit), which is derived from the N dilution curve. Actual N concentration depends on N allocated both in metabolic and structural pools, which may be affected by genotype, and agronomical practices such as, sowing date, plant density and N rate.

Objective

Evaluate the effect of genotype, and agronomical practices such as sowing date, plant density and N rate on NNI and Leaf /Stem ratio at flowering

Materials and Methods

Field experiments were carried out during the growing season 2014/2015, in two sites, located at Experimental Station of National Agricultural Technology Institute in Paraná (EEA INTA Paraná), Argentina (Lat. 31.8°S). The treatments included a combination of two sowing dates (SD), three N rates (0, 90 and 270 kg N ha⁻¹), three plant densities (5, 7 and 9 plants m⁻²) and two hybrids (DK70-10VT3PRO and DK73-10VT3PRO). Treatments were arranged in a randomized complete block design with three replications.

Results and Discussion

❖ The NNI was affected ($p < 0.0001$) by N rate, plant density and sowing date, whereas L/S ratio was affected by genotype ($P < 0.007$) and sowing date ($P < 0.0001$). The NNI was reduced as plant density was increased whereas the opposite effect occurred when N rate was increased (Fig. 1 and 2).

❖ The L/S ratio was higher in early than in late sowing date, and was significantly increased by N rate in early sowing (Fig. 3).

