Tolerance of a range of crop species to seed coating with Monocalcium phosphate

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The effect of fertilizer placement on the establishment of crops and the sensitivity of species to fertilizer damage have been studied by several workers (e.g. 1). Other studies with crops (2) have shown that, at low rates, nutrient seed coatings are 3-4 times as effective per unit of phosphorus (P) as drilled applications. Investigations with pastures have also shown P seed coatings to be effective provided that the species are tolerant of monocalcium phosphate (MCP) during emergence (3). The work presented here investigates the tolerance of a range of crops to seed coating with 3 rates of MCP.

Methods

An emergence study under controlled environment conditions (20?/15?C - 12 h cycle without light) was conducted using 3 levels of MCP applied to seeds of 8 species and sown in P-deficient soil at 11% moisture (w/w) (75% of F.C.). Treatments included raw seed, an inert coating and MCP coatings equivalent to 32, 64 and 96% of the raw seed weight of each species. The design was a randomized complete block with 4 replicates.

Results and Discussion

All MCP treatments caused at least some delay in the emergence of all species, whilst for final emergence the species ranged in tolerance from no reduction at any MCP rate (oats, barley), to reduction only at the highest MCP rate (wheat, sorghum, sunflower), to a significant reduction at all MCP rates (rape, soybeans, lupins) (Table 1).

Table 1 - Effect of P seed coatings on the final emergence of 8 crop species (as % of control) and raw seed weight of each species.

Seed coating	Species							
	Barley	Oats	Wheat	Sorghum	Rape	Sunflower	Soybeans	Lupins
Raw	100 a*	100 a	100 ab	100 a	100 a	100 a	100 a	100 b
Inert	100 a	100 a	106 a	96 a	94 ab	115 a	99 a	106 a
MCP 32%	96 a	100 a	84 bc	96 a	87 bc	104 a	23 b	3 c
MCP 64%	98 a	98 a	83 bc	98 ac	84 c	108 a	1 c	0 d
MCP 96%	96 a	98 a	69 c	86 b	70 d	80 b	0 c	0 d
Raw seed wt (mg/seed)	49	44	36	35	4	63	133	168

* Data within columns followed by the same letter are not significantly different (P >0.05) (Duncans Multiple Range Test).

In general, these results with MCP seed coatings follow the trends found for injury due to the banding of fertilizers (1). The inert coating significantly increased emergence of lupins and a similar trend was evident for sunflowers, perhaps due to the absorption of moisture by the fine particulate coating.

Related species (e.g. wheat and oats) differed in their susceptibility to damage. Guttay (4) suggested seed structure as an explanation. Further work is being conducted to understand the mechanism of tolerance/injury of the various crop species to soluble P seed coatings.

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