Effect of Varities and sulphur on growth and yield validation of rice (*Oryza sativa* L.)

Abstarct:

The field experiment was conducted during *kharif* 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.36 %), available N (171.48 kg/ha), available P (15.2 kg/ha) and available K (232.5 kg/ha). The experiment was laid out in Randomized Block Design with nine treatments which are each replicated thrice on the basis of one year experimentation. The treatments consists of T1: MTU – 7029 + Sulphur 10Kg/ha, T2: MTU – 7029 + Sulphur 20Kg/ha, T3: MTU – 7029 + Sulphur 30Kg/ha, T4: BPT – 5204 + Sulphur 10Kg/ha, T5: BPT – 5204+ Sulphur 20Kg/ha, T6: BPT – 5204 + Sulphur 30Kg/ha, T7: ARIZE – 6444 + Sulphur 10Kg/ha, T8: ARIZE – 6444 + Sulphur 20Kg/ha, T9: ARIZE – 6444 + Sulphur 30Kg/ha are used. The results showed that application of The application of BPT – 5204 + Sulphur 30Kg/ha, recorded significantly higher Plant height (111.20 cm), Number of tillers/plant (11.45), Plant dry weight (53.07 g/plant), Crop Growth rate (16.07 g/m^2/day) panicles/plant (17.00), number of grains per hill (100.69), Test weight (21.51 g), panicle length (20.20 cm), grain yield (5.62 t/ha), Straw yield (9.68 t/ha), Harvest index (36.72 %) were recorded with the treatment of BPT – 5204 + Sulphur 30Kg/ha.Higher gross returns (Rs. 1,72.050.00/ha), net return (Rs. 1,12,790.00/ha) and benefit cost ratio (1.90) was obtained in the treatment of BPT – 5204 + Sulphur 30Kg/ha.

Key words: *Nitrogen, Phosphorous, Potassium, Rice.*

Introduction:

Rice is the seed of the grass species Oryza sativa (Asian rice) or less commonly O. glaberrima (African rice). The name wild rice is usually used for species of the genera Zizania and Porteresia, both wild and domesticated, although the term may also be used for primitive or uncultivated varieties of Oryza. As a cereal grain, domesticated rice is the most widely consumed staple food for over half of the world's human population, articularly in Asia and Africa. It is the agricultural commodity with the third - highest worldwide production, after sugarcane and maize. Since sizable portions of sugarcane and maize crops are used for purposes other than human consumption, rice is the most important food crop with regard to human nutrition and caloric intake, providing more than one-fifth of the calories consumed worldwide by humans. There are many varieties of rice and culinary

preferences tend to vary regionally.Sulphur is one of the essential elements required for normal plant growth and plays an important role as a component of many plant processes. This is because plant metabolism is dependent on sulphur and a deficiency of this nutrient leads to impaired basal metabolism. Not only does it reduce yields, it also reduces product quality. If the supply of S is inadequate, applying high levels of other nutrients (N, P, and K) may not increase yields due to imbalances in plant N/S and P/S ratios. I have. In addition, a sufficient and balanced supply of nutrients promotes the correct development of plants and has a positive effect on yield. Therefore, under such circumstances, the application of S fertilizer is imminent to increase the yield of aerobic rice. Various sulfur fertilizers are available in India, but gypsum is the most common. Because it's cheap and readily available. Another inexpensive sulfur source, phosphogypsum, a by-product of the calcium superphosphate industry, has gained attention and market acceptance as a sulfur source. Sulfate leaching is expected under aerobic rice, so the use of slow-acting S carriers may be helpful **(Nayak *et al*., 2013**).

Material and Methods:

The field experiment was conducted during *Khairf* 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). 8The experiment was laid out in Randomized Block Design with nine treatments including control each replicated thrice on the basis of one year experimentation. The treatments consists of T1: MTU – 7029 + Sulphur 10Kg/ha, T2: MTU – 7029 + Sulphur 20Kg/ha, T3: MTU – 7029 + Sulphur 30Kg/ha, T4: BPT – 5204+ Sulphur 10Kg/ha, T5: BPT – 5204+ Sulphur 20Kg/ha, T6: BPT – 5204+ Sulphur 30Kg/ha, T7: ARIZE – 6444 + Sulphur 10Kg/ha, T8: ARIZE – 6444 + Sulphur 20Kg/ha, T9: ARIZE – 6444 + Sulphur 30Kg/ha are used. The observations were recorded are plant height ,No.of tillers/hill, plant dry weight, no of panicles/hill, no of grains/hill, Grain yield.the collected data were subjected to statistical analysis by analysis of varience methods (**Gomez and Gomez, 1984)**

Results and Discussion:

Pre - harvest Parameters:

Plant height:

The perusal of data indicate that plant height measured at (i.e., 60 DAS), At 60 DAS, there was significant difference among the treatments. However, highest plant height (53.80 cm) was recorded with the application of BPT - 5204 + sulphur 30kg/ha, whereas minimum plant height (47.10 cm) was recorded with the treatment ARIZE – 6444 + Sulphur 10Kg/ha and BPT - 5204 + sulphur 20kg/ha (53.40 cm), MTU – 7029 + sulphur 30kg/ha (52.10 cm) were statistically at par with T6. There was significant difference among the treatments. similar findings were

reported by **Anil kumar *et al* (2012) ,Ram *et al*. (2018), Rajesh *et al*. (2018)** increase in plant height might be owing to the positive role of S in plant metabolic activity,which may have led to the increased phothosynthesis and there by plant height. These results clearly indicated that sulphur has a definite positive impact on plant height.

