

## Effect of Zinc Enriched Soil on Yield of Fodder Sorghum and Growth Performance in Post-Weaning Growing Kid

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**ABSTRACT:** An on farm trial was conducted to study the growth performance of post weaning kids fed with zinc enriched fodder. The experiment was conducted in Peramandampalayam village of Mohanur block at Namakkal district and 10 locations considered as replications of experiment group. Soil and water samples were analysed. The experimental groups are T<sub>1</sub>: Farmers practice (FP) @ 15t/h and urea 50 kg/ha and T<sub>2</sub>: T<sub>1</sub>+ Zinc sulphate @ 20 kg/ha. After sowing fodder sorghum (COFS 29) samples were collected for analysis of zinc. The application of zinc sulphate in soil non significantly increased concentration of zinc, yield and dry matter yield of fodder sorghum compared to farmers practice. Zinc enriched fodder sorghum did not significantly increased total dry matter intake and average daily gain of post weaning growing kid over farmers practice. Feeding of zinc enriched fodder sorghum slightly increased net return and B:C ratio as compared to farmers practice. The conclusion of the study was feeding of zinc enriched fodder sorghum slightly improved growth performance in post weaning growing kid.

**Keywords:** Zinc, Fodder, Soil, Average daily gain, Net return, Kid.

### INTRODUCTION

Livestock sector contribution has increased in total agriculture and allied sector of GVA (Gross Value Added) from 24.32 % (2014-15) to 28.63 % (2018-2019). Livestock sector contributed 4.19 percent of total GVA in 2018-19 (National Accounts Statistics, 2020). The demand for green and dry fodder will reach to 1012 and 631 million tonnes respectively by the year 2050. The deficit of green and dry fodder will be 18.4 % and 13.2 % respectively in the year 2050. To meet out the deficit, green forage supply need to grow at 1.69% annually (IGFRI Vision, 2050).

Micronutrients is important for plant growth and among the micronutrients, zinc is one of the most essential minerals for soil and plant health. Application of zinc fertilizer is needed for higher crop yield and better crop quality. Biofortification of soil with zinc fertilizers enhance zinc content in plants (Alloway, 2008). Foliar application of zinc sulphate improve productivity of crop (Sharma and Singh 2018). Zinc is a very important for growth, reproduction and immune response in ruminants (Underwood and Suttle 1999).

Some of the studies (Gowda *et al.*, 2000; Yadav and Khirwar 2005) stated that a close relationship between soil zinc content, plants and animals. One health concept summarizes that animal health, human health and environmental health are intrinsically intertwined

and interdependent. The health of one affects health of all. In India, indiscriminate use of nitrogen fertilizer along with zinc deficiency decrease the growth of fodder. As per the report of All India Coordinated Research Project (AICRP) about 40% of soil samples collected across India are deficient in available Zn (Shukla *et al.*, 2016) results in livestock are concurrently reported (Rakesh *et al.*, 2017) zinc deficiency. Hence, the objective of this study was to enrichment of zinc in fodder sorghum through soil and to study the effect of zinc enriched fodder on growth performance in post weaning growing goat.

### MATERIALS AND METHODS

The experiment was conducted in 10 locations of Peramandampalayam village of Mohanur block at Namakkal district and 10 locations considered as replications of experiment group. The soil and water samples were taken from respective locations, analyzed the results was presented in Table 1. The two treatment groups were T<sub>1</sub>: Farmers practice (FP) was farm yard manure @ 15t/h and urea 50 kg/ha and T<sub>2</sub>: T<sub>1</sub> + Zinc sulphate @ 20 kg/ha. The 50 kg of nitrogen was split in two doses and applied as top dressing. Zinc sulphate was mixed with farmyard manure applied at the time of sowing. Fodder sorghum (COFS 29) was sown in the field on October in 2020. Fodder sorghum (COFS 29)

was harvested at 60 days after sowing. Harvested fodder was weighed, chaffed, shade dried and stover was fed to the goat as per the treatment groups for 60 days. All post weaning growing kids were maintained

in uniform conditions with well ventilated housing. All growing kids were dewormed before start of experiment. All growing kids were weighed monthly by using weighing balance.

**Table 1: Physico-chemical analysis of soil and water before start of experiment.**

Water		Soil	
pH	7.56	Soil colour	Red
EC (dS m <sup>-1</sup> )	0.92	Soil texture	Sandy loam
TDS (ppm)	588.86	Lime status	Slightly calcareous
Calcium (meq l <sup>-1</sup> )	4.12	Soil pH	7.89
Magnesium (meq l <sup>-1</sup> )	2.74	EC (dS m <sup>-1</sup> )	0.16
Sodium (meq l <sup>-1</sup> )	2.12	Organic carbon (%)	0.59
Potassium (meq l <sup>-1</sup> )	0.23	Available Nitrogen (kg ha <sup>-1</sup> )	260.86
Carbonate (meq l <sup>-1</sup> )	0.54	Available Phosphorus (kg ha <sup>-1</sup> )	17.96
Bicarbonate (meq l <sup>-1</sup> )	2.48	Available Potassium (kg ha <sup>-1</sup> )	339.43
Chloride (meq l <sup>-1</sup> )	5.51	Available Sulphur (mg kg <sup>-1</sup> )	20.88
Sulphate (meq l <sup>-1</sup> )	0.67	Available Zinc (mg kg <sup>-1</sup> )	1.05
		Available Boron (mg kg <sup>-1</sup> )	0.38

