The effect of an engineered biostimulant derived from *Ascophyllum nodosum* on grass yield under a reduced nitrogen regime in an agronomic setting

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Article

The Effect of an Engineered Biostimulant Derived from *Ascophyllum nodosum* on Grass Yield under a Reduced Nitrogen Regime in an Agronomic Setting

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Emission Targets for Agriculture

Challenge: to maintain yields under reduced fertilizer use

- European Commission's Biodiversity Strategy 2030 targets: **20 % reduction in fertilizer use by reducing fertilizer losses by 50 %**

- Irish agriculture: **25 % reduction in emissions by 2030**

Can biostimulants be part of the solution?

This project:

- Calcium Ammonia Nitrate pellet fertiliser coated with a liquid seaweed (*Ascophyllum nodosum)* extract biostimulant

- Grass managed under different production systems

Engineered Biostimulant

- Biostimulants: materials other than fertilisers, that promote plant growth when applied in low quantities (Zhang, 2007)

- Traditional application: foliar spray or irrigation

- **This project:** novel method of application via coating of pelletised fertiliser

- Calcium Ammonia Nitrate (C.A.N.) pellet fertiliser coated with **PSI-362** (a liquid extract from *Ascophyllum nodosum*)

POLICY AND PRACTICE REVIEWS
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General Principles to Justify Plant Biostimulant Claims

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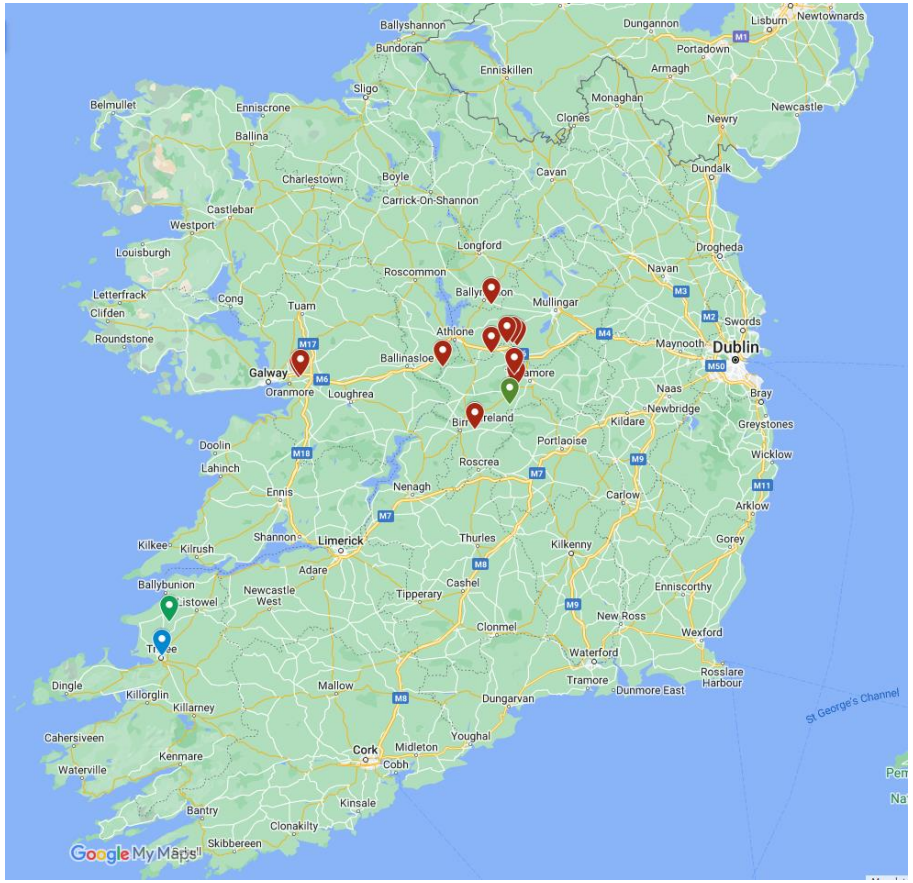
The forthcoming European Union (EU) Fertilizing Products Regulation[1] proposes a claim-based definition of plant biostimulants, stipulating that "plant biostimulant" means a product stimulating plant nutrition processes independently of the product's nutrient

Trial Set-Up

- **Lysimeter Trials**
  - Simulated Pasture Set-up
    - Monthly applications of fertiliser
  - 2 Soil Types: Loam and Silt-loam
  - 3 rates of biostimulant application

- **Farm Trials**
- 13 different farm sites across Ireland
- Agronomic Farm Trials
  - Mixture of silage trials (1st, 2nd and 3rd cuts)
  - Pasture grazing trials

