Does endophyte-association improve productivity in tall fescue?

The case of the novel AR584 strain in a non-limiting environment

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Endophytes in tall fescue: some background

- Enhanced plant robustness (Bacon & Siegel, 1988)
- Water deficit stress tolerance (Elmi & West, 1995)
- Disease resistance (Latch, 2009)

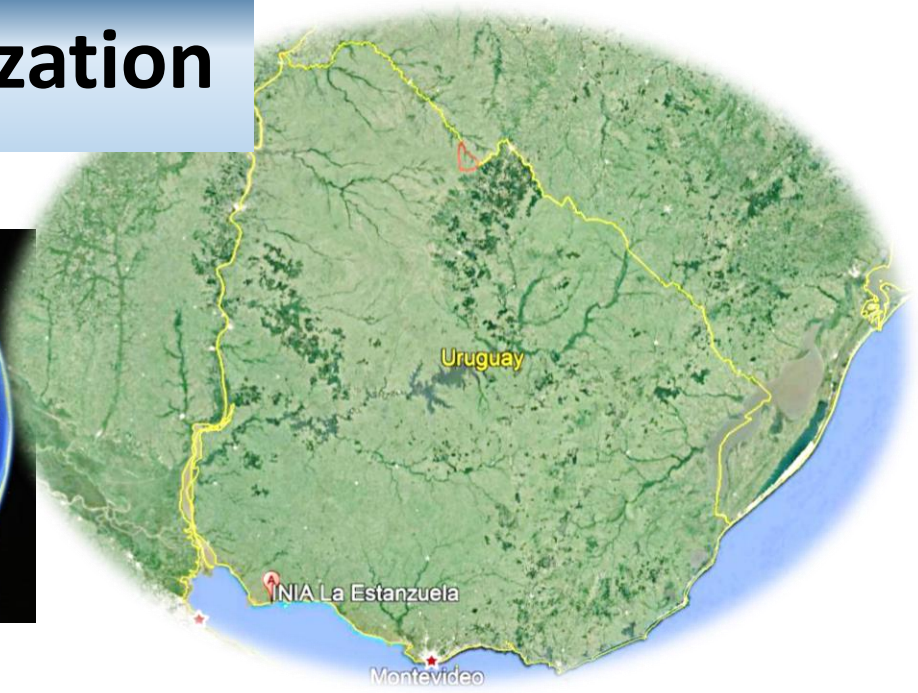
AR584 strain (Latch et al., 2000) (Grasslanz Technology Ltd.):

lacks ergot-alkaloids - resistance to invertebrate pests

AR584 in Uruguay:

- Safe for cattle grazing (Pereyra et al., 2018)
- Increased tolerance to aphids and white grubs (Cibils-Stewart et al., 2017)
- Summer behavior -> no significant effect (Pereyra et al., 2017; Larratea et al., 2018)

Environmental characterization



- **Temperature**: Annual average: 17ºC (Summer 24ºC/Winter 11ºC)
- **Rainfall**: Annual 1200mm / monthly 100mm (60-120mm)
- **Day lenght**: 10 hour winter / 14 hours summer
- **Frosts:** 25 per year
- **Tall fescue forage yield**: 7300 kg DM ha^{-1} annual average

Materials and methods

- Tall fescue yield trials from 2010 to 2017: 3 year terms
- 12 trials
- 2 Cultivars with and without AR584 endophyte

