



UNIVERSITÀ DEGLI STUDI DI PERUGIA
Dipartimento di Scienze Agrarie Alimentari ed Ambientali



STRIP TILLAGE AND SOWING: IS PRECISION PLANTING INDISPENSABLE IN SILAGE MAIZE?

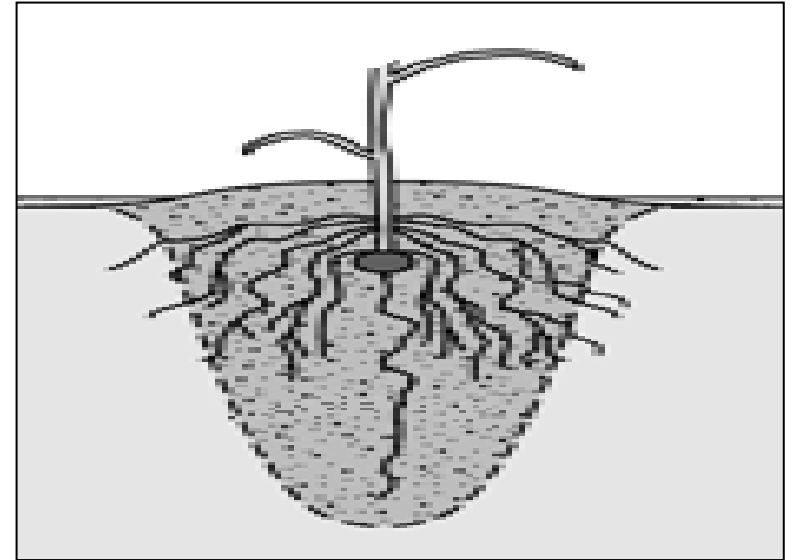
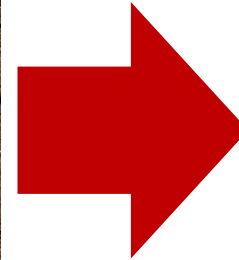
P. Benincasa, A. Zorzi, F. Panella, G. Tosti, M. Trevini

Convegno SIA – Sassari, 20-22 settembre 2016

Strip Tillage



strips ~ 15 cm wide by ~ 15 cm deep





Benefits

it works like a **minimum tillage limited to the strip**

- good seedbed preparation and crop establishment
- high soil cover, low soil disturbance, low costs
(compared to minimum tillage)

Diffusion of strip tillage

- Widespread overseas
- Recently introduced in Europe
- Recent study in Italy (Trevini et al., 2013 - Europ. J. Agron.)
- **Chances for farmers' adoption:** reduce costs and simplify logistics

Strip Tillage & Sowing

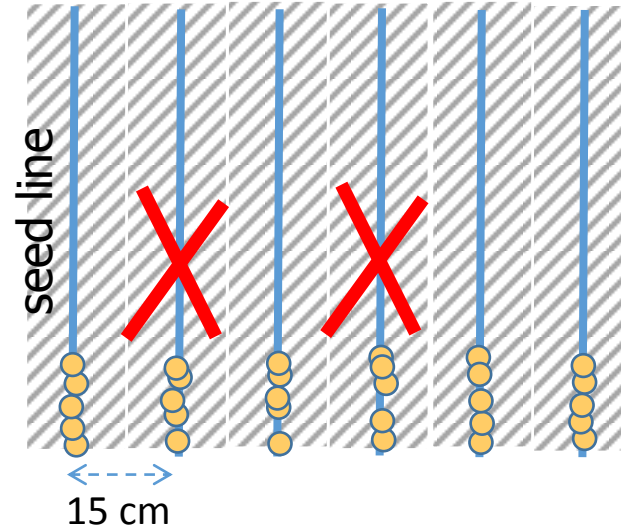
- may be carried out separately, by different machines
- may be combined using **hybrid machines**: very expensive
- need to reduce amortization costs by using these machines over a large acreage
- **ideally, use of the same machine for all crops**