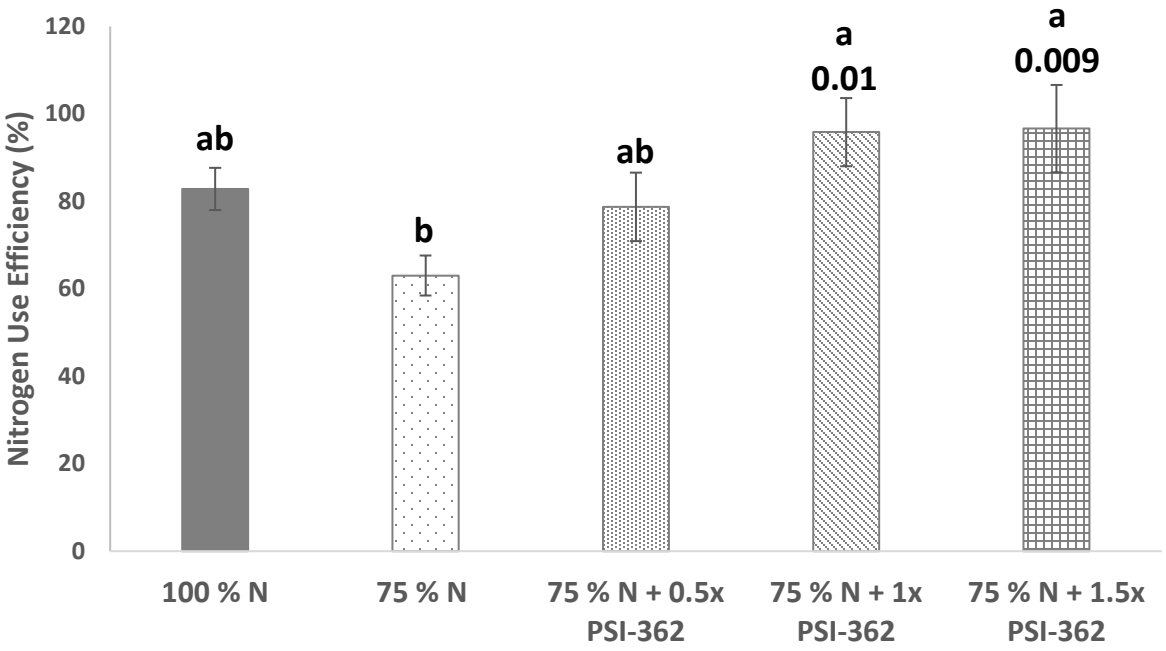


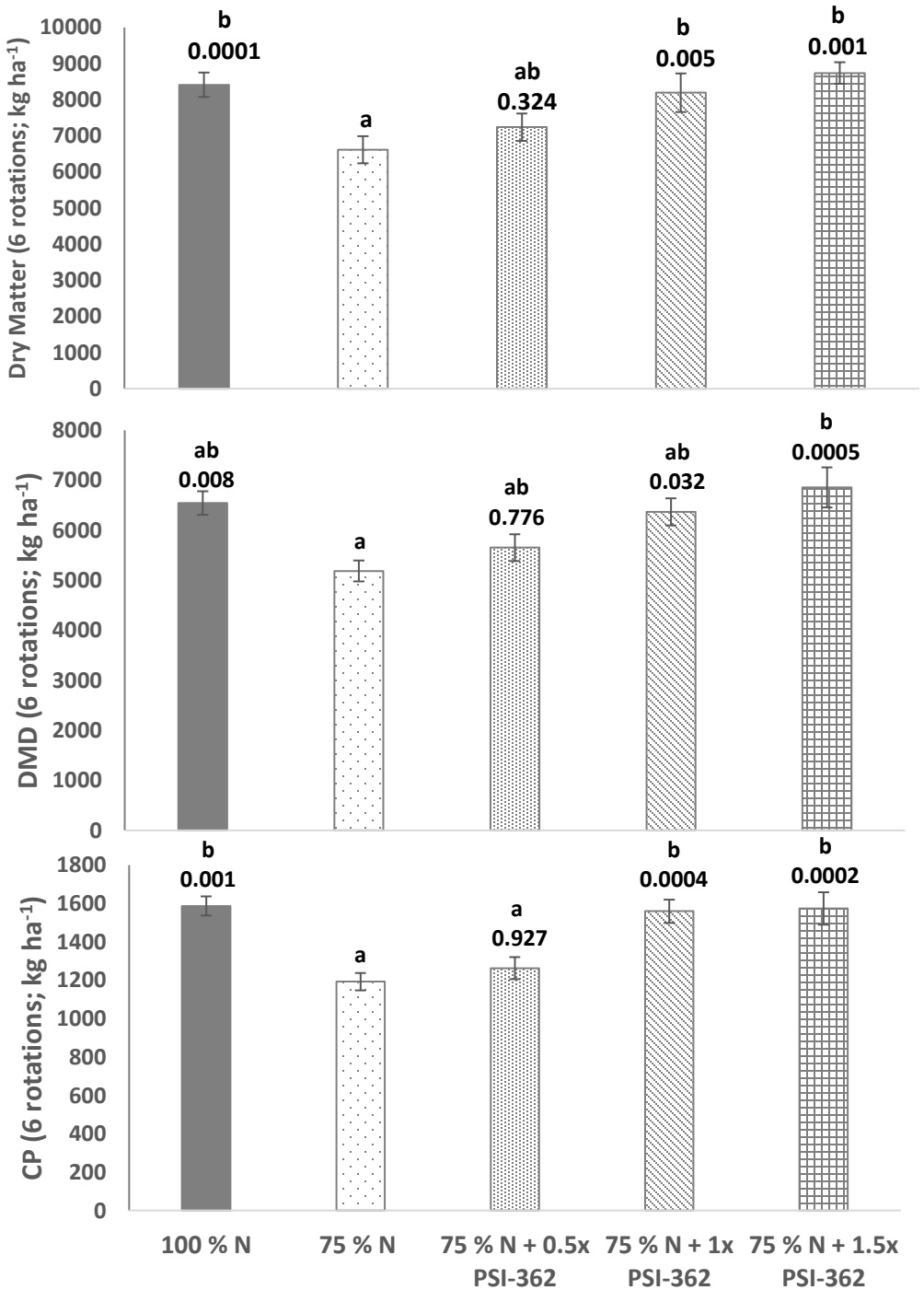
Lysimeter

Pasture

Silage

Results: Lysimeter Trials





DMD = Dry Matter Digestibility
CP = Crude Protein

Results: Field / Farm Trial Data

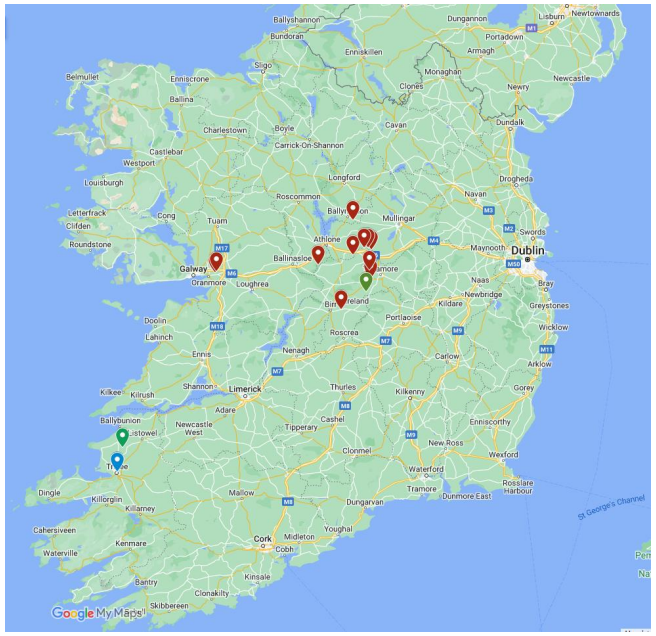
Summary of all 11 field trials (silage harvesting)

PSI-362 applied at 1x recommended rate

	Yield (kg DM ha^{-1})	P value	Crude Protein (kg DM ha^{-1})	P value	Dry Matter Digestibility (kg DM ha^{-1})	P value
100 % N	4508 ± 192	0.775	840 ± 80	0.948	3352 ± 300	0.878
80 % N + PSI-362	4594 ± 225		847 ± 68		3426 ± 359	

Summary of pasture field trials
n = 17 for pasture site 1 with 5 grazings per replicate;
n = 2 for pasture site 2 with 5 grazings per replicate; control = protected urea

Site	Treatment	Daily Grass Growth (kg of DM/Ha)	P value	Dry Matter Digestibility (kg/Ha/day)	P value	Crude Protein (kg /Ha/day)	P value
1	**100% N**	60.9± 2.5	0.629	47.2 ± 1.9	0.132	13.2 ± 0.5	0.45
	75% N + PSI-362	59.3 ± 2.4		46.3 ± 1.9		14.8 ± 0.6	
2	**100% N (PU)**	92.4 ± 11.8	0.679	ND	N/A	ND	N/A
	75% N + PSI-362	99.4 ± 11.6		ND		ND	



Conclusions

- **No loss in yield or grass quality** under a reduced N regime (compared to the 100 % N control) **when using PSI-362 coated fertiliser** in a farm setting

- Effect observed across different farming systems (silage vs. pasture)

- Concentration effect

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