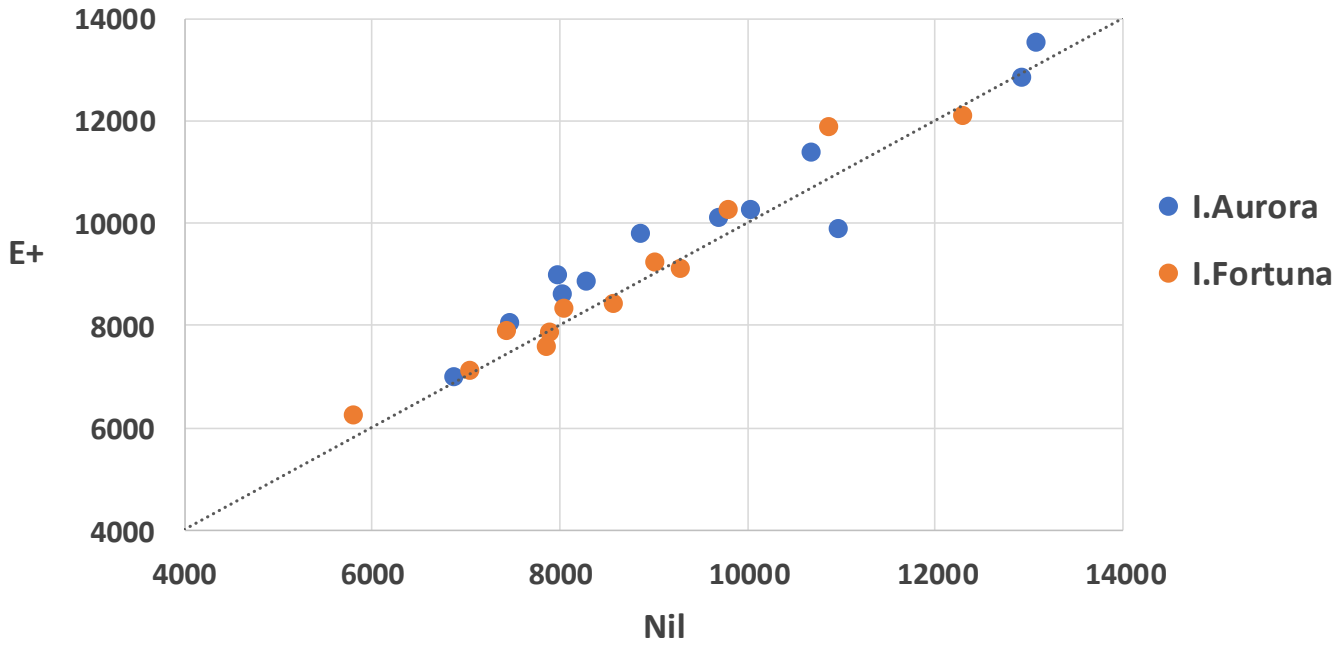
	INIA Aurora	INIA Fortuna
Nil	3 ±2	25 ±8
E+	91 ±5	93 ±3

