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Sulphur application in onion for enlargement of bulb

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Abstract

A field experiment was concluded at village Baghbahal, Buromunda and Brahmanidunguri of Bolangir district to study the “Sulphur application in Onion for enlargement of bulb” in western central table land zone of Odisha during rabi 2020-21 under Biotech-Kissan Project of OUAT, Bhubaneswar. The results indicate that the application of S @ 45 kg/ha gives early maturity (118 days) with higher bulb diameter both polar (5.16cm) and equatorial (5.63). Significantly recommended practice increases the yield i.e., 216.76 q/ha compare to the farmers practice i.e. 196.23 q/ha. By investing Rs. 1,10,000/- cost of production in recommended practice, gives Rs. 2,14,540/-net return where as farmers practice gives Rs. 1,94,345/- net return. S application significantly increase the B:C ratio from 2.94 (FP) to 2.95 (RP). Hence, the Sulphur application @ 45 kg/ha may be recommended to the farmers for Onion cultivation to get better growth yield and bulb quality.

Keywords: sulphur application, onion, enlargement, bulb

Introduction

Onion (*Allium cepa*. L.) is one of the most commercial vegetable cum spice crop. It is called as queen of the Kitchen belongs to the family Amaryllidaceae having chromosome number $2n=76$. It is known for its flavour, pungency which is due to Sulphur containing compound alyl propyl disulphides and also eco-friendly stored grains protectant (Jaggi, 2005) [5]. In India it is grown in an area 11.73 lakh hectares with production of 187.77 lakhs metric tons and productivity of 16 metric tons/ha (Anon, 2014) [1]. Onion is a Sulphur loving plant and is required for proper growth and yield in Onion (Kumar and Singh, 1995) [7]. Sulphur has been recognized as an important nutrient for higher yield, quality of bulbs and building up Sulphur containing aminoacids and also for a good vegetative growth. Sulphur has been found not only to increase the bulb yield but also improve its quality especially pungency and flavour (Jaggi and Dixit, 1999) [6]. Balasubramaniam, *et al.* (1979) [3] also reported that Onion required sulphur fertilization in increasing the dry matter production have been reported by Singh and Rathi (1987) [8]. “S” containing secondary molecules are not only of importance for nutritive value and flavours but also for resistance against pest and diseases (Bell, 1981) [4]. Severe “S” deficiency during bulb development has detrimental effect on yield and quality of Onion (Ajay and Singh, 1994) [2]. Hence, the present study was conducted with the objectives to find out recorded growth and yield of Onion by application of Sulphur.

Materials and Methods

A field experiment was conducted in rabi 2020-21 at Baghbahal, Buromunda and Brahmanidunguri villages of Bolangir district, Odisha to study the “Effect of Sulphur on growth and yield of Onion in western central table land Zone of Odisha” under Biotech-Kissan Project of OUAT, Bhubaneswar. The experiment was laid out in a Randomized Block Design (RBD) with two treatments such as farmers practice (FP) as no application of sulphur & recommended practice (RP) as application of sulphur @ 45 kg/ha and 13 replications in village Baghbahal (4), Buromunda (4) and Brahmanidunguri (5). The Onion variety taken in FP and RP as Agrifound Light Red. The soil of the land was sandy loam in texture with Ph 6.2, 0.38 per cent Organic carbon. The available nitrogen, phosphorous and potassium were 205 kg/ha, 9 kg/ha and 169 kg/ha respectively. The soil test based fertilizer applied at dose 150 kg nitrogen, 75 kg phosphorous and 100 kg potassium. Fertilizer were applied in three split doses like basal (0 DAS), 1st top dressing (30 DAS) and 2nd top dressing (45 DAS). For weed management Oxyflurofen were applied. The crop was harvested at maturity where the plants turned yellowish white necrotic leaf tips coupled with neck fall in more than 50-70%.