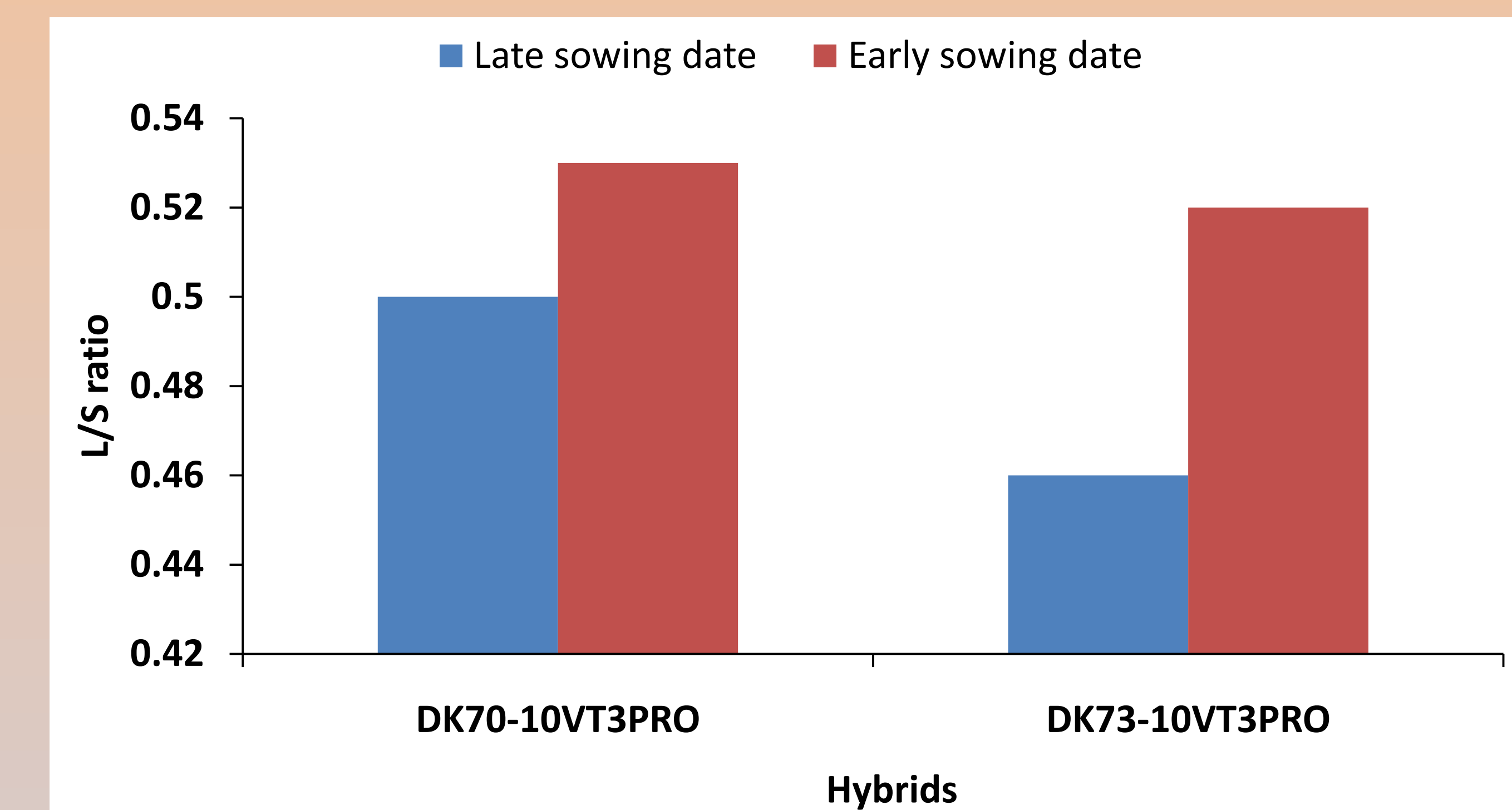


Figure 3. Leaf/Stem ratio based on hybrid in contrasting sowing date (early and late) in Paraná.

❖ The NNI was positively associated with the L/S ratio in early sowing (Fig. 4), whereas both variables were negatively associated in late sowing. Moreover, both NNI and L/S ratio were positively associated with grain yield in early sowing (Fig. 5) but not in late sowing.

