Aga Khan Foundation, Baghlan Regional Office

Departments of Participatory Management of Irrigation Systems (PMIS) And Natural Resource Management (NRM)

Final Report on SRI Practices in Baghlan and Takhar Provinces, 2007

To: Vincent Thomas
From: Ali Muhammad
Objective: System of Rice Intensification
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In May 2007, Aga Khan Foundation (AKF) brought a consultant from India named Parcha Kishan Rao, who is associated with WASSAN, an NGO in Andhra Pradesh state of India that is working on the introduction and refinement of the System of Rice Intensification, known as SRI. The methods that constitute SRI were assembled as a set of practices for raising rice productivity some 25 years ago in Madagascar. SRI has since been spreading in more than 20 other countries, including some countries neighboring Afghanistan, including India, Bangladesh, Nepal and Iran. These places have different climates and different soil conditions from Afghanistan, but SRI practices have been giving good results there, increasing yields by 10% to 80% compared to traditional or conventional methods. It is fortunate that the above-mentioned SRI consultant was brought by AKF to Afghanistan. The Afghanistan activities and progress reports in Baghlan and Takhar Provinces have been posted on the SRI website (http://ciifad.cornell.edu/sri/), thanks to Lucy Fisher (lhf2@cornell.edu).

SRI consultant Kishan Rao trained AKF staff regarding SRI practice when he was here, and the AKF SRI team together with the consultant then chose some SRI demonstration plots. However, as the time was limited, we couldn't find ideal plots. PMIS staff selected 800 square meters of cultivable land at **Baghlan Agriculture Faculty research farm**, and 2 Jeribs of land in Old Baghlan at **Shahi Khail** which depended on water in the Jangharoq downstream area. These are the two demonstration plots in Baghlan Province. In Takhar Province, the demonstration-evaluation plots were on one Jerib of land at **Nahri Saed** and one Jerib at **Nahri Zargar**. (One Jeerib = **2000** sq. m.) Both of these canals (*Nahrs*) are under the AKF PMIS program.
The latter trial at Nahri Zargar was included as one farmer volunteered to do SRI on his plots there. This farmer named **Asadullah** just asked the SRI team to support him technically. He himself carried out all of the activities on his SRI plots, as our program supported him technically. His results were good. AKF's SRI core staff applied all of the knowledge that Kishan taught them about SRI practices, and the team made regular field visits to the SRI demo plots for observing all events about the System of Rice Intensification. The SRI team arranged for farmers' exposure trips to all the SRI demo plots, and besides farmers, we invited students from the Baghlan Agriculture Faculty to see the SRI demo plots. There we explained what SRI is and how its methods are being taken up in other countries.

The PMIS Natural Resource Management (NRM) staff also shared their ideas about SRI with staff of the NGO **German Agro Action (GAA)** and with farmers working with them. We organized an exposure trip for GAA farmers, and GAA brought the farmers from Kunduz Province working with it to the PMIS SRI demo plots. During the visit, the AKF/PMIS SRI team made a presentation which explained the 'seven steps' of SRI practice that are being tried under the Participatory Management of Irrigation System (PMIS) project which is funded by the European Community (EC). These 'seven steps' were described by our staff to the farmers, sharing all of our knowledge regarding SRI with these honorable farmers.

The first 800 sq. m. area was divided into four plots as farmers proposed to get more experience.

Plot No. 1: Without animal manure and chemical fertilizers, i.e., no nutrients were applied.
Plot No. 2: Only animal manure was added.
Plot No. 3: Only chemical fertilizers were used. .
Plot No. 4: Chemical fertilizers and animal manure were applied.