The plants were uprooted from the plot and the soil adhered to the bulbs were removed. Then the tops were removed and bulbs were cured under shade for 8-10 days. The growth and yield of Onion was recorded.

Result and Discussion

1. Study of Physiological parameters

The application of S @ 45 kg/ha gives early maturity at 118 days compare to no application of S at 125 days. The

recommended practice gives higher bulb diameter in polar was 5.15cm and equatorial was 5.63cm compare to the farmers practice in polar was 4.65cm and equatorial was 4.99 cm. The maximum day required for maturity was noticed in the farmers practice. The diameter of bulb (cm) in polar and equatorial was increased significantly due to the application of Sulphur (Table 1). Similar results were reported by Narseen *et al.*, (2007), Ullah *et al.*, (2008) and Bharati and Ram (2014) in Onion.

Table 1: Physiological parameters

| Treatments | Days to maturity | Bulb diameter | |
|------------|------------------|---------------|----------------|
| | | Polar (cm) | Equatorial(cm) |
| FP | 125 | 4.65 | 4.99 |
| RP | 118 | 5.16 | 5.63 |
| SE | 0.29 | 0.03 | 0.05 |
| CD (0.05) | 0.86 | 0.13 | 0.18 |

2. Study of Yield parameters

The data presented in the table-2 revealed that the application of S (RP) gives significantly higher weight of fresh bulb (75.68g), cured bulb (32.36g), yield per plant (5.931g) and yield per hectare (216.36q) compare to the no application of "S" i.e. 59.84 g, 29.51g, 5.21kg and 196.23q. The influence of "S" on the yield of Onion bulb could be attributed to an

important role of Sulphur in plant protein and some hormone formation, also sulphur is necessary for enzymatic action, chlorophyll formation, synthesis of certain aminoacids and vitamins, hence it helps have a good vegetative growth leading to get high wight of bulb in Onion. Similar results were found by Sharma *et al.* (2009) in Onion.

Table 2: Yield parameters

| Treatments | Weight of fresh bulb (g) | Weight of cured bulb (g) | Yield per plant (kg) | Yield per hectare (g) |
|------------|--------------------------|--------------------------|----------------------|-----------------------|
| FP | 59.84 | 29.51 | 5.21 | 196.23 |
| RP | 75.68 | 32.36 | 5.93 | 216.36 |
| SE (1) | 0.62 | 0.15 | 0.04 | 0.88 |
| CD (0.05) | 1.83 | 0.43 | 0.09 | 2.63 |

3. Study of Economic parameters

The data presented in the table 3 revealed that under demonstration the recommended practice recorded Rs.1,10,00/- cost of production gives Rs. 3,24,540/ gross return which leads to Rs. 2,14,540 net return, where as in Farmers practice recorded Rs. 1,09,000/- cost of production gives Rs.2,94,345 gross return which leads to Rs. 1,74,345/- net return. The recommended practice gives significantly little higher B:C ratio 2.95 compare to the farmers practice 2.94.

Table 3: Economic parameters

| Treatments | Cost of production (Rs.) | Gross return (Rs.) | Net return (Rs.) | B:C ratio |
|------------|--------------------------|--------------------|------------------|-----------|
| FP | 100000 | 294345 | 194345 | 2.94 |
| RP | 110000 | 324540 | 214540 | 2.95 |

Conclusion

From the demonstration we conclude that the application of S @ 45 kg/ha gives early maturity (118 days) with higher bulb diameter both polar (5.16cm) and equatorial (5.63). Significantly recommended practice increases the yield i.e., 216.76 q/ha compare to the farmers practice i.e. 196.23. By investing Rs. 1,10,000/- cost of production in recommended practice, gives Rs. 2,14,540/-net return where as farmers practice gives Rs. 1,94,345/- net return. S application significantly increase the B:C ratio from 2.94 (FP) to 2.95 (RP). Hence, the Sulphur application @ 45 kg/ha may be recommended to the farmers for Onion cultivation to get better growth yield and bulb quality.

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