

Resource Conservation Technologies

The conservation of resources (land, water, energy) saves cost of water, energy and protects environment while leading to improved productivity on sustainable basis. Targeting the resource conserving technologies offers newer opportunities of better livelihood for the resource poor small and marginal farmers. The major areas of research under this theme cover water conservation, planting techniques such as raised bed and bed furrow planting; orchard floor management, mitigation of desertification and case studies on resource economics.

RESOURCE CONSERVATION TECHNOLOGIES

Wheat

- Performance of wheat cultivars; Chakwal 97, Margalla 99 and Wafaq 2001 with flat sowing and raised beds planting techniques was evaluated. Wheat variety, Wafaq-2001 had higher biological and grain yield on beds due to its better tillering and growth. Wheat cultivars (Chakwal 97 and Margalla 99) had at par yields on beds and flat sowing.

Rice

- Various crop stand establishment techniques viz., double zero tillage, direct seeding, brown manuring, bed transplanting and traditional transplanting were evaluated. The highest paddy yield (3.96 t ha^{-1}) was recorded from conventional planting followed by double zero tillage (3.85 t ha^{-1}).
- Development of system for rice intensification (SRI) was initiated. No significant increase in yield was observed in various plant spacings. However, significant effect of seedling age was found in seedling mortality and rice yield.
- Elucidated the water saving methods in transplanted rice through continuous flooding, alternate drying and wetting and saturated field condition. An advantage of 33% water saving was observed in alternate drying and wetting.
- Weedicide application 25 DAS gave better results in direct seeded rice.

Maize, Sorghum and Millet

- Maize borer resistant germplasm (BR-1, BR-2, BR-3) has been developed and being tested. It will save the resources and reduce the environmental pollution.



Borer damaged stalk

Plant Physiology

- Fodder beet seed production trials conducted at Distt. Swat, on salt affected arable lands of Pakistan produced 40kg viable (80% viability) seed.
- For cultivation, the locally produced seeds were planted on coordinating units of Fodder Program, NARC and PARC outstations as adaptation trials, which produced successfully good biomass of foliage and beet.

Land Resources

- No-till wheat sowing resulted in greater soil bulk density and a lesser total porosity in heavy textured soil compared to light textured soil (Figure 1). In light textured Jhakkar soil no-till resulted in greater infiltration at saturated and under most suction levels and macroporosity compared to the conventional tillage. A silty clay Kotly soil had greater macroporosity in conventional tillage than in no-till. Water retention at -330 cm and at -1000 cm water heads which relates to $< 9 \mu\text{m}$ and 9 to $3 \mu\text{m}$ pores diameter, respectively, showed that conventional tillage in Sindhilianwali had greater volume fraction of $< 9 \mu\text{m}$ pores up to 20 cm profile

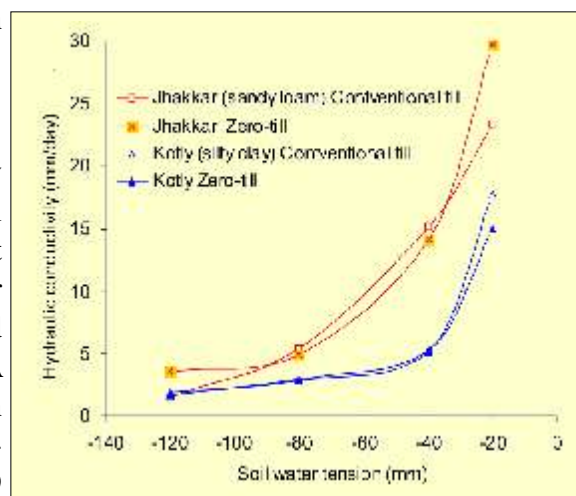


Figure 1. Hydraulic conductivity (as function of soil water tension) as affected by the tillage treatments in two texturally different soils

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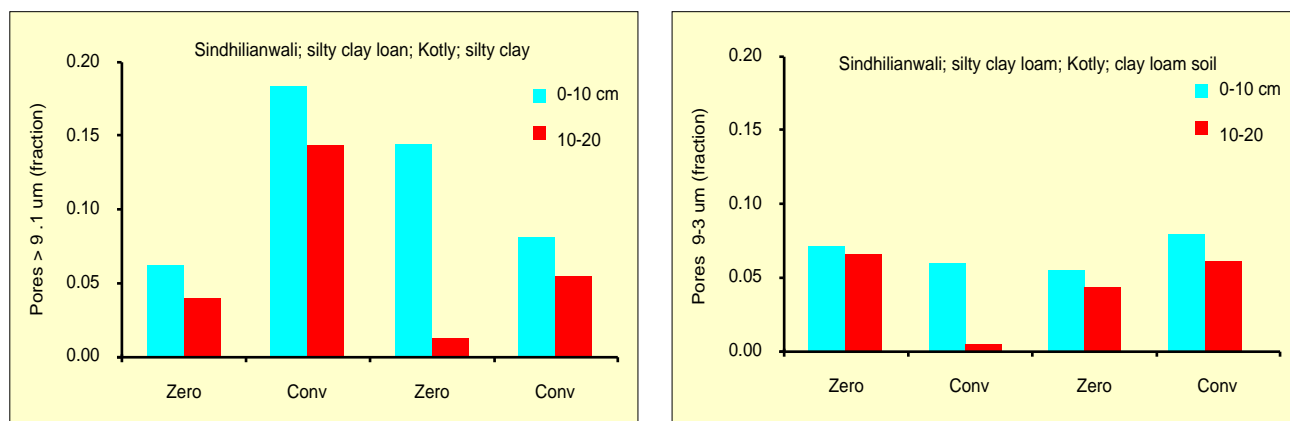


Figure 2. Volume fraction of mesopore as affected by the tillage treatments at two depths in two soils differing in their texture

depth compared to the no-till (Figure 2). Pore size in Kotly was greater in no-till but only at 0 to 10 cm depth while the lower depth had the least volume fraction of the same size pores.

Honeybee Research

- Effect of honeybee pollination on four cultivars of sunflower: Hysun-33, Hysun-38, S-278 and ZR-130 was completed. The seed set in cultivars exposed to honeybees was 74.43%, 78.98%, 78.84% and 78.63% whereas in seed set plants caged without bees was 30.67%, 25.78%, 28.8% and 22.95% in Hysun 33, Hysun 38, S-278 and ZR-130, respectively. The honeybee pollination response was more in variety, S-278 as compared to other varieties with reference to seed set. The fruit set in loquat was 40.3% as compared to 7.18% (without bees).
- Pollination trial on cucumber variety Sialkot selection was studied at NARC. Fruit set, yield and quality of honey bee open pollinated plant were significantly higher than those non-pollinated. Results revealed that fruit set was 80.87% in plants exposed to honeybees, whereas 30.16% in plants caged (without honeybees).



Honeybee pollination effect on sunflower

Tea

- Tomato, Brinjal, Chillies and Okra were cultivated in between the tea plant rows. It was found that intercropping of vegetables not only generated income but also improved the growth of tea crop as compared to control (tea alone).

Orchards

- Population of earthworm and useful microbial species reached maximum within four years of no cultivation (mowing) as compared to clean cultivation. Mowing reduced requirement for irrigation water to 30% within four years as compared to clean cultivation.