BUT currently

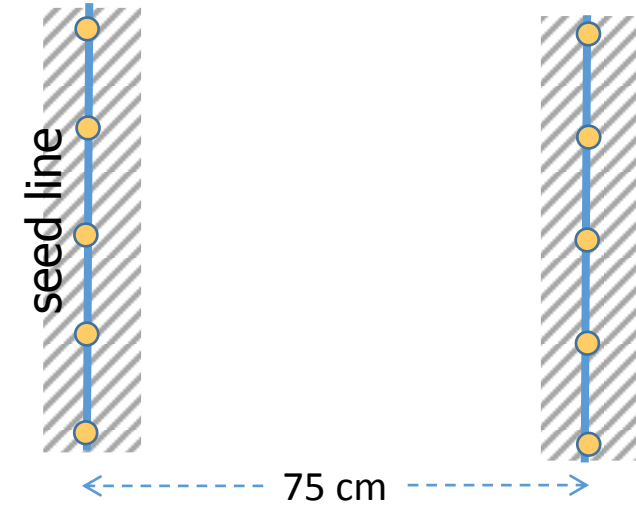
- **High density crops** (e.g. winter cereals) **are sown at 10-20 cm by volumetric seeders**
- **Low density crops** (e.g. sorghum, maize) **are sown at 40-80 cm by precision planters**

CURRENT TECHNIQUE

WHEAT: volumetric line seeding

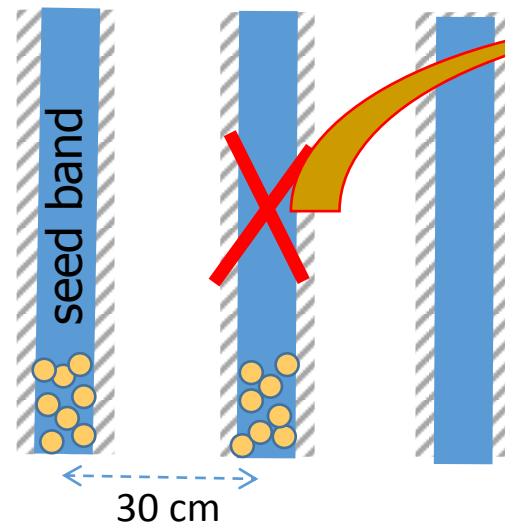


MAIZE: precision line planting

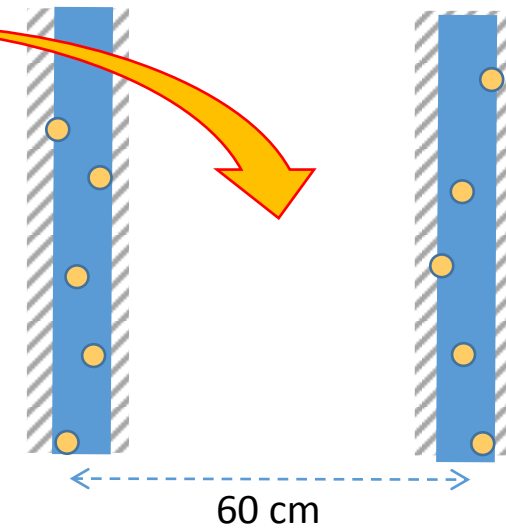


PROPOSAL TO BE TESTED

volumetric band seeding



volumetric band seeding





Hypothesis

**Replacing precision line planting with volumetric band seeding
does **not substantially affect**
crop establishment, growth and final yield of silage maize**

Sod seeder Kinze



Hybrid Claydon



**Strip tiller Kuhn
then
Sod seeder Kinze**



Sowing-Harvest: mid May - mid October

Design: randomized block, 5 reps in 2014, 3 reps in 2015

Plot size: 100 x 12 m (i.e. two passages of 6 m each)