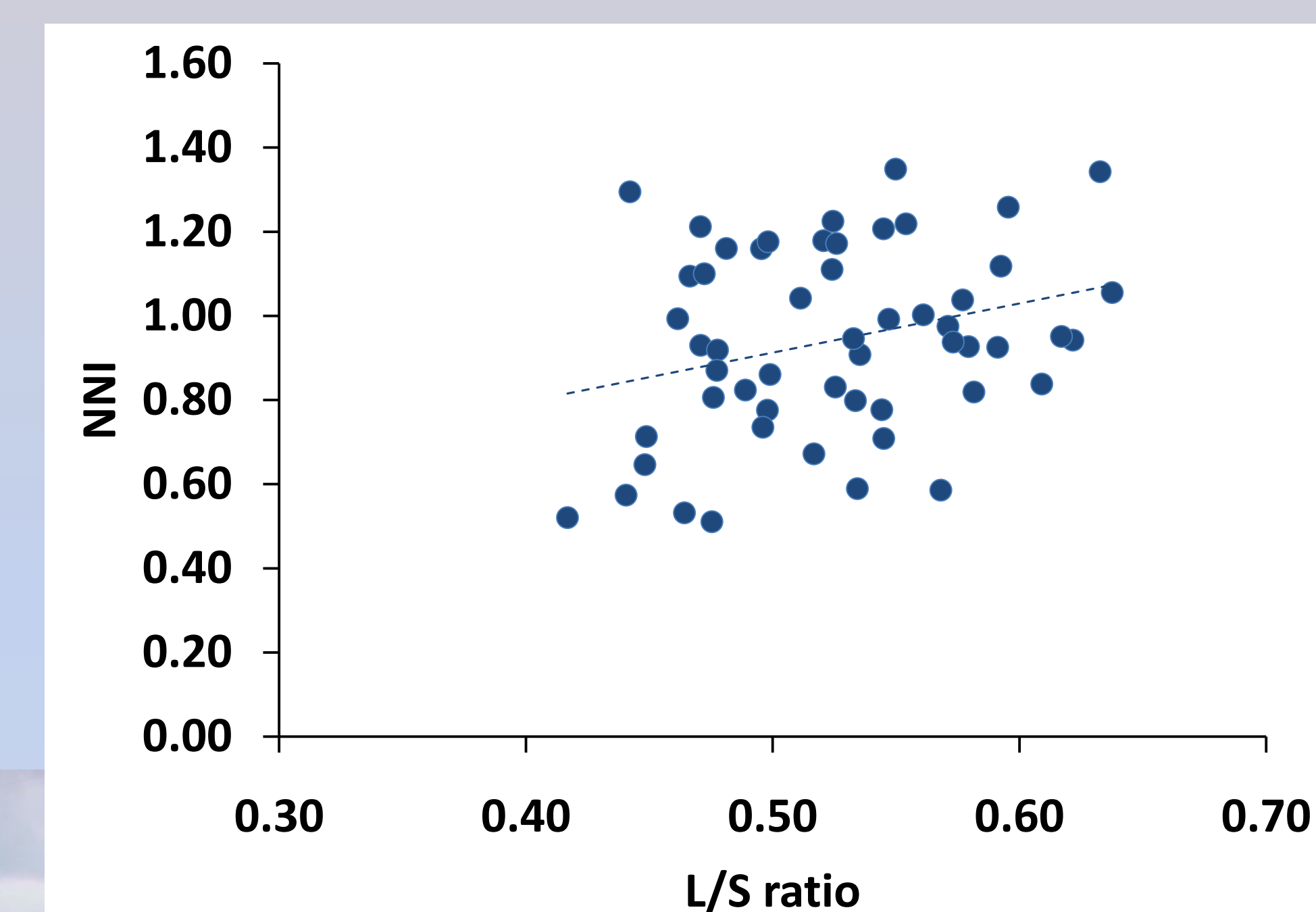


Figure 4. Relationship between Leaf/Stem ratio and Nitrogen Nutrition Index in early sowing date in Paraná.

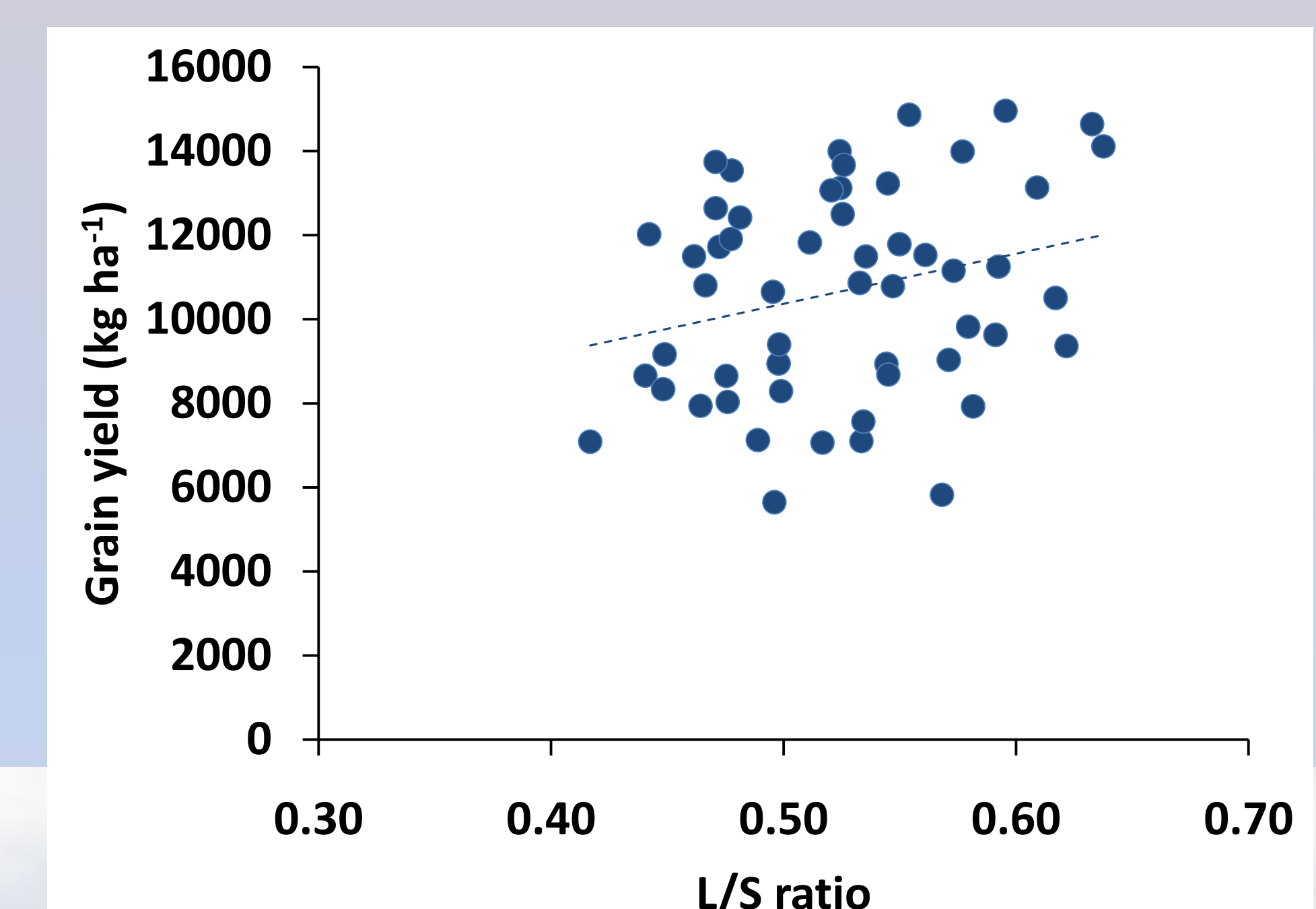


Figure 5. Relationship between Leaf/Stem ratio and grain yield in early sowing date in Paraná.