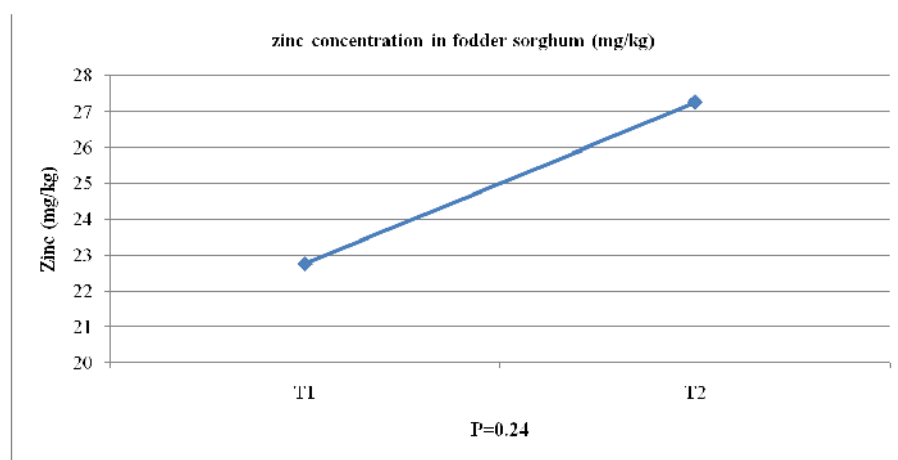
## RESULTS AND DISCUSSION

Zinc enriched soil not significantly enhanced green fodder sorghum yield and dry matter yield of fodder sorghum compared to farmers practice (Table 2). In contrast to results of the present study Verma *et al.* (2005) reported that zinc enriched soil significantly increased fodder yield and dry matter content of fodder sorghum. Giridhar *et al.* (2021) stated that zinc enriched soil increased dry matter yield of fodder sorghum.

The application of zinc sulphate in soil increased concentration of zinc in the fodder sorghum but, not significantly compared to farmers practice (Fig. 1). The zinc content was higher in zinc enriched fodder sorghum (27.25 mg/kg) compared to farmers practice without zinc fortification (22.75 mg/kg). However, Giridhar *et al.* (2021) observed zinc enriched soil significantly increased zinc concentration in fodder sorghum.

**Table 2: Effect of zinc enriched soil on yield of fodder sorghum.**

Treatments	Green fodder (t/ha)	Dry matter content of green fodder (t/ha)
T <sub>1</sub>	119.86	37.15
T <sub>2</sub>	124.54	39.85
P - Value	0.16	0.08



**Fig. 1.** Effect of soil fortification with zinc sulphate on zinc content in fodder.

Zinc enriched fodder sorghum did not significantly increased average daily concentrate intake, average daily green fodder intake and total dry matter intake of growing kid over farmers practice (Table 3). Similarly, Giridhar *et al.* (2021) reported that feeding of zinc

enriched fodder not influenced dry matter intake of sheep. At the start of feeding experiment, the initial body weight of T1 and T2 groups were 8.5 kg and 8.4 kg respectively (Table 4). At the end of experiment, body weight (kg) and average daily gain (kg) of zinc

enriched fodder sorghum fed group was slightly increased, but not significantly over farmers practice. In contrast, Giridhar *et al.* (2021) stated that zinc enriched fodder sorghum significantly increased final body weight and (kg) and average daily gain (kg) over control. The dietary supplementation of zinc methionine improved growth performance in goat (Wenbin *et al.*, 2009).

Feeding of zinc enriched fodder sorghum increased net return and B:C ratio as compared to farmers practice (Table 5). The reason for slight increase net return might be due to high yield of fodder sorghum and increased final body weight of post weaning growing kid.

**Table 3: Average daily feed intake (g/day/animal) in growing kid during feeding trial.**

Treatments	Average daily Concentrate intake	Average daily sorghum stover intake	Total dry matter intake	DM intake (% of Body weight)
T <sub>1</sub>	81.35	275.32	356.67	2.60
T <sub>2</sub>	86.21	282.21	368.42	2.61
value	0.15	0.14	0.08	0.93

**Table 4: Growth performance in goat.**

Treatments	Initial body weight at 4 <sup>th</sup> months of age (kg)	Final body weight at 6 <sup>th</sup> months of age (kg)	Average daily gain (kg)
T <sub>1</sub>	8.52	13.68	0.084
T <sub>2</sub>	8.41	13.86	0.090
P Value	0.15	0.40	0.38

**Table 5: Effect of zinc application on Net Return and B:C ratio kid fed with zinc enriched sorghum fodder.**

Treatments	Cost of production (Rs.)	Net Return (Rs.)	B:C ratio
T <sub>1</sub>	3700.80	4788.00	1.29
T <sub>2</sub>	3384.49	4851.00	1.43

## CONCLUSION

The results of the present study demonstrated that, soil application of zinc sulphate is one of the way to increase zinc content in sorghum fodder. Feeding of zinc enriched fodder sorghum slightly improved growth performance in post weaning growing kid. In future, Effect of foliar application of zinc on fodder yield and growth performance of animal may be evaluated.

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**Conflict of Interest.** None.

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