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EFFECT OF ZINC ON RICE IN KUTTANAD (KERALA)

During recent years, there were several reports of reddish-brown pigmentation on the leaves of high yielding varieties of rice cultivated in Kerala. Similar pigmentation was widely noticed in Jaya crop in Kuttanad during 1972-73 and 1973-74. The symptoms were often exhibited on the middle leaves and confined more on the sheath and base of the leaves. They resembled to zinc deficiency symptoms as described by Agarwala and Sharma (1970). In observational trials, the pigmented rice plants collected from several fields were found to respond to application of zinc sulphate in pot cultures. Studies were hence undertaken, and the results are presented in this paper.

A field experiment with following six treatments was conducted in a randomised block design with five replications at Rice Research Sub Station, Moncompu during 1973-74. 1) Control 2) Seedling dip in 1% zinc sulphate solution. (3) Seedling dip in 2% zinc sulphate solution. (4) Basal application of zinc sulphate at 20 Kg/ha. (5) Basal application of zinc sulphate at 40 Kg/ha. (6, Foliar spray with 1% zinc sulphate solution.

The plot size was 20 sq. meters and variety used for the trial was Jaya. The crop received fertilizer dose at 90:45:45 Kg. NPK per hectare. Plant protection operations were given uniformly avoiding zinc based chemicals. Foliar spray with 100 litres of solution was given two weeks after transplanting.

Observations on number of plants showing reddish-brown pigmentation on the leaves were taken at 30 and 60 days after transplanting (30 and 60 DAT). The yields of grain and straw were recorded and statistically analysed. Data are presented in Table 1.

At 30 DAT, maximum number of pigmented plants was noted in the control plot while minimum was observed in treatment 6 followed by treatments 2 and 5. The number of pigmented plants was negligible at 60 DAT in all treatments. But all treatments receiving zinc except treatment 5 recorded increased grain yield. The increase was 8 to 10% over treatment No. 1. There was no significant difference between methods of application. Basal application of zinc sulphate at 40 Kg/ha. (Treatment 5) recorded a lower yield than that of control.

In a micronutrient trial conducted in 1974-75 also, the same trend was observed in treatments with zinc sulphate. While zinc sulphate at 15 Kg./ha. recorded an yield of 36.5 Kg., the treatment at 30 Kg./ha. recorded a lower yield of 34.0 Kg. per plot confirming the previous results.

Table 1

**Date on observations of pigmented plants and grain yield
(Gross Plot - 20 sq. m. net plot - 15.12 sq. m.)**

Treatment	Treatment details	Average number of pigmented plants		Grain yield	
		At 30 DAT	At 60 DAT	Kg./plot	Kg./ha.
1.	Control	15.2	1.6	9.286	5862
2.	Root dip 1 solution	7.0	Z 1	9.954	6075
3.	Root dip 2% solution	11.4	2.0	10.092	6371
4.	Basal application at 20 kg./ha.	11.8	Z 1	10.084	6366
5.	Basal application at 40 kg./ha.	" -	1	9.750	5726
6.	"foliar spray 1% sol.	5.6	1.2	9.944	6040

F. Test: Highly Significant
C. D. 656.88/gm./plot
Rank. 3426 15

The results indicate that while zinc sulphate in moderate doses increased the yield of rice, it reduced the yield at higher doses. It shows that zinc limits the yield both when it is deficient as well it is in excess. Rice is cultivated in Kuttanad, after a flood-fallowing on soils which are inherently acidic and rich in organic matter. Zinc deficiency can occur from continuous submergence of soils (Anon- 1972). Whatever be the original pH flooded soils reach and maintain an equilibrium pH value between 6.5 and 7.0 within approximately three weeks after flooding (Sanchez, 1972). Under flooded conditions, availability of phosphates is increased. Zinc becomes unavailable even in acid soils due to interaction with phosphates. Organic matter also inactivates zinc in the soil (Anon. - 1972). The response to zinc in Kuttanad soils can be attributed to the beneficial effect gained when nonavailability is compensated by application of zinc in moderate doses. The fact that there is no significant difference between methods of application, also supports the above assumption.

Yield was reduced when zinc sulphate was applied at 30 and 40 Kg./ha. The plot receiving zinc sulphate at 40 Kg./ha. had the minimum number of pigmented plants. Higher dose of zinc sulphate reduced the incidence of pigmented plants but did not increase the yield. This phenomenon may be due to depressing effect of the chemical at higher doses. Micronutrients become harmful to plant growth if applied in large quantities (Yawalkar & Agarwal, 1962). The reduction of grain yield in excess quantities of zinc sulphate is therefore consequential.

Zinc sulphate, in moderate doses was found to reduce reddish brown pigmentation on the leaves and increase the yield of rice in Kuttanad. The increase in yield due to zinc sulphate alone was over 8% when applied in moderate doses by root dip or soil application or foliar spray. For soil application, zinc sulphate at 20 Kg/ha. was found to be the safe dose.

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സംഗ്രഹം

കേരളത്തിൽ പൊതുവെയും കട്ടനാട്ടിൽ പ്രത്യേകിച്ചും അധികേൽപാദനശേഷിയുള്ള നെല്ലിനങ്ങളിൽ "ഓലമഞ്ഞളിപ്പരോഗം" (ഇലയുടെ കടലാഗത്തും പോളയിലും ഓറഞ്ചുകലർന്ന ചുവപ്പുനിറം) വ്യാപകമായി കണ്ടു വരുന്നു. രോഗലക്ഷണങ്ങൾ നാകത്തിന്റെ അഭാവമായി തോന്നിയതിനാൽ, തത്സംബന്ധമായ പഠനങ്ങൾ നടത്തുകയും നെല്ല്യഗവേഷണ ഉപകേന്ദ്രത്തിൽ 1973-74, 1974-75 എന്നീ വർഷങ്ങളിൽ നടത്തുകയുണ്ടായി.

"സീക് സൽഫേറ്റ്" ഒന്നും രണ്ടും ശതമാനം വീര്യമുള്ള ലായനിയിൽ ഞാറ മുക്കി നട്ടും, ഫെക്വിന് 20 കിലോഗ്രാം, 30 കിലോഗ്രാം, 40 കിലോഗ്രാം എന്നീ തോതുകളിൽ മണ്ണിൽ ചേർത്തും, ഒരു ശതമാനം വീര്യമുള്ള ലായനി പത്രപോഷണമായി നൽകിയും ഒട്ടും ചേർക്കാതെയും പരീക്ഷണങ്ങൾ നടത്തി.

ഏതു രീതിയിലായാലും, മിതമായ തോതിൽ നാകം നൽകിയാൽ "മഞ്ഞളിപ്പ്" കറുപ്പുകയും വിളവു 8-9% കണ്ടു വർദ്ധിക്കുകയും ചെയ്യുമെന്നു തെളിഞ്ഞു. എന്നാൽ ഫെക്വിന് 30 കിലോഗ്രാം തോതിലും, 40 കിലോഗ്രാം തോതിലും "സീക് സൽഫേറ്റ്" ചേർന്നപ്പോൾ മഞ്ഞളിപ്പു കാണാതെകിലും, വിളവു കറുപ്പുകയാണുണ്ടായത്. 'സീക് സൽഫേറ്റ്' ഫെക്വിന് 20 കിലോഗ്രാം വരെ സുരക്ഷിതമായി മണ്ണിൽ ചേർക്കാവുന്നതാണെന്നും കാണുകയുണ്ടായി.

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