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INFLUENCE OF ZINC SOURCES OF THE YIELD COMPONENTS, DRY MATTER PRODUCTION AND YIELD OF RICE (VAR. IR 60)

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Studies on the influence of zinc sources indicated that combined application of zincated suphala and zincated urea and zincated urea alone gave highest value in the case of number of panicles/m², 1000 grain weight, dry matter production and yield. Panicle length, number of filled grains/panicle, harvest index was not influenced by zinc sources.

Zinc application seems to influence in yield and yield components significantly. Chatterjee and Mandal (1985) reported that dry matter production of rice plants increased significantly with application of zinc fertilizers. Gill and Hardeep (1978) noted that application of zinc sulphate at 20 kg/ha increased the productive tillers, panicle lengths and number of grains per panicle in rice. Patel (1979) observed that application of 0-2 kg $ZnSO_4$/ha iecreased 1000 grain weight number of effective tillers per plant, fertile spikelets per panicle and panicle lengths. Srinivasan (1984) reported that plant height, dry weight of shoot and root increased with zinc application. Sharma and Singh (1985) showed that number of productive tillers/hill, 1000 grain weight increased with zinc application. Uddin *et al.* (1981) found that with increase in the levels of $ZnSO_4$ application, number of effective tillers, plant height panicle lenght, number of grains per panicle and 1000 grain weight was increased.

Sarkar *et al.* (1980) observed that incorporation of zincated urea at its rate of 5 kg Zn/ha produced higher yield than surface application, root dipping and nursery application. Sakal *et al.* (1981) found that irrespective of the soil, grain and straw yield increased significantly by zinc supply.

The common source of zinc application to crop is zinc sulphate. But its applicability on large scale has not been well documented. Hence the present investigation was carried out to find out the efficiency of new zinc sources in zinc deficient soil on yield components, yield and harvest index.

MATERIALS AND METHODS

A field experiment was conducted in clayey loam soil (Typic Haplustalf) of pH 8.5, EC of 0 5 mmhos/cm with available zinc 1.1 ppm, available N of 191 kg/ha available P_2O_5 of 12 kg/ha and available K of 490 kg/na. There were eight treatments as shown below, replicated four times in a randomized block design.

Treatments

T_1 – Absolute control
T_2 – Zinc sulphate only
T_3 – NPK only
T_4 – NPK + $ZnSO_4$ (25 kg/ha)
T_5 – Zinc blended urea (completely basal)

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Table 1 Effect of zinc sources on yield components, dry matter productions, grain, straw yield and zinc uptake of paddy (Var. IR. 60)

S. No.	Treatments	No: of panicles per m²	Panicle length (cm)	No. of filled grains/ panicle	1000 grain weight (gm)	Zinc uptake (g/ha)	Dry matter production t/ha		yield t/ha	
							T.S.	P.I.	Grain	Straw
1.	Absolute control	297	16.3	52.3	16.7	61.17	0.70	2.74	2.57	3.43
2.	Zinc sulphate only	323	16.4	60.5	17.8	100.06	0.69	2.79	2.91	4.07
3.	NPK only	431	16.9	64.1	20.3	174.88	0.85	3.32	4.19	5.51
4.	NPK+$ZnSO_4$	480	17.3	77.5	21.5	260.17	0.90	3.34	4.63	5.78
5.	Zincated urea (Completely basal)	535	17.9	79.7	21.8	298.32	0.99	3.78	5.08	6.60
6.	Zincated urea (Splits)	511	17.6	79.9	21.6	293.62	0.99	3.71	5.01	6.60
7.	Zincated suphala+ordinary urea	490	17.9	78.5	21.6	256.27	0.96	3.57	4.69	5.97
8.	Zincated suphala +Zincated urea	532	17.9	78.5	21.7	299.13	0.99	3.86	5.24	6.75
	C.D (0 05)	31	0.5	5.1	1.2	28.11	0.65	0.33	0.16	0.27

T.S - Tillering Stage P.I. - Panicle Initiation.