- 6.25 m2 plots - 4 reps - RCB design

- Seasonal and annual dry matter (DM) production

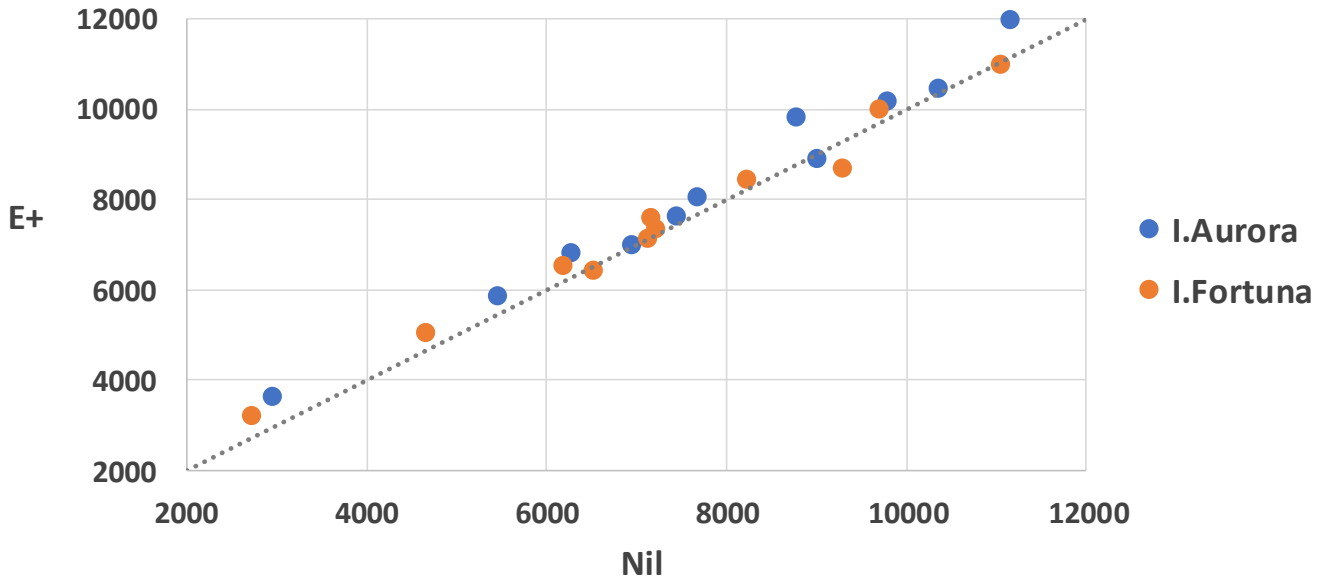
Results

Annual forage yield (kg ha^{-1} DM) year 1

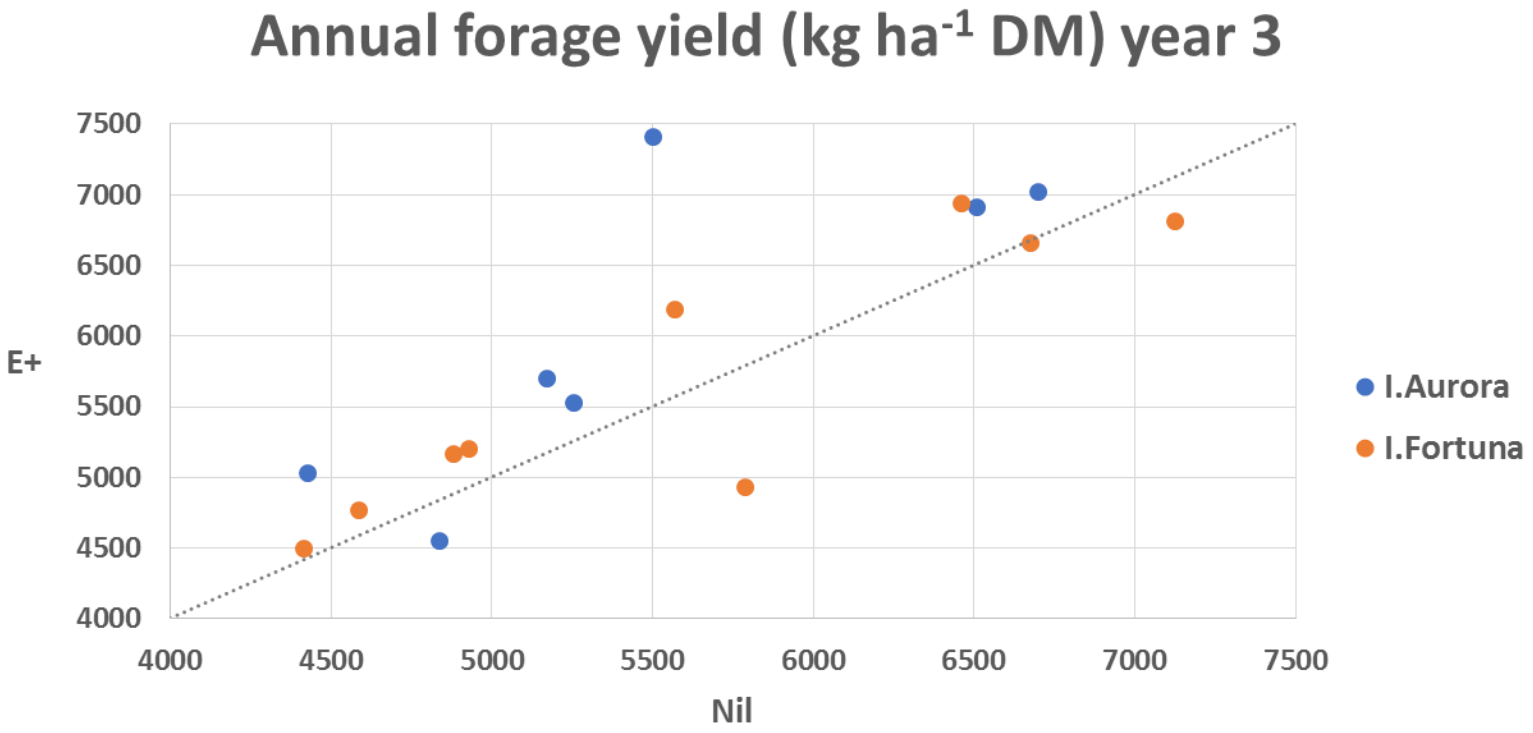


	Trials	E+ > Nil	Δ %	Δ kg	significant (α=0.05)