Treatments: no tillage + precision line planting

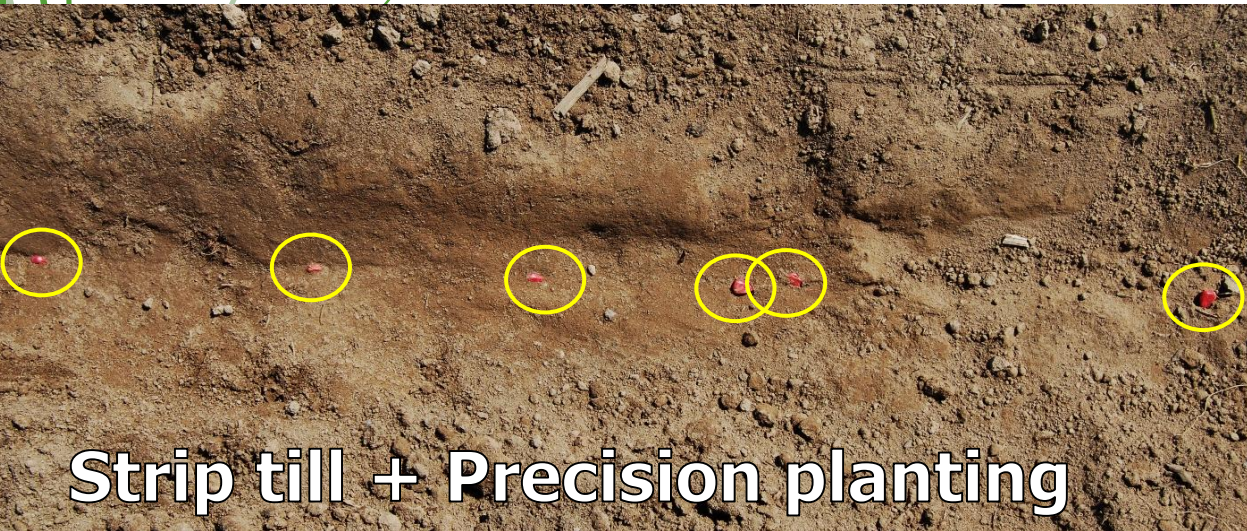
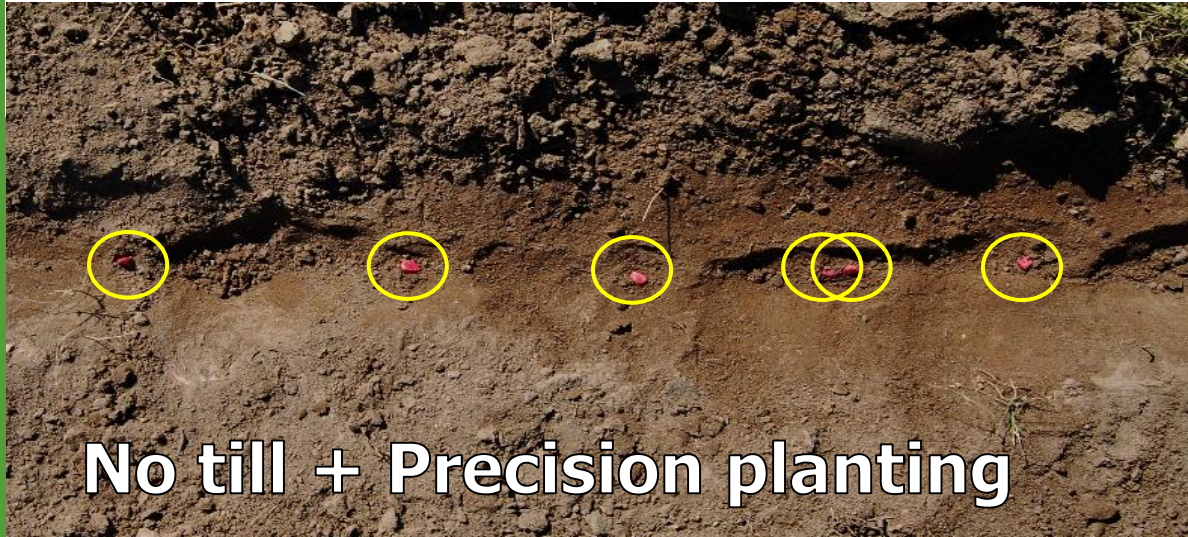
strip tillage + volumetric band seeding (band of 10 cm)

strip tillage + precision line planting (only in 2015)