T_6 – Zinc blended urea (splits) (1/2 as basal+1/4 at tillering and 1/4 at panicle initiation)

T_7 – Zinc blended suphala + Top dressing with ordinary urea.

T_8 – Zinc blended suphala + Top dressing with zincated urea

100: 50: 50 kg N, P_2O_5, K_2O/ha was recommended dose and entire P_2O_5 and K_2O was applied basally and 50 kg N/ha was applied basally and rest in two splits. Three new zinc sources were tried. $ZnSO_4$, zincated urea and zincated suphala. The observation viz., number of panicles/m², panicle length, number of filled grains/ panicle, 1000 grain weight, yield were recorded.

RESULTS AND DISCUSSION

Yield components (Table 1)

No. of panicles/m² : Application of zinc irrespective of zinc sources increased number of panicles/m². This is due to enhanced activity of the metalloenzymes like protinases and peptidases. Combined application of zincated suphala and zincated urea and zincated urea alone produced significantly higher number of panicles per m² compared to other sources. Similar view was made by Elangovan (1986). The significantly positive correlataiion between soil available zine and panicle/m^2 ($r=0.873^{**}$) confirmed the influence of zinc on number of pahicles/m^2.

Panicles length: Zinc application increased the panicle length. Among the sources, zincated urea (basal), zincated suphala and combined application of zincated and zincated suphala were on par but signicantly superior to zinc sulphate application. Similar result were obtained by Gill and Hardeep (1978).

Number of filled grains/panicles: Zinc application increased the number of filled grains per panicle compared to no zinc application. But among the zinc sources, there was no marked variation. Results reported by Altaf Hussain *et al.* (1987) confirmed the above findings.

1000 grain weight: Zinc sulphate and zincated suphala did not have any influence on the thousand grain weight but zincated urea either as basal (T_5) or splits (T_6) and zincated suphala and zincated urea were on par and were superior to no zinc plots. Srinivasan (1981) and Sharma and Singh (1985) reported the increased grain was due to zinc application. The significant positive correlation between soil zinc and 1000 grain weight ($r=0.755^{**}$) confirmed the above result.

Dry matter production

The effect of zinc sulphate on dry matter production was not seen at the tillering. panicle initiation stage though it was seen in the final yield. In the first two stages though the other zinc sources viz., zincated urea and zincated suphala in different combination were on par, these were significantly superior to NPK alone plots. At harvest, the grain yield from the zincated suphala plus zincated urea plots recorded the highest and was on par with zincated urea (basal) but significantly superior to zinc blended urea in splits and zinc sulphate plots. Accelerated physiological activities might be the probable reasons for increasing yield. Similar view was expressed by Katyal and Agarwala (1982).

Grain and straw yield

Application of zinc had significantly increased the grain yield over the zinc application. Panda and Nayak (1974) reported that zinc perhaps influenced the uptake of plant nutrients by rice through enzymatic effect in the metabolic process which ultimately accounted for the higher grain yield. The increase in grain yield could also be due to the increased level of available zinc at all stages crop growth. Among the zinc sources, combined application of zincated suphala and zincated urea recorded the highest grain yield (5.24 t/ha). The percentage increase in grain yield due to zinc application over NPK alone plots ranged from 10.5 to 25.3. The straw yield ranged from 3.43 t/ha and 6.75 t/ha. Zinc sulphate application at 25 kg/ha alone increased signifcantly the straw yield over absolute control by 18.7 per cent. Zincated urea was significantly better than zincated suphala.

When zincated urea was applied along with zincated suphala (T_8), it gave the highest yield of 6.75 t/ha which was 22.5 per cent more than NPK alone plots. The positive significant correlation between zinc uptake at harvest and straw yield ($r = 0.929^{**}$) soil available zinc and straw yield ($r = 0.791^{**}$) and total zinc uptake and straw yield ($r = 0.888^{**}$) confirmed the strong and significant influence of zinc on the straw yield Similar results were obtained by Takkar and Tarjit (1978).

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