

# *Trichoderma* bio-inoculants to enhance grass seed yield in fields affected by take-all disease

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# Perennial ryegrass seed-crop and take-all

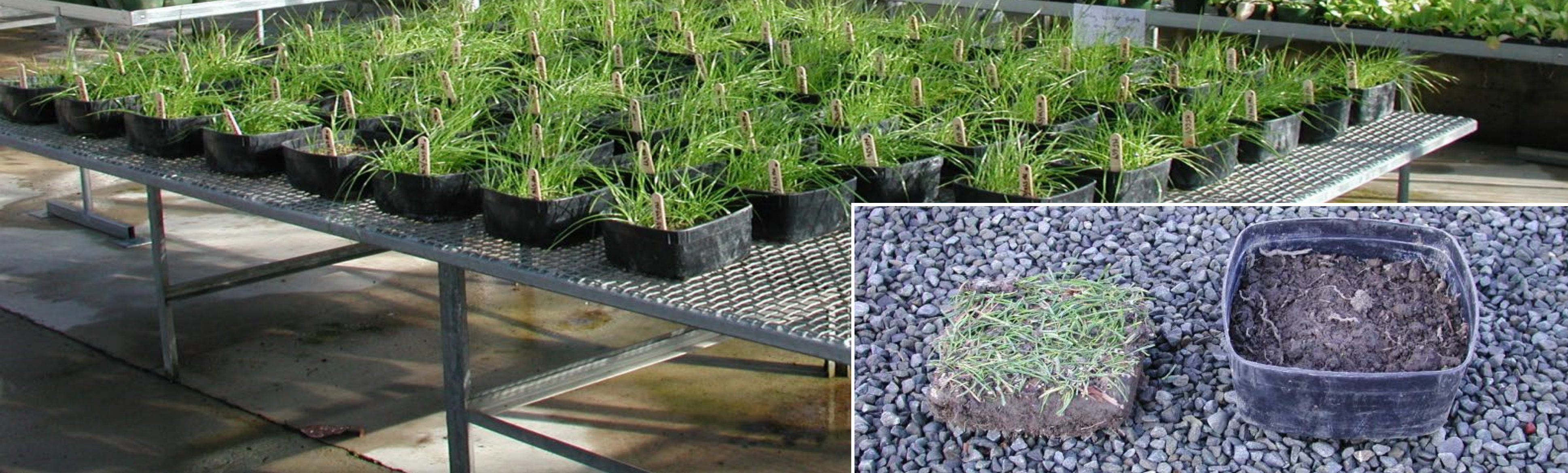
- New Zealand produces 30,000 tonnes seed/annum.
- Exported to countries all over the world.
- Light seed and large dressing losses have been associated with the root-rot pathogen *Gaeumannomyces graminis* var *tritici* which causes take-all disease in grasses and cereals.
- The pathogen is soil-borne.
- Crop rotation major factor