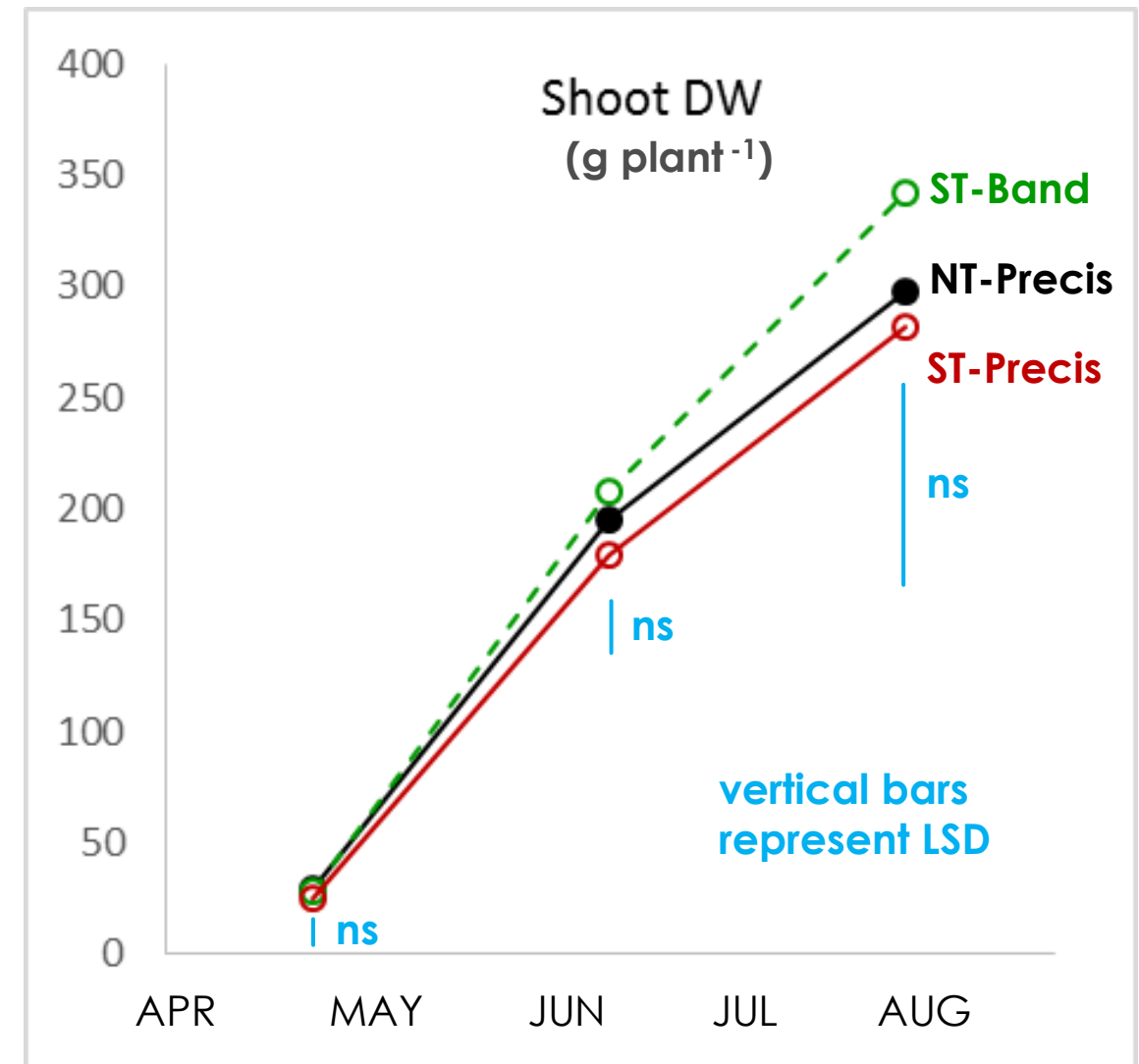