I. Aurora	12	10	5	381	4
I. Fortuna	12	7	2	194	3

Annual forage yield (kg ha^{-1} DM) year 2

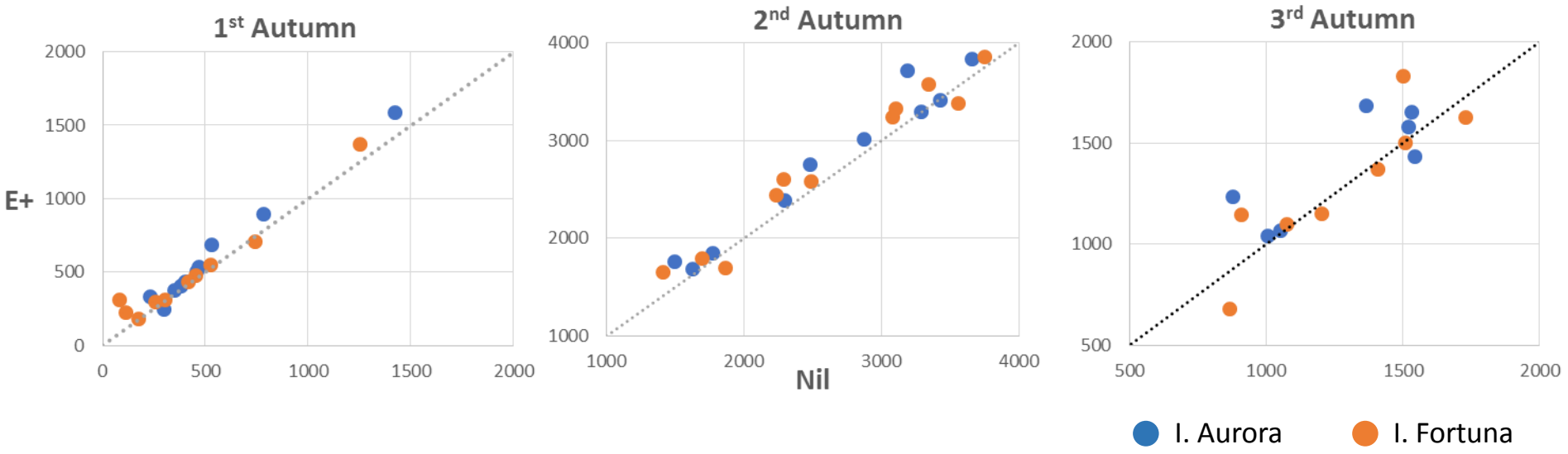


	Trials	E+ > Nil	Δ %	Δ kg	significant (α=0.05)
I. Aurora	11	10	6	412	0
I. Fortuna	11	8	3	146	1



