

Lettuce performances as influenced by different nitrogen dosages and *A. brasilense* strains

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INTRODUCTION & AIM

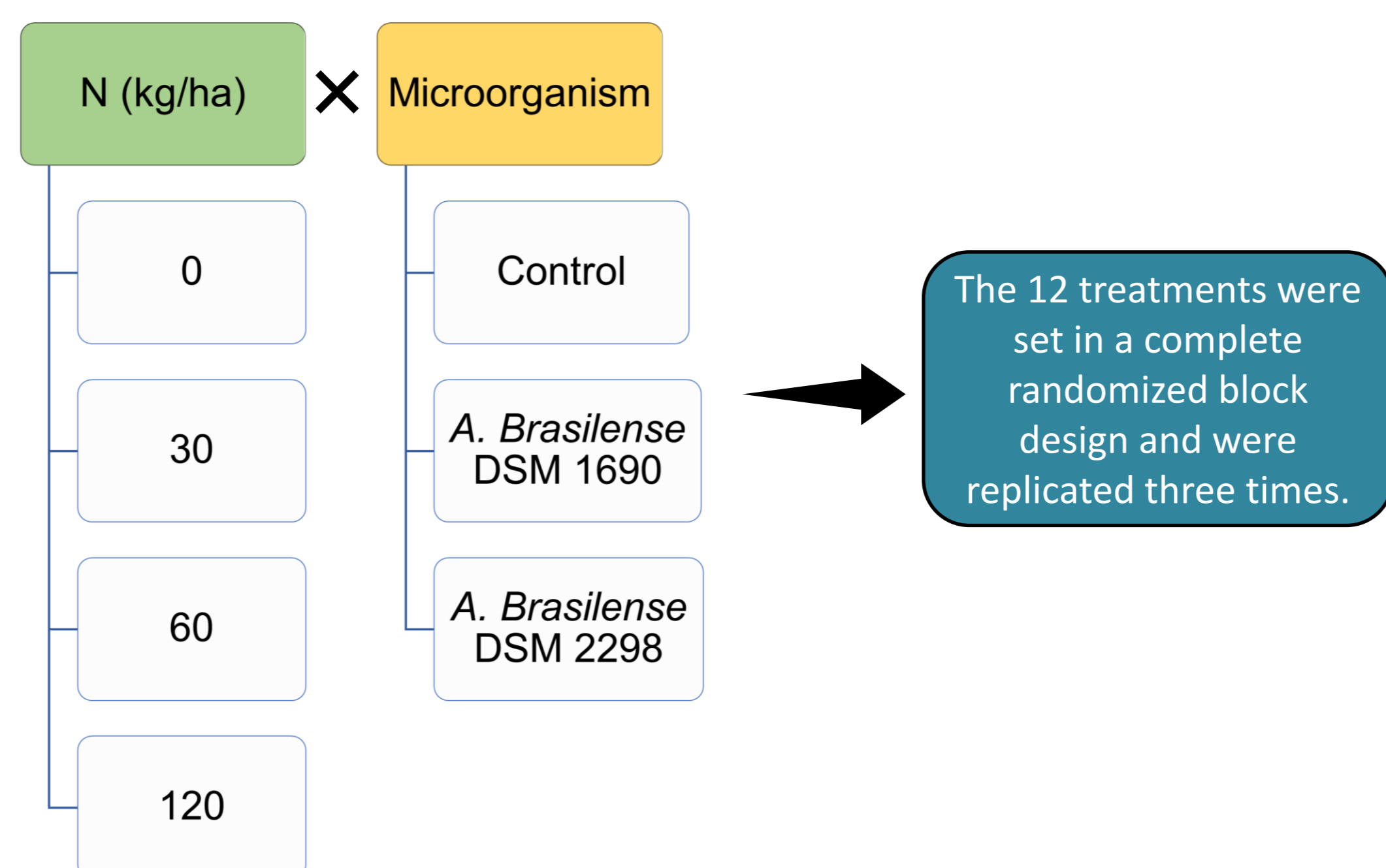
Synthetic nitrogen fertilizers have a negative impact on environment and human health. Thus, introducing new eco-friendly tools capable of increasing resource use efficiency could be useful to reduce nitrogen application rate and to preserve the ecosystem.



The current study was accomplished to evaluate the combined effect of two *A. brasilense* strains and different N fertilization doses on the performances of lettuce plants cultivated under polyethylene-covered tunnel.

