

Multi-year crop responses to Mega MES10 and KMag

Take home messages

- Between 2006 and 2008, 26 replicated trials tested wheat and canola responses to MES10, MESZ and KMag.
- MES10 increased yields by an average of 11.3% (canola) and 7.4% (wheat) compared with MAP.
- MESZ + KMag increased yields by an average of 30.6% (canola) and 13.3% (wheat) compared with MAP.
- Responses were measured on sandy, calcareous, ironstone gravel and some clay soils
- The most responsive sites were those with low soil test sulphur, or low sulphur levels in crop tissue tests.

Trial designs

Twenty-six replicated trials were run between 2006 and 2008 to test wheat and canola responses to MES10 and KMag. Field trials were located in New South Wales, Victoria, South Australia and Western Australia. Soil types ranged from heavy clay soils, granite soils, sandy soils, calcareous soils and ironstone gravel soils.

Independent contractors were employed to sow, manage and harvest the trials. The experimental design was a *randomised complete block design*, with four blocks (replications). Fertiliser rates and crop varieties were chosen to reflect local practices. For example, P rates varied between 10 and 22 kg/ha depending on the soil type, paddock history and yield potential of the area. However, at each trial site the P and N rates were identical in every plot, so differences between yields were due to fulfilling the crops requirements for additional elements such as S, Zn and K. Soil tests were taken prior to planting and shoot tissue tests were taken at late-tillering for wheat and during the vegetative stage for canola.

Multi-year trial responses

Average yield responses to each fertilizer are shown in Table 1. Out of 26 trials, 2 wheat trials and 3 canola trials were severely affected by kangaroo damage, frost damage post flowering or extreme drought conditions, to the point where useful yield data could not be obtained (some of the crops were not harvested). For these trials early dry matter responses are shown in lieu of yield data in Table 2.

The multi-year, multi-site analysis showed that MES10 increased canola and wheat yields by an average of 11.3% and 7.4%, respectively, compared to MAP (Table 1). When applied with KMag, MES10 increased average canola yields by 30.6% and wheat yields by 13.3%.

In 70% of the trials, MES10 increased yields by more than 5%, but not all of these yield differences were statistically significant. Using MES10 or MES10 + KMag, yields were significantly ($P \leq 0.05$) higher than MAP in 11 of the 21 trials. MAP did not yield significantly better than MES10 or MES10 + KMag in any of the trials.

Table 1. Multi-year, multi-site analysis of MES10 and KMag responses in Australia

Fertiliser	Crop	Number of replicated trials	Average yield increase over MAP (%)
MES10	Wheat	10	7.4
	Canola	7	11.3
MESZ	Wheat	12	7.0
	Canola	9	19.8
MESZ + 20% KMag	Wheat	12	13.3
	Canola	9	30.6

Table 2. Dry matter at mid tillering (wheat) and at the vegetative stage (canola) for trials that were not harvested or suffered severe frost damage.

Fertiliser	Crop	Average D.M. increase over MAP (%)
MES10	Wheat	51
	Canola	22
MESZ	Wheat	79
	Canola	19
MESZ + 20% KMag	Wheat	91
	Canola	11

As would be expected, the unresponsive sites were those with high background levels of sulphur and potassium. The most responsive soils were deep sands; the average yield increase with MES10 was 18.3% (canola) and 12.5% (wheat) compared with MAP. On calcareous soils, MES10 increased yields by 13.8% (canola) and 4.6% (wheat) and on ironstone gravel soils by 30.5% (canola; no yield data for wheat). On the more fertile Red-Brown Earth and clay soils, responses ranged from non-responsive to a 2.7% increase in canola yields and an 11.5% increase in wheat yields. Sites most likely to benefit from MES10 are those with known sulphur responses or those with low soil or plant tissue sulphur levels.

The most S responsive sites had soil test levels ranging from 2 to 4 mg/kg sulphur using a 3hr, 0.25M KCl extract. Significant ($P \leq 0.05$) S responses were measured when whole shoot S levels in canola were between 0.20% and 0.56% pre-flowering and between 0.15% and 0.30% at the end of tillering in wheat.

A further 28 cropping trials are currently being harvested from the 2009 season across SA, Vic, NSW and WA.