



Improvement in Water Use Efficiency

Water is lifeblood of Pakistan agriculture and economy. Its efficient use is a necessity and not an option. In view of global climatic changes water availability in Pakistan through river system is constantly on decrease. It has decreased from 104 MAF (Millions acres feet) to 80 MAF in the last five years. The main causes of such decrease are beyond the control of humans, therefore, water research is required to study such variables to ensure its efficiency in-terms of productivity per drop of water for sustained food security.

Improvement in Stock Water System (AZRC, Quetta)

- Rehabilitation of a stock water pond was carried out for improvement in farmer living. There are almost over 400 small ruminants and around 50-cattle. These small ruminants used to drink water twice a day from the pond, and pond lasted for 8 days only before it was redesigned. After redesigning, the stock water lasted for almost 30 days with the same number of animals.



Excavation work in progress for pond improvement

- The catchments area of pond was surveyed and it was found that the water shed area contributing for the stock water was 26 ha. And the slope of the catchments area was 1.92 %. The pond was lined with 300 micron PE plastic film for seepage control. Prior to redesigning, storage capacity of the pond was 550000 liters which was increased to 750650 liters.



RCC pipe intervention to improve crop conveyance losses

Controlling Water Conveyance Losses

- Strategy to reduce these losses was implemented through water course lining. The treatments were RCC 12 inch pipe lining, which was done from pond to the fields and completed on two farmers fields. The second treatment was 2 inch dia PVC pipe lining which was done from tube well to the pond for three farmers field. This year 2 inch PVC pipe lining was laid at on conjunctive use of tube well water with Sailaba water. Conveyance water losses were controlled by RCC & PVC pipe lines at Siddiqabad and Naseeb Ullah's farm at Nali Wali Zai before and after lining of the water courses, were measured by using cut-throat flumes (Table 1.)

Table 1. Water losses in water courses at IRS Siddiqabad and Nali Wali Zai.

Farmer	Treatment	Length (m)	Water losses (m ³ /hr/100m)		Water saving (m ³ /100m/hr)
			Before	After	
Malik Siraj	RCC pipe	148	9.57	2.02	7.55
Siddiqabad	PVC pipe	60	2.40	0.00	2.40
Abdul Salam Siddiqabad	RCC pipe	173	8.66	0.60	8.60
	PVC pipe	25	3.44	0.00	3.44
Alam Khan Siddiqabad	PVC pipe	250	2.85	0.11	2.74
Naseeb Ullah Nali Wali Zai	PVC pipe	131	2.88	0.05	2.83

Efficient use of Ground Water to Increase Crop Water Productivity (CWP)

- To improve CWP and WUE of wheat crop, trials were carried out on three farmers' fields at Siddiqabad, District Mastung, Three treatments (control, farmer's practice and supplemental irrigation) were used. In control no irrigation was applied but crop was raised with the pre-soaking irrigation, in farmer's practice the farmers were free to apply irrigations according to their will, while in supplemental irrigation treatment, two irrigations were managed on critical growth stages i.e., tillering and grain formation. Total rainfall during cropping season was 199.8 mm. N and P fertilizers were applied @140 kg ha⁻¹ and 100 kg P₂O₅ ha⁻¹ respectively (Table 2)

Table 2. Crop water productivity data of IRS Siddiqabad, Mastung.

Treatment	Grain yield (t ha ⁻¹)	TDM (t ha ⁻¹)	Straw (t ha ⁻¹)	HI	Available Water				WUE kg mm ⁻¹	WP Rs m ⁻³	Increased WP (Rs m ⁻³) with Saved water (113mm)
					Rauni	Irrigate	Rain	Total			
T1 Control	1.29	7.80	6.51	16.5	75	-	199	274	4.70	12.50	17.80
T2 Farmers Practice	2.57	13.0	10.43	19.8	75	345.5	199	622.5	4.13	5.77	5.77
T3 supplemental Irrigation	2.48	11.40	8.93	21.7	75	232.5	199	506.5	4.88	14.55	17.86

** = Highly Significant P < 0.05

- The highest grain yield of 2.57 t ha^{-1} was obtained in treatment with three irrigations (345.5 mm). Treatment , with two irrigations (232.5 mm) produced 2.48 t ha^{-1} grain yield. WUE of supplemental irrigation was higher than the other two treatments, which was 4.88 kg mm^{-3} and lowest WUE is calculated for farmer's practice 4.13 kg mm^{-3} . Water Productivity (WP) in rupees m^{-3} of supplemental irrigation was also highest (14.55). The amount of water saved between T2 & T3 is 113 mm. If the saved amount of water is applied to T1 treatment, this can increase WP up to 17.80 Rs. M^3 thus increasing WP up to 42% (Table 2).



Water productivity research trials on wheat at farmer's field, Mastung.

