Research Notes

Critical levels of soil available N, P and K for aggregatum onion as influenced by yield targeting under integrated plant nutrition system in inceptisols

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The soil test calibration for fertilizer prescription based on the concept of yield targeting provides a means for the computation of critical soil test values. These values are the soil test levels above which, there would be no requirement of fertilizer application for indicated levels of crop yield. The present study was therefore undertaken during 1998-99 on inceptisols at farmer's holding, Vadavalli, Coimbatore to formulate the fertilizer prescription and to fix the critical levels of macronutrients by yield targeting under Integrated Plant Nutrition System (IPNS).

The experimental soil was red, sandy clay loam (*Typic Ustropept*), neutral pH (7.5), non-saline (EC 0.15 dSm^{-1}) and non-calcareous. The initial $KMNO_4$-N, Olsen-P and NH_4OAc-K status were 194, 13.4 and 211 kg ha^{-1} respectively. There were 24 treatments involving N as urea at 5 levels (0,30,60,90 and 120 kg ha^{-1}), P as single superphosphate at 4 levels (0,30,60 and 90 kg P_2O_5 ha^{-1}), K as muriate of potash at 3 levels (0,30 and 60 kg K_2O ha^{-1}), FYM at 2 levels (0 and 25 t ha^{-1}) and *Azospirillum* biofertilizer at 2 levels (0 and 2 kg ha^{-1}). These 24 treatments were randomized within each fertility strip and a total of 96 plots were formed for four fertility strips adopting fractional factorial design. After the creation of fertility gradients, these treatments were randomly superimposed over the fertility strips and onion crop was grown during *kharif* 1998. The initial and post-harvest soil samples were analysed for $KMNO_4$-N, Olsen-P and NH_4OAc-K status.

In the present study, inductive cum targeted yield model was employed (Ramamoorthy *et al.* 1967) and fertilizer prescription equations were formulated for onion. Using these equations, fertilizer doses for varying soil test values (nomograms) were worked out. The critical levels were fixed at soil test values about which there was no requirement of fertilizer application (Randhawa and Velayutham, 1982). The critical levels of soil available N,P and K for aggregatum onion are furnished in Table 1. The critical soil test values for all the macronutrients were low under IPNS treatments (NPK+FYM, NPK+ *Azospirillum* and NPK+FYM+Azospirillum) as compared to NPK alone. This in turn resulted in saving of NPK fertilizers. Irrespective of treatments, higher yield targeting resulted in higher critical levels of nutrients in the soil.

Thus, the results led to conclude that IPNS resulted in low critical soil test values

Table 1. Critical levels of soil test values for aggregatum onion as influenced by yield targeting under IPNS (kg ha^{-1})

S.No.	Treatments	17 t ha^{-1} fresh bulb yield			20 t ha^{-1} fresh bulb yield		
		N	P	K	N	P	K
1.	NPK alone	450	69	456	530	82	536
2.	NPK + FYM	353	59	347	433	71	427
3.	NPK + Azospirillum	418	69	347	390	70	427
4.	NPK + FYM + Azospirillum	310	58	347	390	70	427

over NPK alone and high yield targets recorded higher critical levels. The reduction of fertilizer N, P_2O_5 and K_2O requirements under IPNS was of higher magnitude which in turn would have led to attaining the critical levels well in advance as compared to that of NPK alone.

References

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Research Notes

Impact of treated paper mill effluent irrigation on quality of soil and ground water

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The paper and pulp industry is classified as a highly water intensive one and it also forms a major polluter of soil and water resources. In order to utilize the enormous quantity of treated effluent, the bagasse based paper mill has established an Treated Effluent Water Lift Irrigation Society (TEWLIS) and has continously used the treated effluent water in the erstwhile drylands of rainfed regions in Pugalur taluk of Karur district, Tamil Nadu for agriculture since 1994. The treated paper mill effluent contains nutrients that enhance the plant growth but also has other toxic materials too.

A systematic study was conducted during 1996 and 1997 to assess the impact of continuous effluent irrigation on soil and ground water in TEWLIS area. The soil and ground water samples were collected periodically once in three months, at 17 bench marked sites, selected randomly within the ayacut area irrigated with treated paper mill effluent since 1994. Three sites were selected in Cauvery water irrigated areas, which were taken as control. Water samples collected from the wells were kept in freezer at 4°C to avoid microbial activity whereas the soil samples were dried in shade and processed for chemical analysis as per standard procedure (Jackson, 1973).

The analytical data on various chemical parameters on soil and ground water as influenced by the paper mill effluent and cauvery water (control) irrigation, over four year period is presented in Table 1. It is evident that continuous irrigation with treated paper mill effluent had increased the soil pH, electrical conductivity (EC), organic carbon (OC), available NPK, exchangeable sodium percentage (ESP), exchangeable Na, Ca, K except Mg which was higher in cauvery river water irrigated soils. The soil EC and ESP were increased by 94 and 127 per cent due to effluent irrigation over control. The increase of soluble salt content in soil under effluent irrigation could be ascribed to the salt content of the treated effluent. An increasing trend on soil EC, OC and available NPK and exchangeable cations and ESP due to continous paper mill effluent irrigation over a period of 15 years has been reported by Palaniswami and Sree Ramulu (1994). The bacteria, fungi and actinomycetes populations of the soil were also increased due to continuous effluent irrigation.

The ground waters within the effluent irrigated areas had less pH but high EC, total hardness, carbonates, bicarbonates, chlorides sulphates, sodium, calcium, magnesium, potassium