Evaluating the benefits of using Bayer's TagTeam® legume inoculant in a granular or dry peat formulation in the West Midlands region.

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Key messages

- TagTeam dry peat application is a new method for growers to apply inoculant without having to produce a wet slurry or use granules.
- Peat inoculant formulations may still be a viable option for growers in dry soil under some conditions.

Background

Lupins are commonly grown on the sandplain soils in the West Midlands region. Effective nodulation of legumes is important to maximise the amount of nitrogen fixed by the legume; however, lupins are not usually treated with inoculant due to the presence of native inoculant in the soil. It is unclear if this native inoculant is as effective as newer types of inoculant, and the objective of this project is to evaluate TagTeam on the nodulation and grain yield of lupin and chickpea on a sandplain soil.

TagTeam is a dual action inoculant tool combining the phosphate solubilising microorganism *Penicillium bilaii* with nitrogen-fixing rhizobia bacteria (*Bradyrhizobium lupini* for lupins, and *Mesorhizobium ciceri* for chickpeas). Together, they can create more fixed nitrogen, and better access to soil and fertiliser phosphate, providing higher yield potential in pulse inoculants.

Results

Table 1: Establishment, nodulation and yield results. The JM Carter Nodulation Assessment Guide was used for the nodulation assessment (0-2 is considered poor nodulation, and 3-5 is considered good inoculation).

	Assessment Date	18-Jul-19			28-Aug-19		29-Nov-19		
	Days after seeding	57 DAS (GS18)			98 DAS (early flower)		191 DAS (harvest)		
Crop	**Treatment summary**	**Establishment (plants/m row)**		**Establish. %**	**Nodulation Assessment Scale (0-5)**		**Yield (t/ha)**		**Yield % UTC**
NL Lupins	Untreated	13.7	b	100	**2.9**	a	2.633	a	100
	TagTeam Dry Peat (x1 rate)	17.0	a	124	**3.9**	a	2.437	a	92.5
	TagTeam Dry Peat (x2 rate)	19.7	a	144	**3.9**	a	2.442	a	92.7
Chickpeas	Untreated	10.7	bc	100	**0**	b	0.843	b	100
	TagTeam Dry Peat (x1 rate)	9.7	c	91	**3.6**	a	0.957	b	114
	TagTeam Granular	11.7	bc	109	**2.8**	a	0.965	b	114
	LSD P=.05	**2.9**			**0.86**		**0.5804**		
	Standard Deviation	**1.6**			**0.47**		**0.3191**		
	CV	**11.62**			**16.46**		**18.63**		

Figure 1: Chickpea root systems 98 days after sowing: untreated (L), TagTeam granules (C) and TagTeam peat (R).

Discussion

At this trial there was no yield benefit in applying an inoculant on lupin seed. Although there was a noticeable improvement in crop establishment and nodulation when doing so (from a 2.9 rating to a 3.9 nodulation rating), it did not translate to yield. It is possible that this is because the frequency of lupins grown in this environment has been high, and therefore enough numbers of rhizobia are present in the soil to achieve suitable nodulation. The dry finish to the season may have also influenced the final yield.

When growing a pulse crop that has not been grown in the paddock recently (in this case, chickpeas), not only was there a significant (P=.05) increase in nodulation, but there was an increase in yield. This shows that rhizobia numbers present in the soil needs to be considered before deciding whether to inoculate.

One observation to note, is the performance of the dry peat inoculant compared to the granular product when sown in dry conditions. In Australian broadacre, the common rule when sowing pulses is to use a peat-based inoculant in wet conditions, and a granular-based product in dry conditions. This is due to the higher survivability of rhizobia in a granule in adverse conditions. This trial was sown dry on 22 May 2019, 15 days prior to the break in the season; and yet the peat-based inoculant produced superior nodulation to the granular product (see Figure 1). Further work is required, but the higher numbers of rhizobia per plant when using peat (544,000) compared to granular (22,222) suggests some flexibility, as most legumes only need 10,000 rhizobia per plant to achieve effective nodulation.

Further Information

For more on TagTeam inoculant, visit http://www.tagteam.com.au, and for a comprehensive look at the use of legume inoculants in Australia, refer to GRDC's *"Inoculating Legumes: A Practical Guide"* (2012) by Elizabeth Drew, et al.

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