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Irrigation Systems in Syria: Can institutional reforms control the degradation?

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Introduction and Objectives

In Syria, where the extent of water scarcity is reflected in the staggering figures of water deficit i.e. 258 m3 per person per year, paradoxically, agriculture accounts for about 95% of total consumption of water. Considering this fact, current research work tries to address the major bottlenecks in ensuring efficient use of water in two distinct agricultural entities i.e. the Public River (Euphrates) Irrigation System (PRIS) (canals system) and Private Wells Irrigation System (PWIS). The two major issues that meddle with the economic use of water in the former system are the fixed water charge per unit area irrelevant to the consumption level and lack of proper monitoring of water use. In private wells region, the main issues are uncontrolled water pumping and illegal well digging. The objectives of this study are first to compare profits of cotton production in relation to irrigation systems, as well the groundwater levels and costs of the existing irrigation technologies. Secondly we want to determine the water productivity in cotton fields and thirdly to find institutional solutions for the current water problems in both regions.

Methods

Data was collected from 40 farms in the PRIS and 40 farms in the PWIS. In the PWIS, farms are subdivided in two groups: surface irrigation and drip irrigation. Collected data included all costs, incomes and consumed water quantity related to cotton production. Farms were randomly selected and Data was analyzed using the Policy Analysis Matrix and the Productivity Analysis.

P 1. Private wells irrigation system

P 2. Public river irrigation system

Results

1. Profits of cotton production

The greatest profit was achieved in the drip irrigation system. In the PRIS profit was negative, whereas it was positive in the PWIS.

	Revenues	Costs	Profits
	€ /ha	€ /ha	€ /ha
surface irrigation in the PRIS	1285,8	1295,1	- 9,2
surface irrigation in the PWIS	1693,5	1665,5	28
drip irrigation in the PWIS	1581	1408,2	172,8

Table 1: Profits of cotton production in relation to irrigation systems

2. Water costs and groundwater levels

Water costs in the three systems were clearly different. In the PRIS, though the quantity of water used was the biggest, water costs were the lowest. Indeed farmers only paid a fee for access to water, regardless of the quantity they used. In addition, in the PWIS, water is not priced; but pumping costs give an indication of procurement costs of water.

	Water Quantity	Water Costs	Cotton Productivity
	m3/ha	€ /ha	Kg/ha
surface irrigation in the PRIS (public)	16747	60,9	2782
surface irrigation in the PWIS (private)	14053	437,3	3792
drip irrigation in the PWIS (private)	7697	357,8	3655

Table 2: Water quantities and costs of existing irrigation technologies

The existing water policy has caused the lowering of groundwater levels in the PWIS while raising it in PRIS.

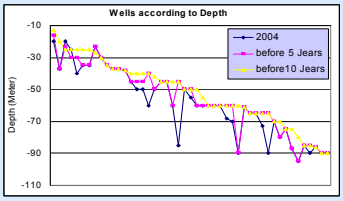

Fig 1: Lowering of groundwater levels in PWIS

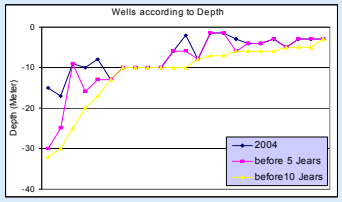

Fig 2: Raising of groundwater levels in PWIS.

3. Water productivity

Water productivity was higher for the drip irrigation (only present in the PWIS) than for the surface irrigation in both areas. In most cases, for the surface irrigation system water productivity values were higher in the PWIS (private) than in the PRIS (public).

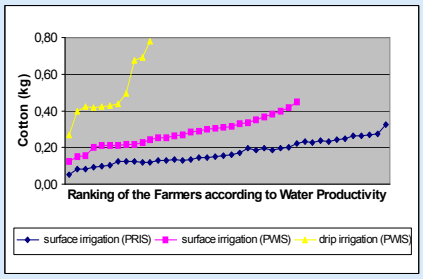

Fig 3: Water productivity in cotton fields of farmers

P5. Drip system

P3. Conventional system

Surface system consists of conventional and long furrows. Water productivity (on average) for conventional and long furrows systems was higher in the PWIS than in the PRIS. In addition, in the drip irrigation system, water productivity was higher than in the surface irrigation system in both areas.

P4. Long furrows system

	System type	Average of Water productivity (kg cotton/ m^3)
surface irrigation in the PRIS (public)	conventional	0,16
	long furrows	0,21
surface irrigation in the PWIS (private)	conventional	0,28
	long furrows	0,24
drip irrigation in the PWIS (private)	drip system	0,49

Table 3: Water productivity in cotton fields

Conclusions and Suggestions:

- Cotton production in Syria is profitable only in the PWIS.
- Drip Irrigation System is very important for water use efficiency and agricultural sustainability.
- The higher the cost for water, the higher the cotton productivity.
- The fixed water charge per unit area leads to degradation of cotton productivity and water dissipation and is not leading to adoption of drip irrigation.

Therefore we suggest to change the fixed water charge per unit area in the river area into a **charge per cubic meter**. This will trigger the adoption of drip irrigation.

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