No.of tillers/plant:

However, highest number of tillers (7.90) was recorded with the application of BPT – 5204+ Sulphur 30Kg/ha, whereas minimum number of tillers (6.14) was recorded with the treatment ARIZE – 6444 + Sulphur 10Kg/ha and BPT - 5204 + sulphur 20kg/ha (7.66) was statistically at par with T6, there was significant difference among the treatments. Similar findings were reported by **Anil kumar *et al* (2012), Dinesh *et al.* (2018)** ,**Ram *et al*. (2018), Rajesh *et al*. (2018)** tillering is the product of expanding auxillary buds and closely associated with the nutritional conditions of the mother culm during its early growth period which gets improved by the applicaton of sulphur

Plant Dry weight:

However, highest dry weight (14.00 gm) was recorded with the application of BPT - 5204 + sulphur 30kg/ha, whereas minimum dry weight (12.30 gm) was recorded with the treatment ARIZE – 6444 + Sulphur 10Kg/ha and BPT - 5204 + sulphur 20kg/ha (13.87 gm) was statistically at par with T6. Similar findings were repoted by **Ram *et al.* (2018),Anil kumar *et al* (2012), Rajesh *et al*. (2018)** increases in dry weight which is quite obvious that continued and balanced supply of nutrients right from early stage of growth resulted in vigorus plant growth and its results to better dry weight

Post - harvest Parameters:

No of panicles/hill:

Significantly maximum Number of Panicles/hill (17.00) was recorded with the treatment of application of BPT - 5204 + sulphur 30kg/ha and BPT - 5204 + sulphur 20kg/ha (17.00) over all the treatments, minimum was recorded in treatments ARIZE – 6444 + Sulphur 10Kg/ha (12.00) and MTU – 7029 + sulphur 30kg/ha (16.50) which was found to be statistically at par with T6.similar findings were reported by **Bassiouni *et al* (2016),Rahman *et al* (2007), Rajesh *et al.* (2018)** increases in panicles that owing to improving soil properties by reducing ph of sailine soil drainage improvement ,encouraging aggregates formation and nutrient availability reflecting on plant growth and salinity tolerance of rice and it improves the higher assimilation and translocation of carbohydrates to panicle induced by sulphur.And the sulphur also could stimulate synthesis of chloroplast protein resulting in greater photosynthetic efficiency which in

turn resulted in increased yield

No. of grains/hill:

Significantly maximum Number of grains/hill (100.69) was recorded with the treatment of application of BPT - 5204 + sulphur 30kg/ha over all the treatments, minimum was recorded in treatments MTU – 7029 + Sulphur 10Kg/ha (92.76) and BPT – 5204 + Sulphur 20Kg/ha (100.48), MTU – 7029 + Sulphur 30Kg/ha (99.35) was statistically at par with T6. Similar findings were reported by **Anil kumar *et al* (2012), jiten singh *et al* (2018), Rajesh *et al.* (2018)** tillering is the product of expanding auxillary buds and closely associated with the nutritional conditions of the mother culm during its early growth period which gets improved by the applicaton of sulphur

Grain yield:

Significantly maximum grain yield (5.62 t/ha) was recorded with the treatment of application of BPT - 5204 + sulphur 30kg/ha over all the treatments, minimum was recorded in treatments ARIZE – 6444 + Sulphur 10Kg/ha (4.50 t/ha) and BPT - 5204 + sulphur 20kg/ha (5.37 t/ha) which were found to be statistically at par with T6. Similar findings were reported by **Ram *et al.* (2018)** ,**Jyothish *et al* . *(*2019)**application of sulphur to soil increases the availability of S in soil which might have helped the crop to achieve better growth as it is an evident that S application significantly and positively increased the values of yield attributes,which might have increased the grain yield significantly

Conclusion:

It is concluded that application of BPT – 5204 + Sulphur 50Kg/ha (Treatment 6) was recorded significantly higher grain yield (5.82 t/ha), and benefit cost ratio (2.92) as compared to other treatments. Since, the finding based on the research done in one season.

Table 1: Influence of varieties and sulphur on growth and Yield attributes and their combination on growth and yield attributes of Rice

Treatments	Plant Height	Number of tillers/plants	Dry weight	**Number of panicle/hills**	**Number of grains/hills**	**Grain yield (kg/ha)**
T1	47.70	6.34	12.52	13.10	92.76	4.59
T2	51.60	7.30	13.21	16.00	98.78	4.89
T3	52.10	7.54	13.40	16.50	99.35	4.90
T4	48.60	6.54	12.61	14.50	96.39	4.96
T5	53.40	7.66	13.87	17.00	100.48	5.37
T6	**53.80**	**7.90**	**14.00**	17.00	100.69	5.62
T7	47.10	6.14	12.30	12.00	95.71	4.50
T8	49.40	7.02	13.08	14.80	97.25	4.96
T9	49.90	7.15	13.08	15.30	98.46	4.98
F – Test	S	S	S	S	S	S
SEm	0.79	0.12	0.20	0.2	1.53	0.08
CD (p=0.05)	2.39	0.35	0.61	0.59	2.58	0.26

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