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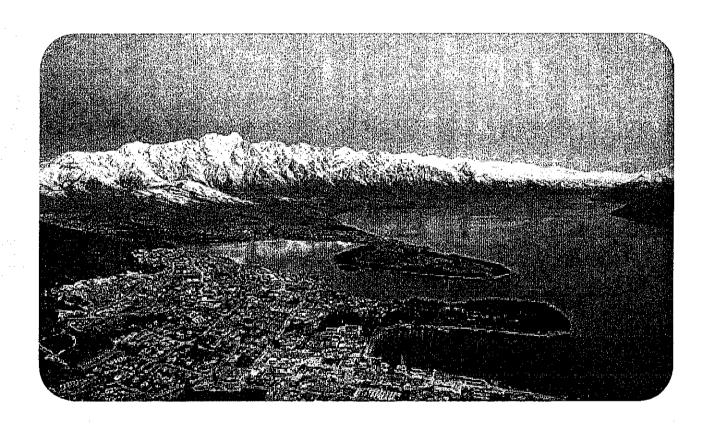


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SOIL TEST BASED BALANCED NUTRIENT MANAGEMENT FOR SUSTAINABLE INTENSIFICATION AND FOOD SECURITY: CASE FROM INDIAN SEMI-ARID TROPICS

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Abstract. In the semi-arid tropics (SAT), there exists large yield gaps (2 to 4 fold) between current farmers' yields and achievable ones. Apart from water shortages, soil degradation is primarily responsible for existing gaps along with inefficient utilization of existing water that is available.

Soil testing of on-farm soils across the states in Indian SAT showed widespread new deficiencies of sulphur (46 to 96% deficient sites), boron (56 to 100%) and zinc (18 to 85%) in addition to already known phosphorus (21 to 74%) and nitrogen (11 to 76%, derived from soil carbon). Based on these results, a

new fertilizer management strategy was designed to meet varying soil fertility need at cluster of villages level by recommending full nutrient dose if >50% fields were deficient and half dose in case of <50% deficient fields. Soil test based nutrient management significantly increased crop productivity up to 86% in groundnut, 55% in sorghum, 40% in soybean and 50% in maize with favorable benefit-cost ratios (3.32 to 10.2). Nutrient balancing improved nitrogen fertilizer efficiency in respect of plant uptake from soil, improved transport into grain, improved native and applied nitrogen use efficiency in food production and improved grain nutritional quality. Balanced nutrient managed plots showed better post-harvest soil health. Residual benefits of sulphur, boron and zinc were seen for up to four succeeding seasons.

Findings of these nutrient balancing trials have sensitized policy makers in some states to align their fertilizer management policies to benefit millions of smallholders in the Indian SAT.

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