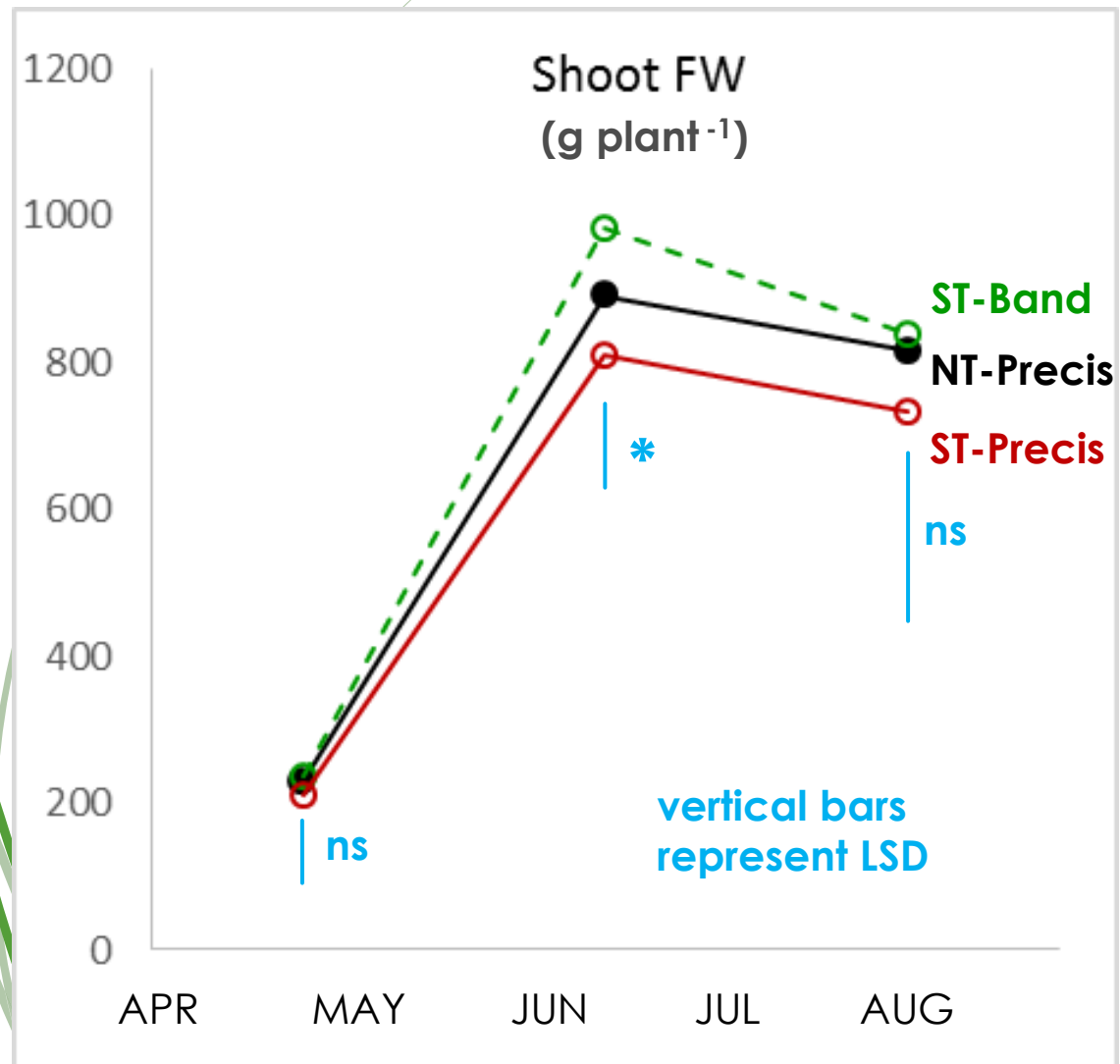
RESULTS