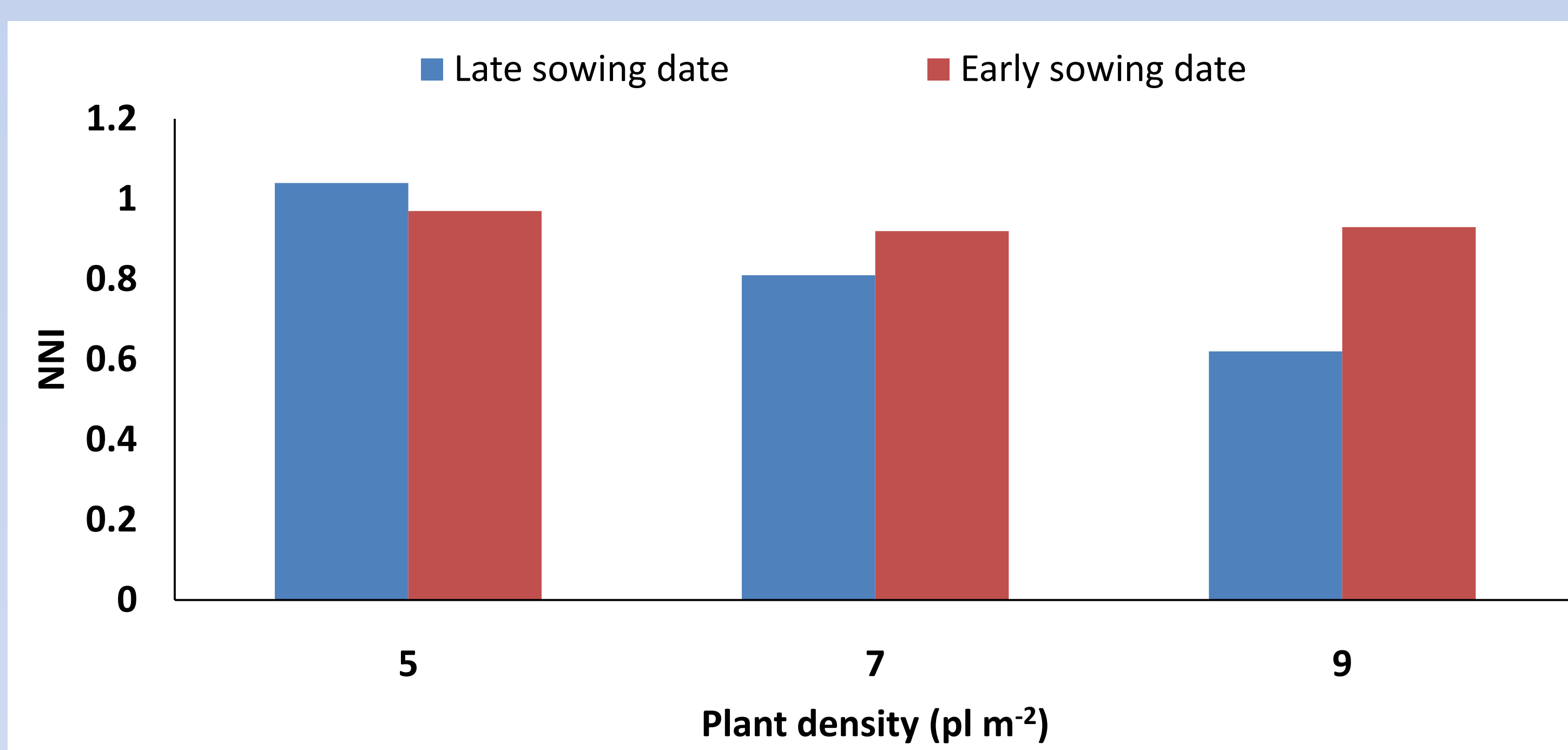


Figure 1. Plant density and Nitrogen Nutrition Index in contrasting sowing date (early and late).

