

Optimization of Secondary Nutrients Using Site Specific Nutrient Management for Yield Maximization in *Inceptisols* of Bemetara District of Chhattisgarh

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ABSTRACT

This study was initiated to Optimization of secondary nutrients using Site Specific Nutrient Management for yield maximization in Inceptisols of Bemetara district of Chhattisgarh. Total 11 treatments were tested with rice (MTU-1010) as a test crop, laid out in CRD with three replications. Site Specific Nutrient management is based on the principle that when the supply of a particular nutrient is inadequate in relation to other nutrients, the whole supply of that nutrient will be taken up by the crop. Highest Ca, Mg and S uptake in Inceptisol were recorded in the treatment receiving all nutrients as 296, 170 and 85 mg/pot, respectively and statistically at par with those of other treatments except N, P and S omitted treatments. S nutrients in Inceptisols should be applied as per the recommended dose (45 kg/ha) for optimum crop production of the target district under study.

Key words: SSNM, Inceptisols, Optimization, MTU-1010

INTRODUCTION

Site-specific nutrient management (SSNM) is a widely used term in all parts of the world, generally with reference to addressing nutrient deficiencies which exist within fields, and making adjustments in nutrient application to match these location or soil differences. In the soil test based SSNM approach, the fertiliser rates were established based on the concept of crop removal adjusting the soil residual nutrients. In this approach, both the macro and secondary nutrients were applied at rates that are required to meet the crop yield removal.

A pot culture study was undertaken in the green house of the Department of Soil Science and Agricultural Chemistry, College of Agriculture, IGKV, Raipur during kharif season 2015 to study Optimization of secondary nutrients using Site Specific Nutrient Management for yield maximization in Inceptisols of Bemetara District of Chhattisgarh. Total 11 treatments were formulated with application of nutrients (N, P, K, S, Fe, Mn, Cu, B, S and Mo) in optimum level and sequentially each nutrient was omitted from all nutrients applied (SSNM).

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The processed and uniformed soil samples were filled in cemented pots @ 10 kg and nutrients as specified above were applied through different sources taking care to avoid any precipitation during solution mixing and application. The optimum doses of nutrients were fixed in kg/ha as N -150, P₂O₅ - 44, K₂O - 66, S - 45, Fe - 20, Mn - 15, Cu - 7.5, Zn -7.5, B - 3 and Mo - 0.75 for SSNM dose the mean total Ca, Mg,S uptake by rice in *Inceptisol* was significantly affected with application of different treatments. Omission of N, P and S treatments caused significant reductions in the uptake of Ca, Mg, S in comparison to the treatment receiving all the nutrients.

Omission of N and P reduced the uptakes more than that of omission of other nutrients indicating that these two nutrients were the most limiting nutrients. Lower Ca uptakes were observed with N and P omission obviously due to lower grain and straw yields and lower Ca concentrations. Uptakes of Ca in N, P and S omitted pots were in the order of N < P < S in accordance with the grain and straw yields and Ca concentrations in the respective pots.

Total Mg uptakes by rice in both the soils were found more in the treatments which received all the nutrients (All), whereas the omission of N, P and S reduced the uptakes of Mg by rice. Highest uptakes of Mg were observed in the treatments receiving all the

nutrients because supply of all the nutrients including Mg in “All” treatments increased the grain and straw yields as well as the Mg concentrations causing more uptake of Mg. Lower Mg uptakes were observed with

N and P omission since these two elements were the most limiting. Uptakes of Mg in N, P and S were in the order of N < P < S in accordance with the grain and straw yields and Mg concentrations in the respective pots.

Total S uptakes were found more in the treatments which received all the nutrients (All), whereas the omission of N, P and S reduced the uptakes of S by rice. Increase of S concentrations in plant with application of S supplied in the “All” treatment as well as with nutrient omitted for K, Ca/Fe, Mg/Mn, Zn, Cu, B, Mo and higher grain and straw yields caused more uptake of S^{4,3}.

S uptakes in N and P omitted pots were lower than that of other nutrient omission treatments indicating that these were the most limiting nutrients. The uptakes of S in N, P and S omitted pots were in the order of N < P < S which were related to grain and straw yields and their respective S concentrations.

The initial status of Ca and Mg in *Inceptisols* were more than sufficient while the initial status of available S was marginal . S nutrients in *Inceptisols* should be applied as per the recommended dose (45 kg/ha)for optimum crop production of the target district under study.

Total uptake of Ca, Mg and S (mg/pot) in rice in relation to different treatments in *Inceptisol*

S.No.	Treatments	Ca	Mg	S
1	All	296 a	170 a	85 a
2	All – N	193 c	113 c	47 d
3	All – P	233 b	131 c	60 c
4	All – K	280 a	154 ab	72 abc
5	All – S	238 b	133 bc	64 bc
6	All – Ca	285 a	160 a	78 a
7	All – Mg	282 a	153 ab	75 ab
8	All – Cu	284 a	156 a	77 ab
9	All – Zn	288 a	159 a	77 a
10	All – B	312 a	171 a	85 a
11	All – Mo	283 a	161 a	79 a
C.D. at 5%		40	22	12

The values in a column with a common letter are not significantly different

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