# Take-all disease (*Gaeumannomyces graminis* var. *tritici* or *Ggt*)



# Testing Pasture bio-inoculant (PBI) - Inverted sward technique



# Glasshouse experiment with Prairie grass (*Bromus willdenowii*)

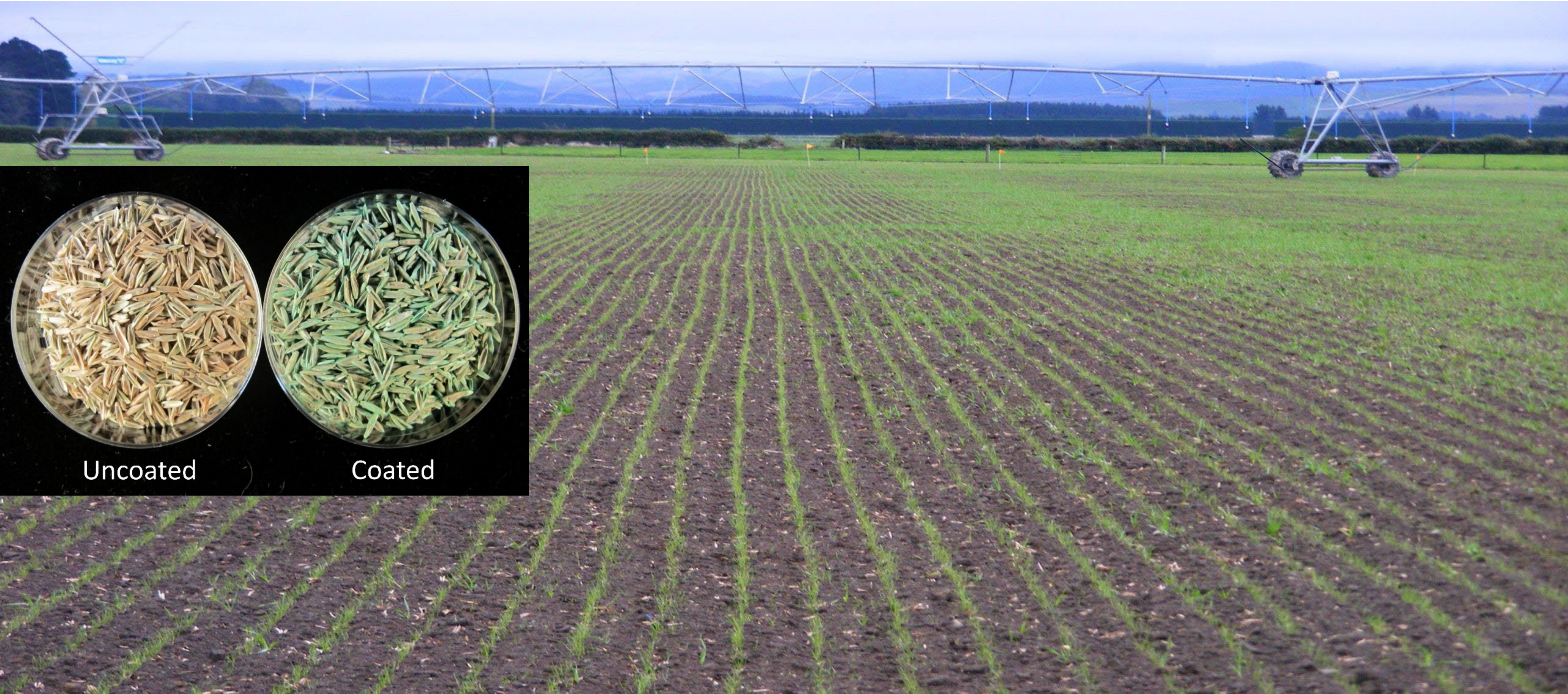


# Seed yield (*Bromus*) and its components

Treatment	No. of seeds/ plant	Field dressed seed weight (g)/plant	Machine dressed seed weight (g)/plant	Thousand seed weight (g)
Soil only control	242*	2.36*	2.14*	9.74
Ggt control	201	1.94	1.79	9.61
LU132 + Ggt	234*	2.31*	2.11*	9.85*
LU140 + Ggt	219	2.19*	1.99*	9.77
LU584 + Ggt	238*	2.33*	2.07*	9.76
LSD (5%)	18	0.18	0.16	0.23

\* Indicates significant difference ( $P < 0.05$ ) from Ggt control.

# Perennial ryegrass new pasture (Seed-coat formulation)



Uncoated

Coated

# Over-drilling the Prill formulation at Darfield





# Root and soil sampling



# Ggt root disease score in field experiments

Treatments	2019-20		2020-21	
	August 2019	Dec 2019	July 2020	Nov 2020
Control	1.46	3.0	0.54	1.00
PBI	0.62*	1.3*	0.21*	0.42*
LSD (5%)	0.48	0.3	0.29	0.36

\* Indicates significant difference ( $P < 0.05$ ) from control.

# Tiller number and crop dry weight cv 'Request' (Greendale 2019-20)

Treatments	Reproductive tiller number/m <sup>2</sup>	Vegetative tiller number/m <sup>2</sup>	Crop dry weight g/m <sup>2</sup>
Control	1059	4755	563
PBI	1429*	6772*	645*
LSD (5%)	261	1625	44



\* Indicates significant difference ( $P < 0.05$ ).

# Tiller number and crop dry weight cv 'Platform' (Ashton 2020-21)

Treatments	Reproductive tillers/m <sup>2</sup>	Vegetative tillers/m <sup>2</sup>	Crop dry weight (g/m <sup>2</sup> )
Control	1763	364	958
PBI	2156*	205*	1048
LSD (5%)	383	101	130

\* Indicates significant difference ( $P < 0.05$ ).

