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Study to Estimate Water Savings, Yield and Income Benefits from using SRI Methods in Southern Iraq

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Evaluations of SRI at the Al-Mishkhab rice research station started in 2005. Because Iraq is a water-stressed country, the water-saving aspect of SRI has been most important. A field study in southern Iraq sought to establish what intervals of irrigation with SRI methods would achieve the best returns under the conditions in which rice is grown in our country. Economic and not just agronomic assessments were made under Iraq's water-deficit conditions.

In this study, input and output data were gathered and analyzed for when SRI methods were used under three different irrigation regimes: continuous submergence of the rice crop; irrigation at 3day intervals; and at 7day intervals. The amounts of water used for the different methods were measured by water meter. **Table 1** below indicates the amounts of water used for the three respective methods of irrigation.

Table 1. Amounts of irrigation water used (m^3 ha^{-1}) with SRI practices under different irrigation regimes

Irrigation method	Irrigation water used	Water use as % of continuous submergence
Continuous submergence	79,090	--
3-d intervals	39,485	50%
7-d intervals	22,072	22%

When the irrigation schedule was modified to give SRI-managed rice plots an issue of water only every three days (no continuous submergence), paddy yield was 20% higher with a 50% reduction in the total water issues (**Table 2**). In this way, water productivity was more than doubled (104%).

It was found that the highest water productivity was achieved with 7day intervals of irrigation, important because water is Iraq's scarcest resource. There was some sacrifice of yield with 7day rather than 3day intervals. But the water saving with 7day intervals was 73% compared with continuous submergence of the rice crop, and a saving of 44% compared to 3-day intervals.

Table 2: Average grain yield and water productivity with SRI under different irrigation methods

Irrigation methods	Grain yield (t ha^{-1})	% of CS	Water consumption (m^3 ha^{-1})	% of CS	Water productivity (kg m^{-3})	% of CS
Continuous submergence	5.83	--	79,090	--	73.73	--
3-d intervals	7.02	+20%	39,485	-50%	177.81	+241%
7-d intervals	5.20	-11%	22,072	-72%	235.73	+320%

The amount of water saved with 7day intervals could allow many more farmers in Iraq to cultivate a larger area of land, thereby greatly increasing their and the country's rice production. It would benefit the country and a large number of farmers if the current rice farmers could be compensated for using water more productively even if there is some reduction in their own grain production.

Cultivating a larger area with the water saving from 7day irrigation intervals using SRI methods should raise national rice output by more than enough to compensate current

rice farmers for the production forgone by changing to 7day irrigation intervals rather than 3day intervals. There would also be additional value created by using some of the water saved for other social purposes, e.g., for expanding industrial production, after farmers have been compensated for using SRI methods with 7day rather than 3day intervals.

If no such incentive scheme could be established so that rice would be grown with 7day intervals, there would still be great benefit to farmers and the country from moving to SRI production methods with 3day intervals rather than continuing present methods with routine flooding of rice fields.

If an inclusive economic analysis were done, there would be costs and/or cost-savings added to the calculations below in **Table 3**. But this gives a picture of the scale of resources involved.

Table 3: Comparison of the costs and returns when growing rice using SRI methods with alternative irrigation regimes

Irrigation methods	Cost (dollars/ ha^{-1})			
	Cost of production	Value of production	Net economic returns	Change from continuous submergence
Continuous submergence	1,208	3,158	1,950	---
3 day intervals	1,166	3,803	2,637	+35%
7 day intervals	1,116	2,818	1,702	-13%

*Note 1 : Production inputs included: seed, fertilizer, pesticides, electricity, fuel, transport, machinery, field preparation, and repairs.

*Note 2 : Costs of harvesting are not included. They would be somewhat higher for 3day intervals and lower for 7day intervals because of differences in yield.

In any case, the present continuous irrigation of rice fields in Iraq is a waste of irrigation water achieving no significant agronomic or economic benefit. In a water-stressed country like ours, using SRI methods for growing irrigated rice should be a very attractive option for farmers and policy-makers alike.