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Research Paper :

Soil test-based fertilizer requirement for specific yield targets of wheat in *Vertic ustocrepts*

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ABSTRACT

Based on field experiment conducted on a *Vertic ustocrepts* with wheat (GW 496) ,by dividing each of the four fertility strip into 12 subplots which received 9 selected combinations out of 5 levels of N (0, 60, 90, 120, 150 kg ha^{-1}) five levels of P_2O_5(0, 30, 60, 90,120 kg ha^{-1}) and four levels of K_2O (0, 30, 60, 90 kg ha^{-1}),with three control treatments, fertilizer prescription equations were calculated .The results of field verifications trials, conducted at different locations showed that yield targets were achieved below ± 10 per cent variation, but adjusted fertilizer prescription equations were fitted only at yields targets of 50 and 55 qha^{-1} grain yield of wheat. The highest return was obtained in yield targets of 50 and 55 qha^{-1}.

Key words : Target yield, Wheat, Fertilizer prescription equation

Fertilizer is one of the most important agricultural inputs for increasing the crop production. Soil testing is now accepted as a procedure for the recommendation of fertilizer doses for various crops in India. But soil testing would become a useful tool only when it is based on intimate knowledge of soil –crop-variety-fertilizer-climate-management interaction for a given situation. In this regard targeted yield approach has been found to be beneficial which recommends balanced fertilization considering available nutrient status in the soil and the crop needs. Targeted yield approach was first develop by Truog (1960) and Ramamoorthy *et al*.(1967) established theoretical basis and experimental technique suit to Indian conditions**.** They showed linear relationship between yield and nutrient uptake. For obtaining a given yield, fertilizers needed can be estimated considering efficiency of soil and fertilizer nutrients. However, the cost of fertilizer has been increased by about three times during the last 10 years. Fertilizer use efficiency is also low. Similarly the soils of India as well as Gujarat are low in available N,P and medium in K.Wheat is one of the most important cereal crop of Gujarat with an area of o.48mha. with total production of 1.02 lacks metric tones.

Within a normal range of applied fertilizer and available nutrient status of soil, a linear relationship between nutrient uptake and grain yield is an essential feature for targeted yield concept of crops. Research carried out on soil test crop response correlation has generated valuable information regarding nutrient requirement per unit weight of economic produce of harvested crop and about the efficiency of soil available and applied nutrients under various soil types and agro-climatic situations.

MATERIALS AND METHODS

A field experiment was conducted in *rabi* 2003 and 2004 with wheat (Var. GW-496) on a *Vertic ustocrepts*. The soil was silty clay with pH7.9, EC 0.48 dSm^{-1}, Organic carbon 6.2 g kg^{-1}, $CaCO_3$ 165 g kg^{-1}, available N 181 kg ha^{-1}, P_2O_5 29 kg ha^{-1} and K_2O 278 kg ha^{-1}. The field comprised of four equal strips in which a gradient in soil fertility was artificially created by applying graded doses of N, P and K fertilizers so as to get wide range in soil fertility.

A sorghum crop was raised as an exhaust crop in preceding season on these strips. After harvest of exhaust crop, the experiment with wheat as a test crop was conducted in subsequent season (*rabi*-2003) by dividing each of the four fertility strips into 12 subplots which received 9 selected treatments out of the combination of five levels of N (0, 60, 90, 120, 150 kg ha^{-1}), five levels of P(0, 30, 60, 90,120 kg ha^{-1}) and four levels of K (0, 30, 60, 90 kg ha^{-1}). The remaining three sub plots in each fertility gradient strips were kept untreated as controls. Full dose of P and K and half dose of N were applied at the time of sowing. The remaining half dose of N was top dressed in to split at tillering and boot stages. Initial soil samples (0-15 cm) collected from each plot before sowing of wheat were analyzed for alkaline $KMnO_4$-N, Olsen-P and NH_4AC-K. Grain and straw yields of wheat were