Effect of soil texture on injury to crop species by seed coating with monocalcium phosphate

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Nutrient seed coatings at low rates have been shown to be 3-4 times as effective per unit applied phosphorus (P) as drilled applications (4), but can both delay and reduce germination. Since drilled fertilizer was found to be more damaging on coarse sands than on fine textured clay (2), we investigated the effects of P seed coating on emergence from soils of different texture. Monocalcium phosphate (MCP) was used as a soluble source of P in the seed coatings (3).

Methods

An emergence study under controlled environment conditions 20?/15?C-12h cycle without light was conducted using 4 coated seed treatments of wheat and sorghum in soil of 4 textures. Soil textures were varied by mixing a black earth (clay content 60% w/w, CEC

469 mmol(p+)kg-1) and a gleyed podzolic sand (clay content 10% w/w, CEC 36 mmol(p^+)kg^{-1}) resulting in clay contents: 10, 26, 43 and 60% w/w. The seed treatments included raw seed, an inert coating and MCP coatings equivalent to 96 and 126% w/w of the raw seed weight of each species. All soils were watered to field capacity after sowing. Emergence was counted each day. Mitscherlich functions were fitted to the raw data, providing three parameters: time to first emergence, final emergence and the rate factor.

Results and discussion

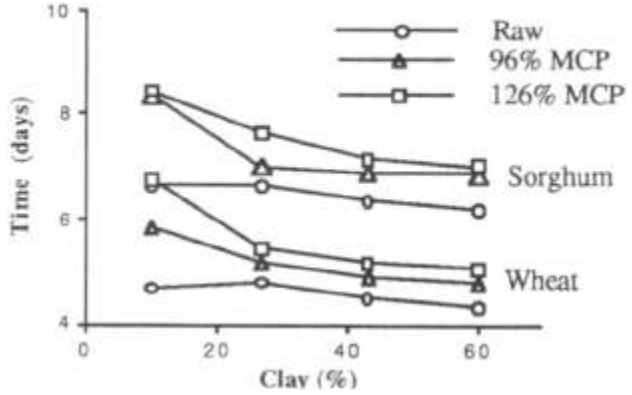

Fig. 1. Effect of soil texture on time to first emergence.

As in previous trials (1) MCP treatments delayed emergence for both species; sorghum being more sensitive than wheat. There was a non-linear effect of soil texture on time to first emergence (Fig. 1) and number of plants emerged for both species. The effect on time to first emergence was greater than that on either final emergence or the rate of emergence.

Maximum emergence and rate of emergence was at 26% w/w clay for both species. The degree of fertiliser injury was dependent on species, weight of P coating and soil texture. It appears that as for drilled fertilisers (2), any negative effects on emergence from P seed coatings is greatest in coarse textured soils.

1. Ascher, J.S., Scott, J.M. and Jessop R.S. (1987). Proc. 4th Aust. Agron. Conf. p. 239.

2. Carter, O.G. 1969. Wool technology and sheep breeding, July 1969, 69-75.

3. Scott, J.M. and Blair, G.J. (1985). Proc. 3rd Aust. Agron. Conf. p. 180.

4. Smid, A.E. and Bates, T.E. (1971). Agron. J. 63, 380-384.