# EFFECT OF SOURCES AND LEVELS OF SULPHUR ON THE YIELD OF CABBAGE

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Sulphur is one of the 16 nutrients mandatory for plant growth, and ranks third or fourth in the amount needed for optimal plant growth following nitrogen, potassium and phosphorus. On the other hand, most vegetables particularly cabbage could be categorized as a heavy sulphur feeder (FAO, 1984; Kemmler and Hobt, 1986). Application of sulphur to plants is not a common practice in the upcountry of Sri Lanka. In addition, fertilizer preference has also changed contributing to the need for sulphur application. When single super phosphate and ammonium sulphur were applied as phosphorus and nitrogen sources respectively, sulphur requirement of the crops was fulfilled without realizing its significance. However, introduction of triple super phosphate and urea as phosphorus and nitrogen source respectively, resulted in a drastic reduction in sulphur additions to soil.

Most farmers in the upcountry use high quantities if chemical and organic fertilizers, Use of poultry manure as a fertilizer is a common practice in the upcountry intermediate zone, while cattle manure is used in the upcountry wet zone. In general, most of the organic manures contain high amount of sulphur. Hence, organic manure applied soils are generally high in sulphur (Wijewardene and Amarasiri, 1989).

Sulphur has long been recognized as an essential nutrient

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for plant and animal growth. Sulphur, is a constituent of the amino acids. The properties of certain enzymes, such as those concerned with photosynthesis and nitrogen fixation, are presumably attributable to the type of sulphur linkages present, where in some instances the maturity of crops is found to be delayed due to inadequacy of sulphur (Park, 1988).

In this study the effectiveness of two sulphur sources such as gypsum and ammonium sulphate and different levels of sulphur application to cabbage was studied in the upcountry.

## MATERIALS AND METHODS

A field experiment was conducted in a Red Yellow Podzolic soil (Panabokke, 1967 ) at the Regional Agricultural Research and Development Centre, Bandarawela. The following treatments were included in the trial design; 0,20,40,60 and 80 kg S/ha gypsum and ammonium sulphate. The experiment was laid out in a randomized complete block design, and replicated three times. Recommended levels of N, P and K were applied to all treatment combinations. Nitrogen was applied as urea, K as muriate of potash and P as triple super phosphate. In treatments where ammonium sulphate was added as sulphur sources, N level was kept constant as in other treatments by adjusting the amount of N applied as urea. Cabbage variety "Hercules" was grown at a spacing of 50 cm x 50 cm. The plot size was 3m x 2.5m. The crop was grown under rainfed conditions with supplementary irrigation whenever necessary. Land was maintained weed-free throughout the experiment.

## RESULTS AND DISCUSSION

The effect of sulphur on the yield of cabbage is shown in Table 1. In general, increasing the level of sulphur resulted in increased cabbage yields. However, the highest yield of cabbage was obtained with the applicant of sulphur at the rate of 60 kg/ha

as ammonium sulphate. Highest level of sulphur at the rate of 80 kg/ha applied as ammonium sulphate was not beneficial to achieve high yields.

The results suggest that sulphur application is beneficial to cabbage cultivation in this soil. This may be due to the high sulphur removal by cabbage. In general, cabbage could be categorized as a heavy sulphur feeder compared to other vegetables (FAO, 1984; Kemmler and Hobt, 1986). Therefore high rates of sulphur application such as 60 kg/ha is beneficial to increase the cabbage yield. Wijewardena and Amarasiri (1989) reported earlier that there was no response to sulphur application from cabbage, tomato and bean in this region. This may due to the fact that they tested such low levels of sulphur as 30 kg/ha as gypsum.

Table 1: Effect of sulphur on the yield of cabbage

| Treatment | Yield (t/ha) |
|---|---|
| No sulphur | 54.8 |
| 20 kg S/ha as gypsum | 55.9 |
| 40 kg S/ha as gypsum | 56.8 |
| 60 kg S/ha as gypsum | 62.5 |
| 80 kg S/ha as gypsum | 65.7 |
| 20 kg S/ha as ammonium sulphate | 57.6 |
| 40 kg S/ha as ammonium sulphate | 60.4 |
| 60 kg S/ha as ammonium sulphate | 73.9 |
| 80 kg S/ha as ammonium sulphate | 72.8 |
| LSD (P = 0.05) | 5.06 |
| CV (%) | 4.7 |

Results of the present experiment further revealed that ammonium sulphate is more beneficial than gypsum. This may be due to the chemical nature of the ammonium sulphate; it is more reactive than gypsum. Therefore, ammonium sulphate is more suitable than gypsum as a source of sulphur for cabbage cultivation.

## CONCLUSION

The application of sulphur at the rate of 60 kg/ha as ammonium sulphate is beneficial for cabbage cultivation in the upcountry. Results further suggest that ammonium sulphate more effective than gypsum as a source of sulphur for cabbage.

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