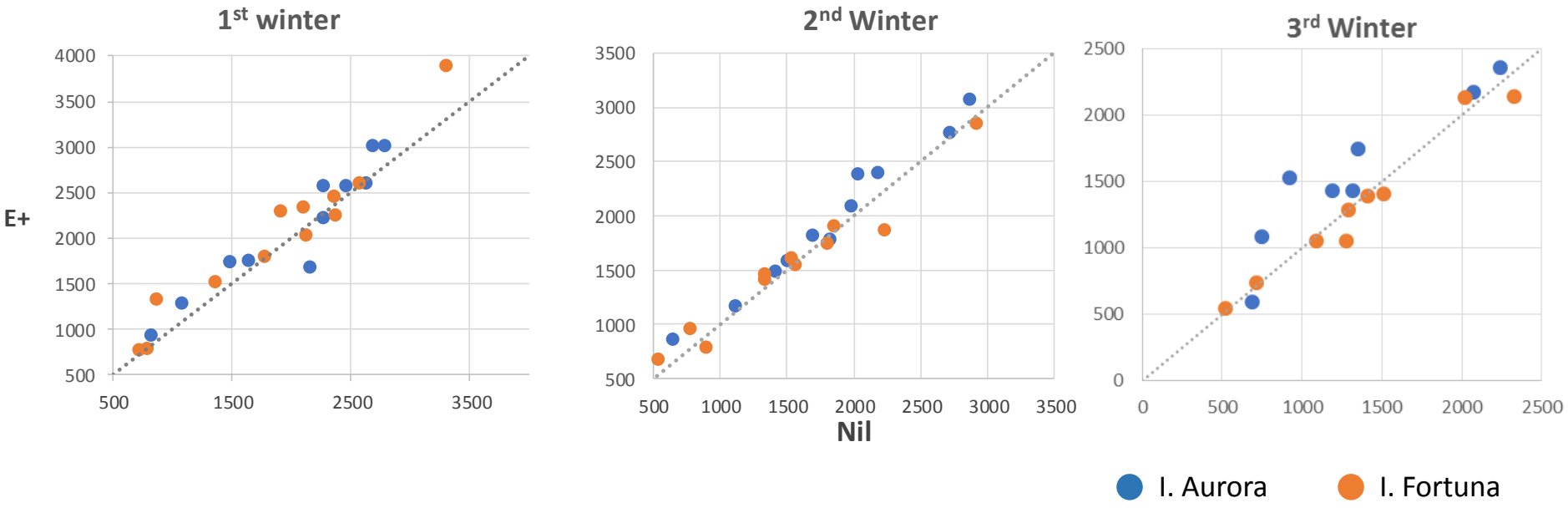
	Trials	E+ > Nil	Δ %	Δ kg	significant (α=0.05)
I. Aurora	8	7	13	710	1
I. Fortuna	9	6	2	146	0