Seed placement



	2014	2015	
	Seeds m ⁻²	Seeds m ⁻²	Seed depth (cm)
NT-Precis planting	13.4	11.0	4.5
ST-Band Seeding	11.9	10.0	4.6
ST-Precis Planting	-	11.3	5.8
Prob. F	0.22	0.41	0.02
LSD _{0,05}	ns	ns	0.81

Individual plant growth



Final harvest



Plant density, individual plant and crop biomass yield at final harvest

Treatment	2014				2015			
	Plants m ⁻²	Plant FW kg/plant	Yield FW t ha ⁻¹	Dry matter %	Plants m ⁻²	Plant FW kg/plant	Yield FW t ha ⁻¹	Dry matter %
NT-Precis Planting	13.0	0.574	74.7	34.9	8.9	0.816	72.7	36.6
ST-Band Seeding	11.3	0.758	85.9	33.2	8.0	0.837	66.7	41.1
ST-Precis Planting	-	-	-	-	9.6	0.734	70.5	38.2
Prob. F	0.265	0.011	0.402	0.423	0.198	0.508	0.574	0.040
LSD _{0,05}	ns	0.1291	ns	ns	ns	ns	ns	3.29

Biomass composition at final harvest

[illegible]



CONCLUSIONS

Replacing precision line planting with volumetric band seeding did not substantially affect the performance of silage maize

(crop establishment and growth, final yield and silage quality)

On this basis, a same hybrid machine (with volumetric band seeding)
could be used to strip-till and sow both maize and winter cereals

(i.e. the main crops of farming systems devoted to forage or biogas production)

with logistic and economic benefits for the farm



Thanks for your attention



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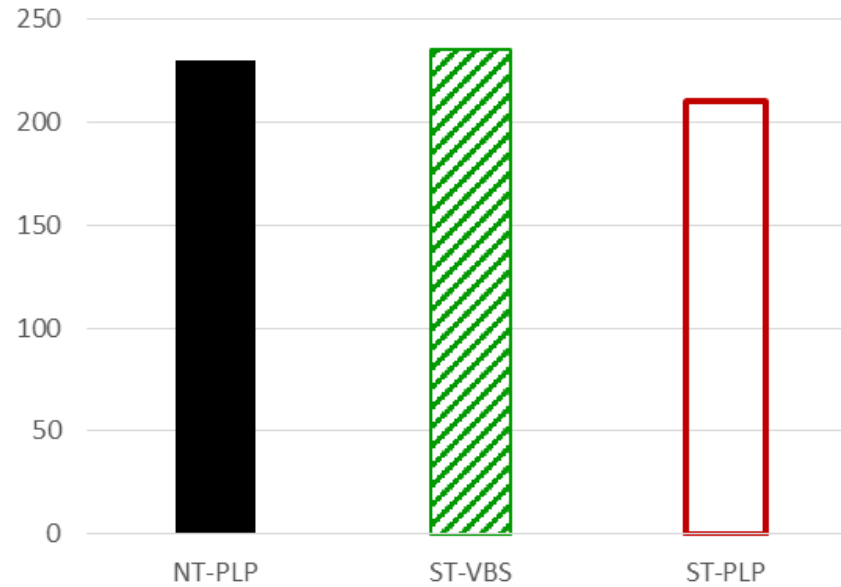
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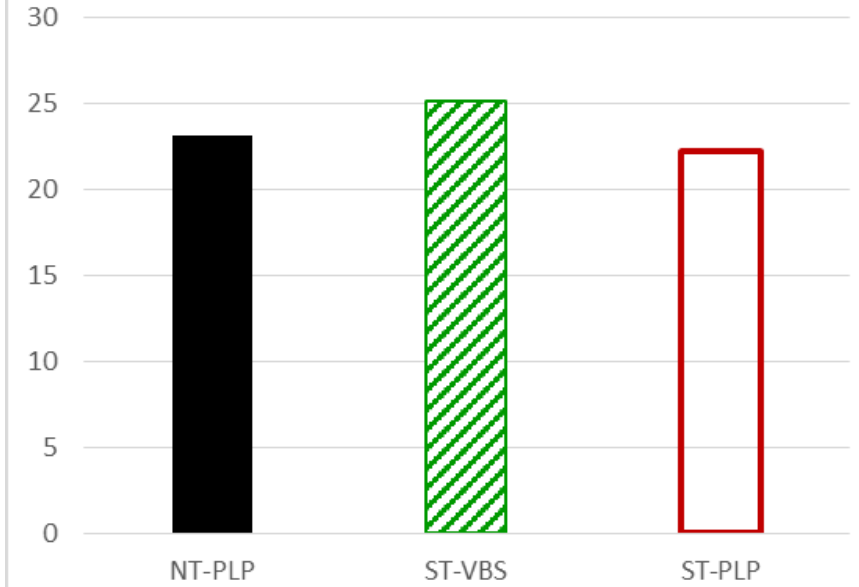
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Individual plant growth

