Original Research Article

Influence of Sulphur and Zinc on Yield, Yield attributes and Economics of Baby Corn(*Zeamays*L.)

ABSTRACT

A Field experiment was conducted during *Zaid* (summer) season of 2023 at Crop Research Farm Department of Agronomy. The treatments consisted of 3 levels of Sulphur*viz.*, (15, 30 and 45 kg/ha) and 3 levels of Zinc *viz.*,(10, 20 and 30 kg/ha) along with recommended doses of nitrogen, phosphorus and potash as control (60-60-40 kg N-P-K/ha). The experiment was laid out in a Randomized Block Design with 10 treatments and replication thrice. Application of Sulphur 45kg/ha along with Zinc 30 kg/ha (Treatment 9) recorded maximum cob yield with husk (10.6 t/ha), cob yield without husk (3.91 t/ha), green fodder yield (28.43 t/ha). The aforesaid treatment also recorded maximum gross return (143144.00INR/ha), net return (95519.00INR/ha) and B:C ratio (2.01).

Keywords:*Babycorn,Economics, Sulphur,Yield, Yield attributes,Zinc, Zaid.*

Comment [SN1]: The abstract lacks the context and objectives of the research, and the conclusion.

Comment [SN2]: Put in English and your language in brackets.

INTRODUCTION

Baby corn (*Zea mays* L.) being one of the most important dual purpose crop is grown widely round the year for its cob as well as green fodder in India. It has an edge over the other cultivated fodder crops due to its higher production potential, wider adaptability, fast growing nature and excellent fodder quality free from toxicants. Baby corn production has been directly integrated with dairying farms in different countries because only 13-20% of fresh ear weight is used as human food and the rest (silk, husk and green stalk) can be used as excellent feed materials for milch ruminants to improve their productivity.

It is dehusked young ear of the female inflorescence of maize plant, harvested at silk emergence before fertilization (**Pandey*et al.*,2000**;**Kapoor**, **2002**).Young cobs are handpicked when the silk length was about 2-4 cm.

Comment [SN3]: The introduction is too short, the context in the study area is missing, what results are observed with this type of fertilization? What remains to be studied? What is the gap in the area? The research objectives are also missing.

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One of the nutrients that is necessaryfor plant growth is Sulphur. equal to phosphorus, Sulphur is needed by plants in equal amounts. Sulphur plays specialized roles in the metabolism, enzymatic processes, and development of plants. Additionally, the synthesis of Sulphur-containing amino acids like cystine, cysteine, and methionine depends on Sulphur. Sulphur is also a component of coenzyme-A, S-glycosides (mustard oils), and vitamins (thiamine and biotin)(Text book of plant nutrient management by ISA-Indian Society of Agronomy)

Comment [SN4]: Cite articles. There are several.

Zinc has a keyrole as a structural constituent or regulatoryco-factor of a wide range of enzymes and proteins in many important biochemical pathways and these are mainly concerned with carbohydrate metabolism, both in photosynthesis and in the conversion of sugars to starch, protein metabolism, auxin metabolism, maintenance of integrity of biological membranes and resistance to some diseases infection **(Alloway, 2008)**.

MATERIALSANDMETHODS

Theexperimentwasconductedduring*Zaid*seasonof2023atCropResearchFarm,Department of Agronomy, SHUATS, Prayagraj (U.P). The soil of the field constituting a part of central gangetic alluvium is neutral and deep. The soil of the experimental field was sandy loam in texture, nearly neutral in soil reaction (pH - 7.6), organic carbon (0.870%), available N (219 kg/ha), available P(41.8 kg/ha) and available K (261.2 kg/ha). The treatment consists of T_1: Sulphur15kg/ha+Zinc10kg/ha,T_2:Sulphur15kg/ha+Zinc20kg/ha,T_3:Sulphur15kg/ha+ Zinc 30 kg/ha, T_4: Sulphur 30 kg/ha + Zinc 10 kg/ha, T_5: Sulphur 30 kg/ha + Zinc 20 kg/ha, T_6: Sulphur 30 kg/ha + Zinc 30 kg/ha, T_7: Sulphur 45 kg/ha + Zinc10 kg/ha, T_8: Sulphur 45 kg/ha + Zinc 20 kg/ha, T_9: Sulphur 45 kg/ha + Zinc 30 kg/ha, T_{10}: Control (RDF-N-P-K-60-60-40 kg/ha). The experiment was laid out in Randomized Block Design, with 10 treatments replicated thrice. The observations were recorded forNo. of corns per plant, Cob yield (t/ha). a) With husk b) Without husk, Green fodder yield (t/ha). Intercultural operations like thinning and weeding practices were done. Thinning practice was done at 10 DAS to promote better plant growth and spacing which it leads to higher yielding.