Seasonal forage yield (kg ha-1 DM): Autumn



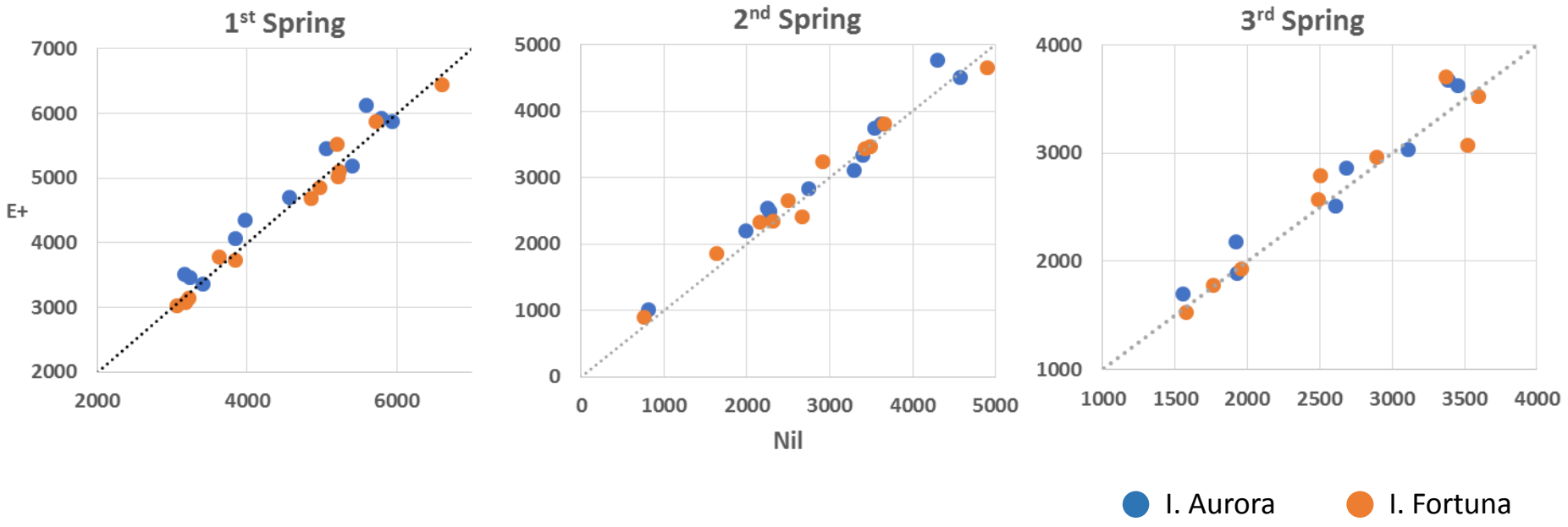
	significant (α=0.05)	Δ %	Δ kg
I. Aurora	6	11	157
I. Fortuna	6	18	87

