

Over the last two decades there has been a lot of activity to determine where sulphur deficiencies occur, on what crops and what rate is needed to correct the deficiencies. Findings illustrate that sulphur fertilization is critical to enhance crop production throughout China. China's National Agricultural Technology Extension and Service Center from the Ministry of Agriculture and The Sulphur Institute conducted 155 scientific field trials between July 2008 and November 2011. Trial results documented dramatic increases in production which were expressed as a percentage and crop yield benefit for each kilogram of sulphur fertilizer nutrient applied.



More and more, we are seeing an array of fertilizers to correct sulphur deficiencies. Historically, single superphosphate and ammonium sulphate have dominated the worldwide supply, but a lot has changed. Now, there are products that contain elemental sulphur for longer-term availability and liquid fertilizers, ammonium thiosulphate for example, to address more versatile applications. With the scope of products available, precise selection and application is required to assure efficient fertilizer use.

## The broad groupings include:

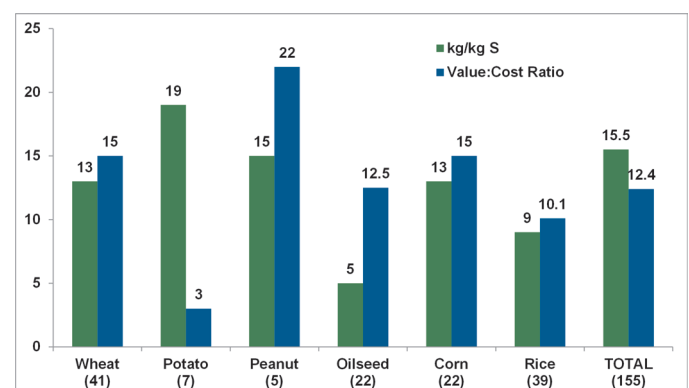
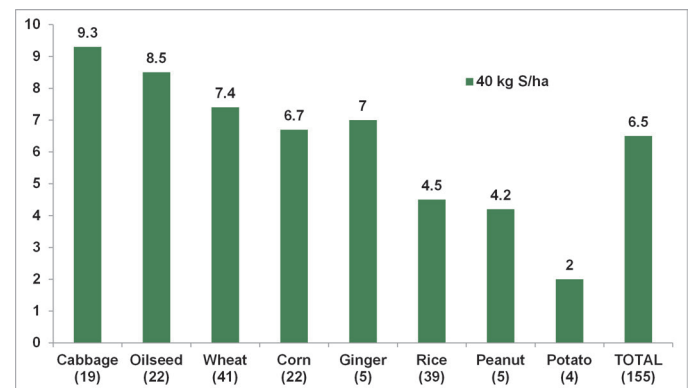
**a) sulphate carriers** – considered readily available and best suited where immediate response is required. Multiple applications may be necessary.

**b) elemental sulphur-based carriers** – offer long-term nutrient availability with release related to the particle size of the sulphur. Research proves sources containing sulphur particles smaller than 150 microns are becomes available within the year of application.

**c) a mixture of sulphate and elemental sulphur-based carriers** – provide immediate and reserve availability of sulphur as the elemental sulphur is oxidized, becomes plant available, in soil.

**d) liquid fertilizers containing sulphur** – offer versatility and can be added to other liquid fertilizers, frequently urea-ammonium nitrate (UAN).

**Figure 1. Average sulphur fertilizer effect on crop yield and economic returns (value to cost ratio) in China (numbers in parentheses represent the number of field trials completed over the period of 2008-2011).**



SULPHUR FERTILIZERS	CONTENT (%)			
	S	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Ammonium Nitrate with Ammonium Sulphate or Ammonium Nitrate Sulphate	7 to 16	up to 30	0	0
Ammonium Nitrate with Gypsum	3 to 6	24 to 27	0	0
Ammonium Phosphate Sulphate	6 to 17	Variable	Variable	0
Ammonium Sulphate	24	21	0	0
Ammonium Sulphate Liquid	9	8	0	0
Ammonium Thiosulphate Solid	43	19.5	0	0
Ammonium Thiosulphate Solution	26	12	0	0
Calcium Nitrate with Sulphur	1 to 5	15	0	0
Calcium Sulphate (Dihydrate Gypsum)	17 to 18	0	0	0
Calcium Sulphate (Hemihydrate Gypsum)	19 to 22	0	0	0
Calcium Sulphate (Anhydrite Gypsum)	22 to 24	0	0	0
Iron Pyrites	54	0	0	0
Magnesium Sulphate (Epsom Salt)	13	0	0	0
Magnesium Sulphate (Kieserite)	10 to 23	0	0	0
Micronized Sulphur*	50 to 99	0	0	0
Mixed-Grade NKs with Sulphur	5.2 to 10	Variable	0	Variable
Mixed-Grade NPs with Sulphur	2 to 21	Variable	Variable	0
Mixed-Grade NPKs with Sulphur	2 to 17	Variable	Variable	Variable
Mixed-Grade PKs with Sulphur	2 to 15	0	Variable	Variable
Nitrogen-Sulphur Solutions	2 to 6	7 to 35	0	0
Potassium Magnesium Sulphate	22	0	0	22
Potassium Sulphate	17 to 18	0	0	48 to 52
Potassium Thiosulphate	17	0	0	25
Single Superphosphate - SSP	11 to 14	0	16 to 20	0
Single Superphosphate - Fortified	28 to 50	0	5 to 16	0
Sulphur (Elemental)	50 to 100	0	0	0
Sulphur Bentonite	85 to 90	0	0	0
Sulphur-Coated DAP	12	12 to 15	40	0
Sulphur-Coated MAP	12	8 to 10	44	0
Sulphur-Coated TSP	10 to 20	0	38 to 43	0
Sulphur-Coated Urea	10 to 14	38 to 40	0	0
Sulphur with Micronutrients	2 to 80	0	0	0
Urea with Sulphur	5 to 18	40	0	0
Urea Sulphuric Acid	9 to 18	10 to 28	0	0
Zinc Sulphate	11	0	0	0

\*Includes wettable/dusting powders (dry powder) and flowable sulphur (liquid suspension)