

Soil Management

The soil is one of the most precious natural resources. It sustains life and the well being and prosperity of a nation greatly depends on its proper utilization. Soils are highly complex in nature and are much less understood as compared to plants and animals. Crop productivity per unit area in Pakistan is much less as compared to advanced countries. Further the soil resource is being degraded by the use of poor quality of irrigation water, imbalanced use of fertilizers, dumping of pollutants, erosion etc. Management of the soil resource is a challenge for its sustainable use in the country.

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Land Resources

- Maximum wheat grain yield (3.89 t ha^{-1}) was obtained with conventional flat bed sowing followed by raised bed sowing. The highest paddy yield (4.15 t ha^{-1}) was achieved in conventional flooded transplanted rice at $20 \times 20 \text{ cm}$ spacing. Total N uptake in wheat was maximum (117 kg ha^{-1}) with conventional flat bed sowing and lowest with zero tilled soil. Highest total N uptake by rice (106 kg ha^{-1}) was recorded with conventional flooded transplanted rice at $20 \times 20 \text{ cm}$ spacing and lowest (89 kg ha^{-1}) with direct seeded rice in zero tilled soil. Percent ^{15}N derived from labeled fertilizer (%Ndff) was higher in wheat than rice; it ranged from 29 to 34% in wheat and 18 to 25% in rice.
- Maximum paddy yield (3874 kg ha^{-1}) was obtained with soil application of K_2SO_4 @ $50 \text{ kg ha}^{-1} \text{ K}_2\text{O}$. Foliar application @ 6.0 % K_2SO_4 can compensate the K requirements as met through soil application by $50 \text{ K}_2\text{O kg ha}^{-1}$. Foliar application of K can substantially reduce the cost of fertilizer (Table).

Table. Effect of soil and foliar applied K on rice crop yield and K uptake under naturally salt-affected soil

Treatments	Crop yield (kg ha^{-1})		K uptake (kg ha^{-1})	
	Paddy	Straw	Paddy	Straw
Control	2959 e	4368 c	12.02 f	67.82 c
Foliar application of K_2SO_4 at 0.5%	3157 d	4549 c	14.41 e	72.29 c
Foliar application of K_2SO_4 at 1 %	3464 c	4993 b	18.51d	83.98b
Foliar application of K_2SO_4 at 2 %	3519 bc	5191ab	19.29 c	89.43ab
Foliar application of K_2SO_4 at 4 %	3618 b	5207ab	20.74b	89.96ab
Foliar application of K_2SO_4 at 6 %	3837 a	5443 a	24.12 a	96.64 a
Soil application of K_2SO_4 at $50 \text{ kg ha}^{-1} \text{ K}_2\text{O}$	3874 a	5627 a	24.70 a	102.0 a

Means followed by different letter (s) within the columns differ significantly at 5% level of significance.

- Soil application of $150 \text{ kg K}_2\text{O ha}^{-1}$ (NPK) increased potato yield significantly over control and a further yield increase of 8% was obtained by foliar spray of K_2O 1% solution alongwith soil application of potash fertilizer @ $50 \text{ kg K}_2\text{O ha}^{-1}$ (Figure 1).
- Soil application of zinc increased grain yield by 25% of maize, 20% of sorghum and 18% of millet over

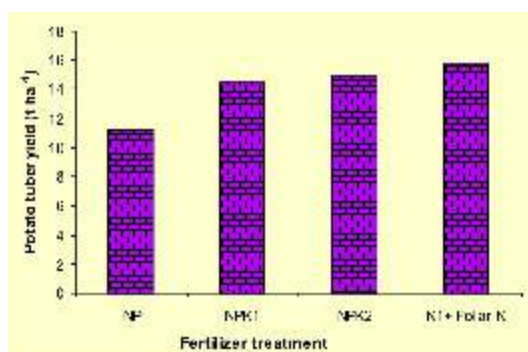


Figure 1. Effect of soil and foliar application of potash on tuber yield

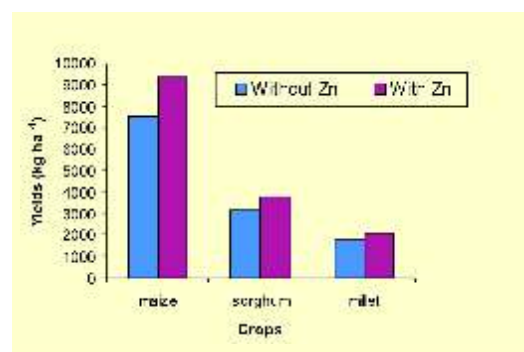


Figure 2. Effect of Zn application on yield of maize, sorghum and millet

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control (Figure 2). Fertilizer requirements for near-maximum grain yield of maize, sorghum and millet were 2.5, 2.2, and 2.1 kg Zn ha⁻¹ respectively.

- Zinc requirement for near-maximum bulb yield of onion was 2.5 mg Zn kg⁻¹ of soil. Critical Zn concentrations were 28 mg kg⁻¹ in young whole shoots, 24 mg kg⁻¹ in matured leaves, 16 mg kg⁻¹ in tops and 14 mg Zn kg⁻¹ in bulb on dry weight basis.
- In the Punjab, B application increased paddy yield by 13-25% over control in Super Basmati and in Sindh, the increase was about 27% over control in IR-6. Value cost ratio for applied B was attractive: 21-32 in Super Basmati and 27-35 in cv. IR-6. Additionally, B use enhanced milling return, head rice recovery and elongation upon cooking.