Seasonal forage yield (kg ha-1 DM): Winter



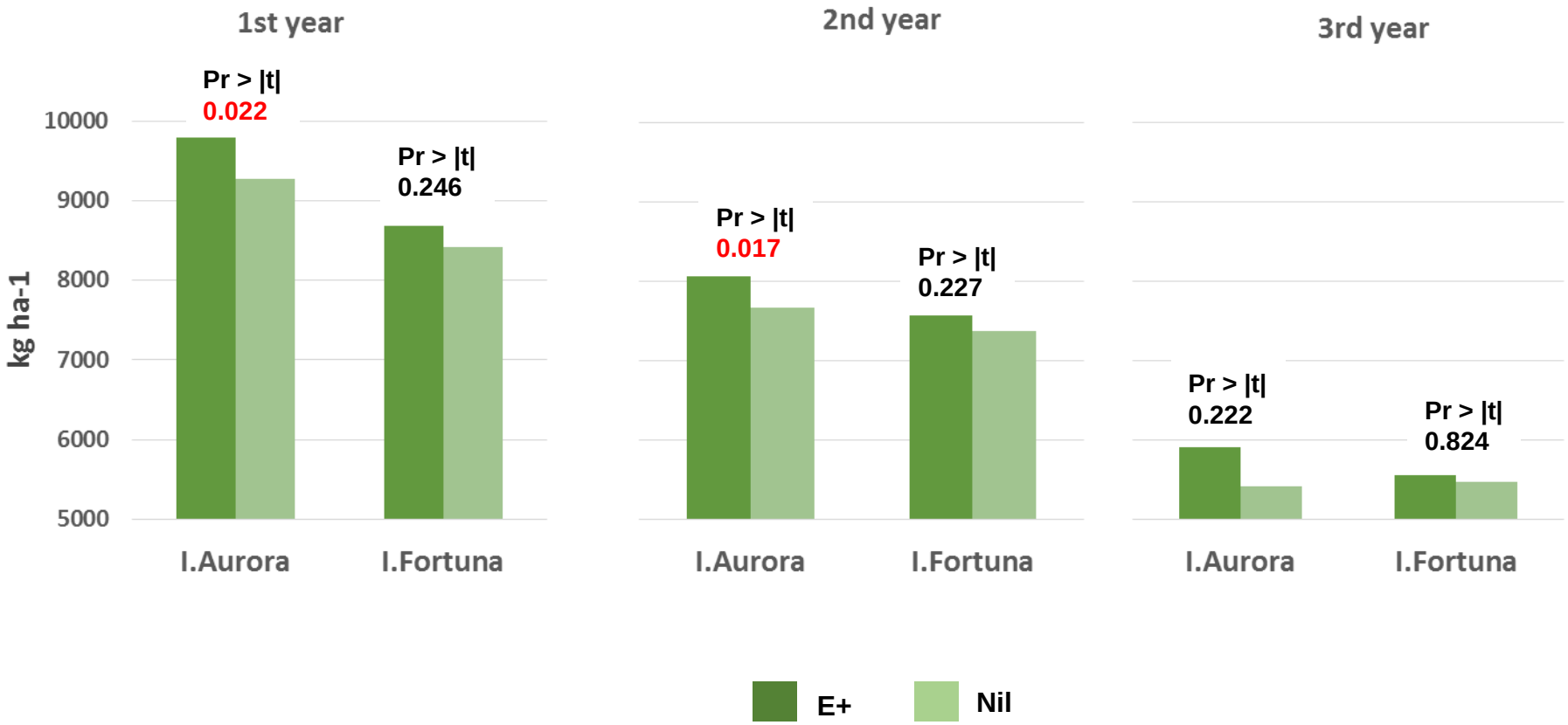
	significant (α=0.05)	Δ %	Δ kg
I. Aurora	4	12	144
I. Fortuna	2	3	31