METHOD

The investigation was accomplished during the 2021 winter-spring period at the field facilities of the Department of Agricultural, Food and Forestry Sciences of the University of Palermo (SAAF). Plants under investigation were grown in a polyethylene-covered tunnel. On 5 February 2021, *Lactuca sativa* L. 'Canasta' plug plants at 3-4 true leaves stage were transplanted adopting a density of 16 plant m⁻². On 6 April 2021, all plants were harvested by cutting the collar, and then the external damaged leaves were removed.



Nitrogen was administered weekly in ammonium nitrate form, starting after 1 week from transplant.

The inoculation with bacteria was accomplished by soaking the plant roots in a solution containing 10 mL L⁻¹ of suspension for 2 minutes. After 15 days, 100 mL/plant of bacteria solution was administered.

RESULTS & DISCUSSION

Our data pointed out that yield was significantly enhanced by *A. brasilense* DSM 2298 inoculation when plants were exposed to medium/low N levels (30 or 60 kg ha⁻¹). Overall, ascorbic acid, total phenolics, carotenoids and chlorophyll were increased by the combined effect of *A. brasilense* DSM 1690 and a N dose of 30 or 60 kg ha⁻¹. Both *A. brasilense* strains enhanced N concentration, especially in plant inoculated with DSM 1690 strain. Interestingly, the NUE index was significantly increased by both microorganisms, however, the best results were showed by plants treated with the strain DSM 2298.

Nitrogen dose (kg ha ⁻¹)	Microorganism	Yield (g plant ⁻¹)	Total phenolic (µg g ⁻¹ fw)	Carotenoids (mg 100 g ⁻¹ fw)	Total Chlorophyll (mg 100 g ⁻¹ fw)	Nitrogen (mg g ⁻¹ dw)	NUE (tkg ⁻¹)
0	DSM 1690	633.4 f	55.4 a	17.5 e	38.3 c	30.0 d	/
	DSM 2298	637.4 f	51.2 ab	17.2 e	36.7 d	29.0 d	/
	Control	478.5 i	47.9 b	14.9 g	33.5 f	25.7 e	/
30	DSM 1690	751.3 c	55.7 a	21.0 b	40.5 b	33.3 c	4.01 b
	DSM 2298	835.3 a	51.5 ab	18.7 d	37.7 c	30.0 d	4.45 a
	Control	565.0 h	47.5 b	15.6 f	35.4 e	29.0 d	3.01 c
60	DSM 1690	603.5 g	55.5 a	22.9 a	40.4 b	35.3 b	1.61 e
	DSM 2298	675.3 d	51.6 ab	19.5 c	37.9 c	31.7 c	1.80 d
	Control	631.1 f	47.5 b	15.5 f	35.4 e	30.3 d	1.68 e
120	DSM 1690	658.1 e	52.0 a	22.8 a	42.5 a	38.7 a	0.88 g
	DSM 2298	816.3 b	50.3 a	19.5 c	38.8 c	34.7 b	1.09 f
	Control	630.1 f	45.5 b	15.5 f	35.4 e	34.3 b	0.84 g
Significance							
Nitrogen (N)		***	***	***	***	***	***
Microorganism (M)		***	***	***	***	***	***
N x M		***	**	***	***	***	***

Treatments	Dry matter (%)	Ascorbic acid (mg g ⁻¹ fw)
Nitrogen dose (kg ha ⁻¹)		
0	13.5 d	34.7 a
30	13.8 c	34.6 a
60	14.1 b	34.5 a
120	14.7 a	33.2 b
Microorganisms		
Control	13.0 c	27.9 c
<i>A. brasilense</i> DSM 1690	14.8 a	38.7 a
<i>A. brasilense</i> DSM 2298	14.3 b	36.2 b
Significance		
Nitrogen (N)	***	***
Microorganism (M)	***	***
N x M	NS	NS

CONCLUSION

Our data highlighted that both plant growth promoting bacteria tested can improve lettuce yield, qualitative parameters and NUE index, especially when combined with a mild N dose (30 or 60 kg ha⁻¹).

FUTURE WORK / REFERENCES

In future study we will evaluate the effectiveness of these plant growth promoting bacteria on different plant species. Moreover, it would be interesting to study the effect of these microorganisms on other nutrients use efficiency.