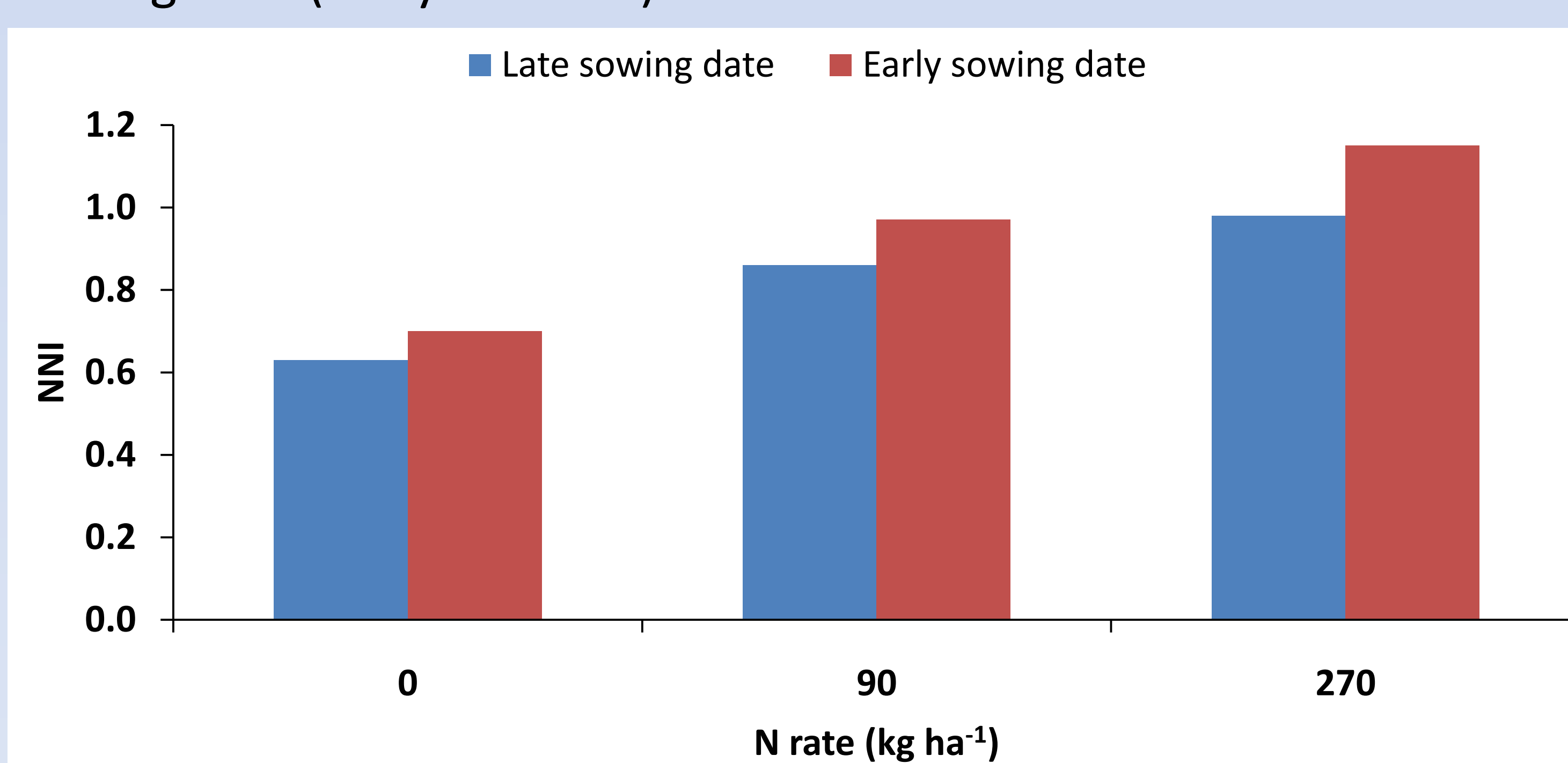


Figure 2. N rate and Nitrogen Nutrition Index in contrasting sowing date (early and late).



Conclusions

❖ Nitrogen nutrition index decrease as function of plant density and increase with N rate.
❖ Nitrogen nutrition index and leaf/stem ratio were unrelated with grain yield in late sowing date. The results suggest no benefits of higher N allocation in metabolic pool in late sowing date.