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Effect of sources and levels of sulphur fertilizers on bulb yield of onion (*Allium cepa* L.)

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SUMMARY

An experiment was conducted to study the effect of sources and levels of sulphur fertilizers on bulb yield of onion during the *Rabi* season of the years 2003-04 to 2005-06. There were significant effects of sulphur sources on bulb yield. Significantly the highest bulb yield of 320.98, 415.63and 383.21 q ha^{-1} were recorded with the use of element sulphur during 2004-05, 2005-06 and in pooled result, respectively. Whereas, various levels of sulphur could not exert any significant effect on the bulb yield during individual years as well as in pooled results. Among various sources, the maximum net returns of 35676 Rs.ha^{-1} and benefit cost ratio of 0.87 were recorded by elemental sulphur and among various levels, the maximum net returns of 31107 Rs.ha^{-1} was secured by the application of sulphur @ 60 kg ha^{-1}. Whereas, net BCR for all the levels of sulphur was equal.

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Onion is an allogamous vegetable crop of global importance. It is popularly used both in immature and mature bulb stage as a vegetable and spices. It is grown mainly as a *Rabi* season crop. In recent times, the deficiency of sulphur is increasing in Indian soils as a result of indiscriminate use of phosphorus and potassium fertilizers (Tandon,1995). Sulphur is an essential nutrient for growth and development of onion plant and bulb. Sulphur being a secondary nutrient is essential for the formation of protein and other biologically important compounds (Lakkineni and Abrol, 1994). Apart from this, it is a component of several enzymes such a nitrogenase and nitrate reductase. Several reports are also available on the increased yield of crop plants by the application of sulphur containing fertilizers but there is hardly any literature on sulphur nutrition of onion particularly for Saurashtra region of Gujarat state. Hence, present experiment was under taken to study the effects of sources and levels of sulphur fertilizers on onion bulb yield in *Rabi* season.

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MATERIALS AND METHODS

A field experiment was conducted during the *Rabi* season of the years 2003-04, 2004-05 and 2005-06 at Vegetable Research Station, Junagadh Agricultural University, Junagadh. Soil of the experimental area was medium black in texture, low in available nitrogen, high in available phosphorus, medium in available potash and low in available sulphur with the pH of 8.20. The treatments comprised of twelve treatment combinations of four different sources (mineral gypsum, elemental sulphur, ammonium sulphate and phospho gypsum) and three levels of sulphur (20,40 and 60 kg S ha^{-1}) were tested in factorial Randomized Block Design with three replications. The common full dose of phosphorus, potash and half dose of nitrogen was applied as basal dose, while remain half dose of nitrogen was applied as top dose at 30 days after transplanting in each experimental year.The sources of nitrogen, phosphorus and potash were urea, diammonium phosphate and murate of potash, respectively. The different sources of sulphur as per treatments were applied at the time of transplanting in each experimental year. The elemental sulphur was applied before 20-25 days of transplanting in each experimental year. The seedlings were transplanted at 15 cm x10 cm spacing on December 5, 2003, December 5, 2004 and December 7,2005 during

Table 1: Effect of sulphur sources and levels on bulb yield and economics of onion

Treatments	Bulb yield (qha^{-1})				Net returns (Rs ha^{-1})	Net BCR
	2003-04	2004-05	2005-06	Pooled		
Sources of sulphur						
S_1=Mineral gypsum	404.94	295.47	353.09	351.17	29452	1:0.72
S_2= Elemental sulphur	413.01	320.98	415.63	383.21	35676	1:0.87
S_3= Ammonium sulphate	376.14	257.60	393.41	342.38	26526	1:0.63
S_4= Phopho gypsum	404.62	303.53	381.89	363.35	31888	1:0.78
C.D.(P= 0.05)	NS	34.31	25.42	23.17		
Sulphur levels kgha^{-1}						
L_1=20	399.51	300.86	374.69	358.35	30775	1:0.75
L_2=40	403.21	280.74	394.45	359.47	30774	1:0.75
L_3=60	396.30	301.60	388.89	362.26	31107	1:0.75
C.D.(P= 0.05)	NS	NS	NS	NS		

NS=Non-significant

the respective experimental year. All the cultural operations were followed to raise a good crop of onion cv. GUJARAT WHITE ONION-1. The data were recorded for bulb yield on net plot basis and then converted on hectare basis and subjected to statistical analysis.

RESULTS AND DISCUSSION

The data on bulb yield influenced due to different sources and levels of sulphur are presented in Table 1.

Effect of sulphur sources:

The results indicated that various sources of sulphur produced significant effect on bulb yield during the years 2004-05, 2005-06 and in pooled. The highest bulb yield of 320.98 q ha^{-1} was secured by the source of elemental sulphur, but statistically, it was at par with the treatment of phospho gypsum and mineral gypsum during the year 2004-05. While, the highest bulb yield of 415.63 q ha^{-1} was produced by the elemental sulphur and it was at par with the treatment of ammonium sulphate during the year 2005-06. The pooled result revealed that significantly the highest bulb yield of 383.21 q ha^{-1} was secured by the elemental sulphur and it was at par with the treatment of phospho gypsum which gave 363.35 q ha^{-1} bulb yields. Yaduvanshi and Yadav (2007) reported that application of sulphur in the form of ammonium sulphate and elemental sulphur produced the maximum sugarcane yield.

Effect of sulphur levels:

The results presented in Table 1 indicated that various levels of sulphur could not exert any significant effect on bulb yield of onion during all the three individual experimental years as well as in pooled analysis. However, increasing levels of sulphur from 20 to 60 kgha^{-1}, increased bulb yield and application of 60 kg S ha^{-1} produced numerically highest bulb yield of 362.26 q ha^{-1} in pooled. Chatterjee *et al.* (1999) reported that increasing the level of sulphur from 0.04 meql^{-1}, 4 meql^{-1} progressively increased the fresh bulb yield of onion. The similar results were also obtained by Yaduvanshi and Yadav (2007) in sugarcane crop.

All the interaction effects on bulb yield were found non significant.

In terms of monetary returns, among different sources of sulphur, the maximum net returns of 35676 Rsha^{-1} and net benefit cost ratio of 1: 0.87 were recorded with the elemental sulphur. While, among various sulphur levels, though non significant effect on bulb yield, maximum net returns of 31107 Rsha-1 was obtained by the application of 60 kg S ha^{-1}, whereas, net BCR was equal (0.75) for all the levels of sulphur.

The results can be summarized that application of sulphur in the form of elemental sulphur before 20-25 days of transplanting was found to be economical for bulb yield of onion during *Rabi* season under Saurashtra region of Gujarat.

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