Comment [SN5]: The control was not applied zinc and sulphur?
Was this NPK fertilization also applied to all treatments? Describe.

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Effective weed management strategies were done frequently for not only reduce competition for resources but also minimize pest and disease incidence, further enhancing crop productivity. Additionally, precision application of fertilizer was done to meet the specific nutritional needs of crop.The collected data was subjected to statistical analysis by analysis of variancemethod (**Gomez*etal.* 1976**). Baby corn, variety (G-5414 Syngenta) were selected for sowing.Seeds are sowed of spacing (45 cm X 10 cm).

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RESULTSANDDISSCUSSION

Comment [SN6]: Describe the results better. There was no statistical difference, quote.

Comment [SN7]: Little discussion. Bringing work results. Present different results, with other cultures.

YIELDPARAMETER:

The number of cobs/plant (2.06) was recorded significantly high in (T_9) which is 45 kg/ ha Sulphur along with 30 kg/ha Zinc. However T_8 45 kg/ha Sulphur along with 20 kg/ha Zinc is statistically at par with T_9. In Baby corn crop Sulphur is crucial for protein synthesis, while zinc plays a vital role in the formation of auxins, essential for plant growth and development. By optimizing these micronutrients, we can potentially enhance cob formation, leading to higher yields per plant. **(McLaughlin M. J.*et al.* (2020).**

Maximum Corn yield with husk (10.06 t/ha) was recorded significantly high in Treatment 9 (Sulphur 45 kg/ha along with Zinc 30kg/ha). However, treatment T8 (45 kg/ha Sulphur along with 20 kg/ha Zinc) was found to be statistically at par with highest. the cob yield with husk retention in baby corn with Sulphur and zinclevels unveils an intriguing nexus. Sulphur fosters husk development, aiding in moisture retention and protecting cobs, while zinc enhances enzymatic processes crucial for husk strength and cob development.**(Smith and Johnson(2021)**

Treatment-9 (45Kg/ha Sulphur + 30 kg/ha Zinc) was recorded significantly maximum Corn

yield without husk (3.91t/ha) which was superior over all other treatments. However, treatment T8 was found to be statistically at par with highest.Increase in corn yield with fertilization might be due to the role of Sulphur and zinc play a vital roleinincreasingcorn yieldbecauseSulphurand zinctakesplaceinmanyphysiologicalprocess of plant such as chlorophyll formation, stomatal regulation, starch utilization which enhancecorn yield. The continuous filling of grains due to sufficient photosynthesis might have resulted in increased length and size of the corn. **Gnanasundari*et al.*, (2018).**

Significantly maximum Green Fodder (28.43 t/ha) was recorded in Treatment-9 (45Kg/ha Sulphur along with 30 kg/ha Zinc) which was superior over all other treatments. However, treatments T8 was found to be statistically at par with Treatment-9(45Kg/ha Sulphur + 30 kg/ha Zinc).Increase in a green fodder yield might be due to the enhanced translocation of Sulphur with applied Zinc, which resulted in a higher production of green fodder in a respective level of nutrient. Similar results of significantly higher fodder yield with Zn application wasalso reported by (**Mahdi *et al.*, 2012).**

ECONOMICS:

Embarking on the economics of baby corn it was observed that Sulphur 45 kg/ha along with Zinc 30 kg/ha in Treatment 9 has gained maximum Gross returns (143144.00 INR/ha), Net returns (95519.00 INR/ha) and highest Benefit cost ratio (2.01).In Baby corn production sulphur and zinc plays pivotal role. Sulphur enhances photosynthetic efficiency and nitrogen metabolism, while zinc promotes enzyme activity crucial for nutrient uptake and crop yield, collectively optimizing economic outcomes for growers. The interplay of sulphur and zinc reveals nuanced impacts on gross returns, net returns, and benefit-cost ratio, illuminating strategies for optimizing profitability while maintaining sustainability. (**Ram *et al.* 2021**)

Comment [SN8]: Changed the font size. Check the journal's guidelines.

Comment [SN9]: put the quote.

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Table1.EffectofSulphurandZinconyieldattributesonBaby corn.

S.no	Treatments	Number of cobs /plant	Cobyield with husk (t/ha)	Cobyield without husk(t/ha)	Greenfodder yield (t/ha)
1	Sulphur15kg/ha+Zinc10kg/ha	1.20	7.42	2.16	21.10
2	Sulphur15kg/ha+Zinc20kg/ha	1.33	7.66	2.42	21.85
3	Sulphur15kg/ha+Zinc30kg/ha	1.40	8.05	2.55	22.83
4	Sulphur30kg/ha+Zinc10kg/ha	1.50	8.23	2.73	24.15
5	Sulphur30kg/ha+Zinc20kg/ha	1.50	8.24	2.74	24.22
6	Sulphur30kg/ha+Zinc30kg/ha	1.56	8.24	2.78	25.12
7	Sulphur45kg/ha+Zinc10kg/ha	1.83	9.55	3.34	26.64
8	Sulphur45kg/ha+Zinc20kg/ha	2.03	9.79	3.52	27.90
9	Sulphur45kg/ha+Zinc30kg/ha	2.06	10.06	3.91	28.43
10	Control:(60-60-40N-P-Kkg/ha)	1.46	8.12	2.62	23.54
	SEm(±)	0.11	0.370	0.420	1.40
	CD(p=0.05)	0.32	1.10	0.360	3.19

Comment [SN10]: Place the table next to the description of the results.

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Table2.EffectofSulphurandZinconeconomicsonBaby corn.

S.no	Treatments	Costofcultivation (INR/ha)	Grossreturns (INR/ha)	Netreturns (INR/ha)	B:CRatio
1	Sulphur15kg/ha+Zinc10kg/ha	43,143.00	1,04,048.00	70,862.00	1.64
2	Sulphur15kg/ha+Zinc20kg/ha	47,436.00	1,25,903.00	78,467.00	1.65
3	Sulphur15kg/ha+Zinc30kg/ha	47,502.00	1,27,423.00	79,921.00	1.68
4	Sulphur30kg/ha+Zinc10kg/ha	43,238.00	1,17,430.00	74,192.00	1.72
5	Sulphur30kg/ha+Zinc20kg/ha	47,495.00	1,30,081.00	82,586.00	1.74
6	Sulphur30kg/ha+Zinc30kg/ha	43,057.00	1,20,501.00	77,444.00	1.80
7	Sulphur45kg/ha+Zinc10kg/ha	47,530.00	1,37,946.00	90,415.00	1.90
8	Sulphur45kg/ha+Zinc20kg/ha	47,596.00	1,40,926.00	93,330.00	1.96
9	Sulphur45kg/ha+Zinc30kg/ha	47,625.00	1,43,144.00	95,519.00	2.01
10	Control:(60-60-40N-P-Kkg/ha)	47,400.00	1,21,957.00	74,556.00	1.57

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CONCLUSION

From the results, it can be concluded that better production and economic returns in baby cornwererecordedwiththeapplicationofSulphur45kg/ha along withZinc30kg/ha~~intreatment9~~.

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Comment [SN11]: References are few and far between. The references should be updated.

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