

Canola needs sulphur fertilizer



KEY PRACTICE: Apply at least 10 lb./ac. of sulphur to every canola acre, every year, no matter the soil test result. Increase if necessary to meet soil test recommendations.

KEY RESEARCH: C.A. Grant, S.S. Malhi and R.E. Karamanos. "Sulfur management for rapeseed," *Field Crops Research* 128 (2012) 119–128 reviews all key research.

Canola growers can experience substantial decreases in yield due to sulphur deficiency. The abstract to the Grant, Malhi and Karamanos review cited above begins with this: "(Canola) has a high concentration of sulphur in its tissue and seed and a particularly high demand for sulphur relative to its yield potential. Therefore, effective sulphur management is an important part of (canola) production. Sulphur deficiencies are becoming increasingly prevalent due to higher crop yields, decreasing aerial deposition of sulphur and decreasing mineralization of sulphur from soil organic matter."

The general recommendation for Western Canada is to apply at least 10 lb./ac. of sulphur to every canola acre, every year, no matter the soil test result. Apply higher rates when necessary to meet soil test recommendations, especially when soil test results are low in sulphur.

A minimum 10 lb./ac. blanket application is necessary because sulphur levels are highly variable within fields, and composite soil tests may show sufficient levels even though large parts of the field may be deficient.

Various field studies in Western Canada over the years have shown this, including S.S. Malhi's field trials in Luvisols in Saskatchewan from 2003-05. In this study, published in *Agronomy Journal* 99, 570-577, Malhi found seed yield was usually maximized at the rate of 30 kg/ha of sulphur, which is roughly 30 lb./ac.

Rigas Karamanos in a 2004 study recognized the extremely high spatial variability in soil test S, which prompted him to recommend that a blanket application of 10 lb./ac. of sulphur may be necessary even on soils that test sufficient in sulphur.

Ammonium sulphate tends to be more efficient than elemental sulphur to address crop needs in the year of application. Numerous studies in Western Canada support this, including Malhi's 2000-02 study, as reported in the *Canadian Journal of Plant Science* in 2005. If using elemental sulphur, Malhi found that fall-applied elemental S usually had greater seed yield and S uptake than spring-applied elemental S.

New rapid release elemental S (RRES) fertilizers are an improvement over other elemental sulphur products, but still do not match yields from an equivalent amount of sulphate-S. From 2011 to 2013, Malhi ran a field experiment to determine the relative effectiveness of RRES fertilizer Vitasul (manufactured by Sulvaris) and sulphate-S fertilizer on canola seed yield on S-deficient Gray Luvisol loam soil at Star City, SK (see the table).

Compared to the zero-S control, seed yield increased significantly with all Vitasul treatments. In this study, spring broadcast pre-emergence and fall-applied Vitasul produced only slightly lower seed yield than the highest yielding spring applied sulphate-S treatments.

When using ammonium sulphate (AS), ideally place it outside the seed row.

An AAFC study led by Cindy Grant looked at seedling damage from combinations of seed-placed phosphate and sulphate products. The study found, as reported in the *Canola Digest Science Edition* 2013, that, “About half the site years showed seedling toxicity with excess rates of monoammonium phosphate and ammonium sulphate (MAP + AS) or ammonium polyphosphate and ammonium thiosulphate (APP + ATS) in combination. Seed-placed P and S significantly reduced stand density at several of the sites, with the effect of S being particularly damaging.”

The recommendation is that growers save the seed row location for phosphorus fertilizer, as it provides a known early season benefit to stand establishment. Adding AS to the seed row in addition to ammonium phosphate may push seed-placed nitrogen levels too high for seedling safety in many cases, however good soil moisture and higher seedbed utilization will reduce the risks from seed-placed fertilizer.

An in-crop application of sulphate fertilizer can be effective – whether broadcast early to meet the crop demand or to rescue yield potential

when canola shows signs of deficiency. Malhi found that canola’s demand for sulphur is highest during flowering and seed set, and that early-season S deficiencies can be corrected with sulphate fertilizer applied as late as rosette to early bolting stages.

Malhi demonstrated this in the study, “Restoring canola yield by applying sulphur fertilizer during the growing season,” which was published in Lee, D.W. (Ed.), *Agrium Symposium: Sulfur Fertility and Fertilizers*. Agrium New Products R & D, Calgary, pp. 51–55. ●

Seed yield of canola with rapid release elemental S (RRES) and sulphate-S fertilizers applied at 20 kg S ha with various combinations of application time and placement method in 2011, 2012 and 2013 on a S-deficient soil at Star City, Saskatchewan.

Treatment		Seed yield (kg/ha)			
No	S source/time/method	2011	2012	2013	Mean
1	Control (no S fertilizer)	2021	1361	2759	2127
2	RRES Broadcast Autumn	2836	1860	3872	2856
3	RRES Broadcast Spring Pre-Till	2451	1666	4028	2715
4	RRES Broadcast Spring Pre-Emergence	2692	1929	4100	2907
5	RRES Spring Sideband	2521	1586	3854	2666
6	RRES Spring Seedrow-Placed	2472	1592	3846	2637
7	Potassium Sulphate Broadcast Autumn	2858	1829	3980	2889
8	Potassium Sulphate Broadcast Spring Pre-Till	2985	1952	4215	3051
9	Potassium Sulphate Broadcast Spring Pre-Emergence	2939	1907	3933	2926
10	Potassium Sulphate Spring Sideband	2830	1948	4097	2958
11	Potassium Sulphate Spring Seedrow-Placed	2993	1661	4013	2889
	LSD _{0.05}	425	228	337	207

Rapid release elemental sulphur is an improved way to deliver elemental sulphur, but sulphate fertilizer still provides the best crop response in the year of application.

Source: S.S. Malhi, AAFC