Seasonal forage yield (kg ha-1 DM): Spring



	significant (α=0.05)	Δ %	Δ kg
I. Aurora	4	5	143
I. Fortuna	2 (1)	2	15

All trials together:



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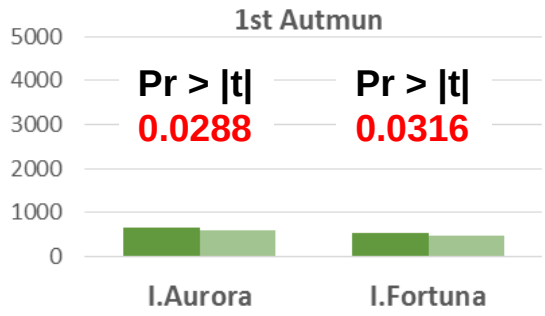

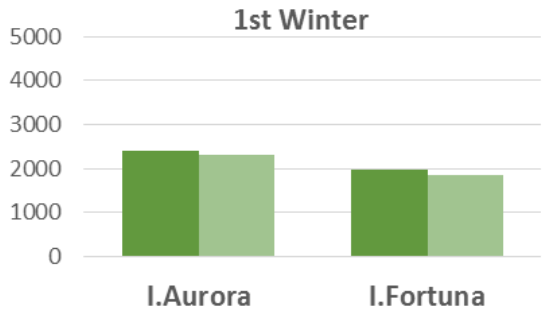

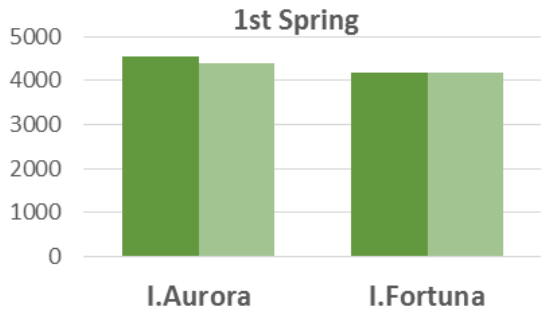

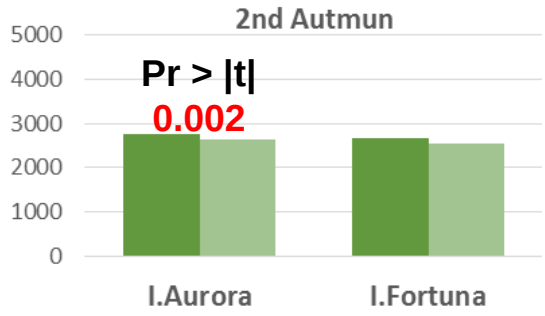

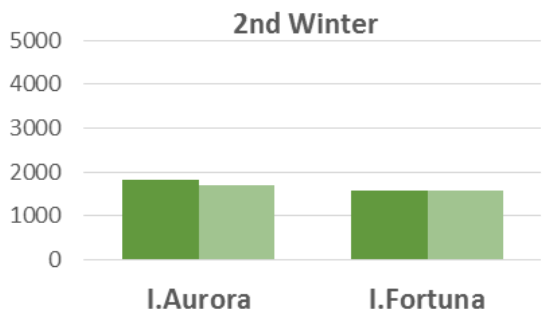

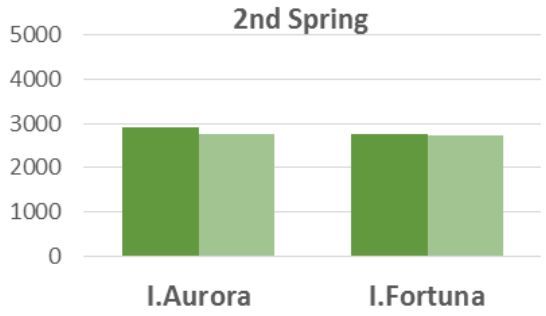

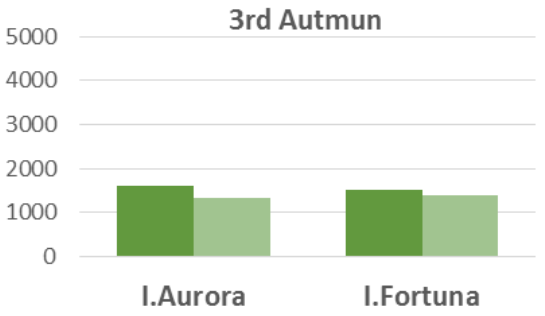

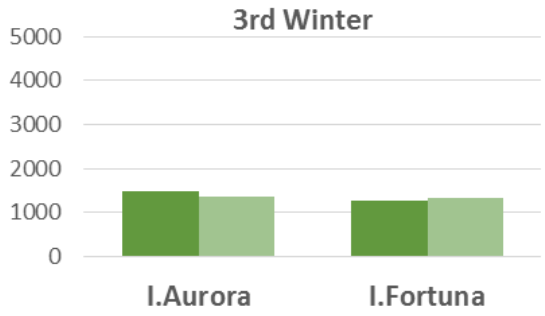

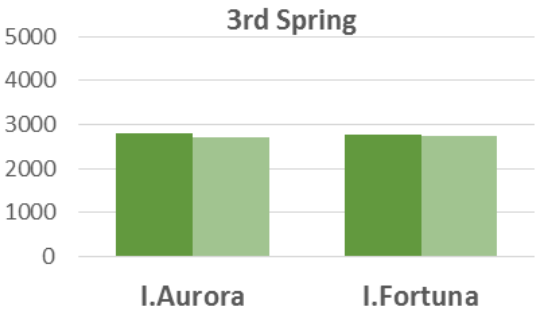

Summary and conclusions

- E+ version yields more than Nil version
- Difference up to 5% but often not significant
- Differences mainly in autumn after the summer stress
- What can be expected under farming conditions?

Thank you!

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