# Planning seed harvest



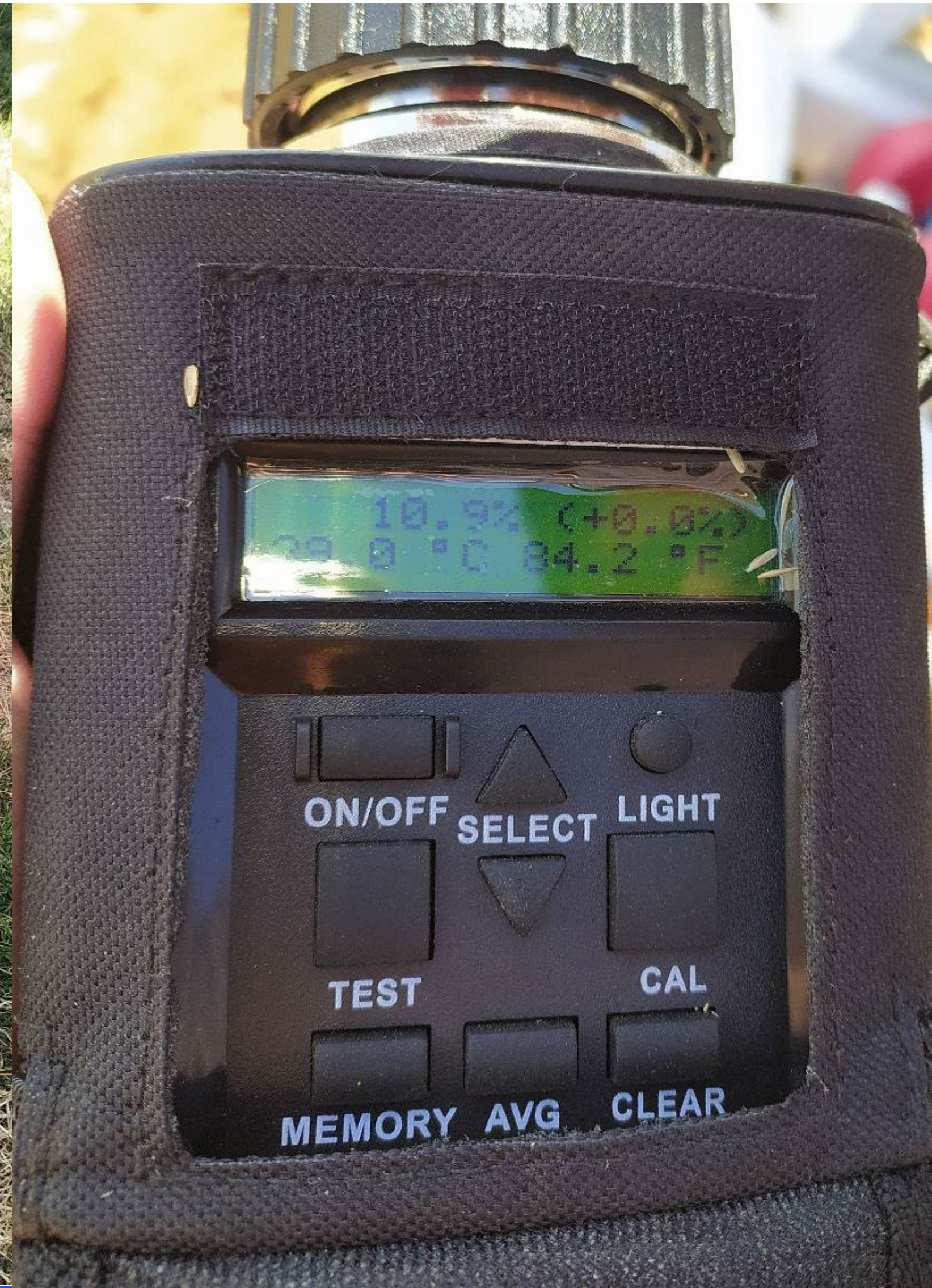
# Seed-harvest with a combine



# Weigh wagon



# Moisture percentage





# Seed yield and thousand seed weight cv. 'Request' (Greendale 2019-20)

Treatment	FDS (kg/ha)	MDS (kg/ha)	Dressing loss (%)	TSW (g)
<b>Control</b>	1130	1030	8	2.23
<b>PBI</b>	1390	1240	10	2.27
<b>LSD (5%)</b>	NS	NS	NS	NS

# Seed yield and thousand seed weight cv. 'Platform' (Ashton 2020-21)

Treatments	MDS yield (kg/ha)	TSW (g)	Dressing loss (%)
Control	1745	1.97	21
PBI	1820*	1.98	17*
LSD (5%)	70	0.26	1.2
F.prob	0.047	NS	0.004

# Summary and future work

- Positive response with the bio-inoculant in nearly all the measured parameters.
- Extend the on-farm work to more paddocks and other pasture seed-crops (Example: Cocksfoot/Orchard grass).



# Thanks for listening

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