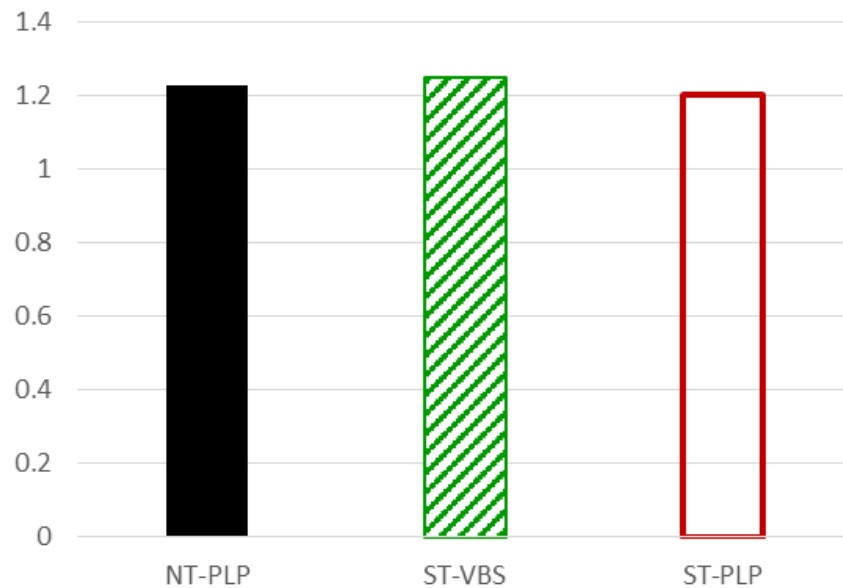
Shoot FW on 8 June (stem elongation)



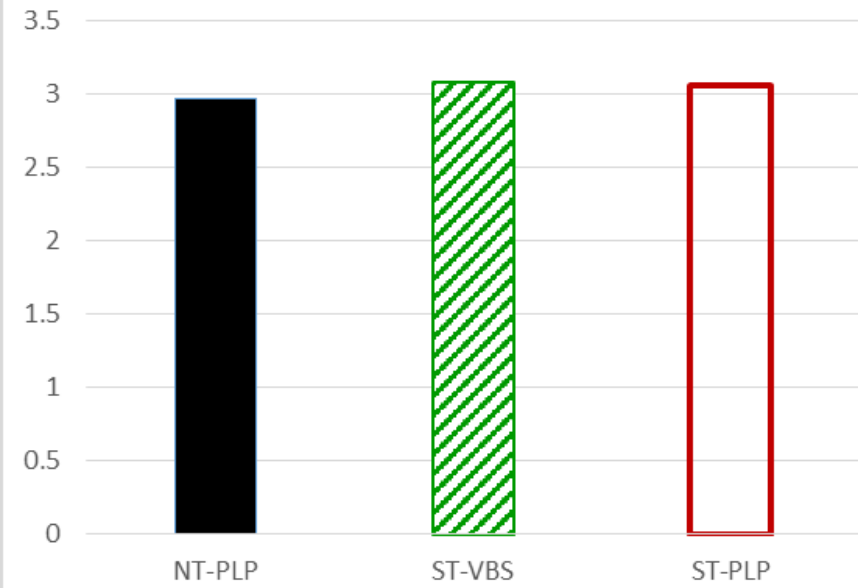
Plant diameter on 8 June



Plant height on 8 June (stem elongation)



Plant height on 22 July (flowering)



NO TILL + PRECIS. PLANTING
Sod seeder Kinze

Machines



STRIP TILL + BAND SEEDING
Hybrid Claydon



STRIP TILL + PRECIS PLANTING
Strip tiller Kuhn + Sod seeder Kinze