Figure 1: Pictures showing different steps of SRI, and activities and involvement of farmers at SRI demo plots

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>As Kishan Rao directed efforts, the SRI team is measuring SRI seedbed on Baghlan Agriculture Faculty research farm. Rice had never been cultivated previously on this land, and it was full of weeds, especially reedy plants.</td><td>SRI team is preparing SRI seedbed in the present of some farmers. Farmers were surprised to see how just 20 sq. m. and one kg of seed was enough for cultivating one Jerib of rice. This was something that Baghlan farmers had never heard about before.</td></tr>
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<tr><td>SRI team is soaking seeds for planting while farmers are watching this process. Just one kg of seeds was used for one Jerib of land. Kishan Rao, SRI consultant, is observing and monitoring the SRI team how they are conducting the processes.</td><td>SRI team is transplanting the young seedlings which are only 12 days of age. Farmers are watching how young seedlings are transplanted. At BAFRF, SRI spacing was 25cm x 25cm.</td></tr>
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The field where we started demonstration of SRI methods was located in Baghlan Agriculture Faculty research farm. When we started seed bed preparation for the first time in the region, we gathered some farmers from Jangharoq canal for seed-bed preparation. Farmers didn't believe that this was going to be a seed bed for rice because of the heavy weeds in this place, especially reeds. Farmers using traditional methods would never have made any seedbed in a place like this, and they thought it is impossible for them to make a seedbed at such a place.

When at transplanting time we called them again to attend the SRI transplantation, they were excited to see the young rice seedlings that we were going to plant at age of 12 days and at a spacing of 25cm x 25cm. They had some thoughts about having SRI demo plots on this farm. Farmers said, "We have experience at this place. You will never get any yield here. This is full of reeds. We can say that this is a reed forest. Rice has never been cultivated here." However, Kishan Rao, SRI consultant, said, "I am going to promise you as I also have some experience. You will get rice with SRI methods here."

Then the farmers became surprised again when we collected them after 10 days to see the first SRI weeding. When they saw the field, they didn't believe how reedy land could have this much rice growth, and they thought that weeding was fantastic with this method! Farmers were concerned that SRI transplantation takes more time than traditional one. But Kishan told them that they can reduce the number of days required for transplanting once they gain experience with the methods. SRI transplanting was very interesting for farmers, to be doing transplanting at the appropriate marked places.

According to farmers' suggestion, in order to get more experience with the new methods, we divided the 800 sq. m. area into 4 plots as noted above. Plots No. 1 & 2 (without animal manure or chemical fertilizer, and with animal manure only) matured satisfactorily because they were transplanted on 23rd -24th of May 2007. Plots No. 3 & 4 (chemical fertilizer only, and both chemical fertilizer and animal manure) didn't mature because of their late transplanting, being transplanted on the 21st of June 2007, around one month later than the first two demo plots. So, we couldn't get any comparable results as had been proposed by farmers and accepted by the SRI team and also by the SRI consultant. It is unfortunate that half of the plots couldn't complete their growth cycle.

This showed us that SRI rice transplanted in June in Baghlan Province won't mature, and SRI crop must be transplanted in May rather than June. May SRI transplantation can give results, but June transplantation cannot. In the future, we must avoid June transplanting, and we will not recommend to any farmer to transplant SRI in June.

Figure 2: Pictures showing SRI Step 7 (weeding) and visits to SRI demo plots at Baghlan Agriculture Faculty Research Farm and farmers from two different districts of Baghlan Province (New Baghlan and Dushi Districts).

Staff from Baghlan Research Farm watching SRI weeding at SRI demos plots.

Baghlan Agriculture Faculty students visiting SRI demo plots and paying attention to the SRI team while it explains SRI practices for students.

	
Farmers visiting from SRI demo plots at BAFRF demo plots. They are from different places, representing Jangharoq and Kelagai areas.	SRI Tillering: This rice plant, transplanted as a young seedling at the age of 12 days, produced 120 tillers by 96 days after transplanting. This was amazing for our farmers and BAFRF faculty and students.

Those from Baghlan Research Farm who watched the SRI weeding using a Mandava Weeder on the SRI demo plots were very glad to see how it operated between the rows. At the same time we briefly explained about SRI practice in other countries of the world where the methods are adapted for different weather or climates. They told us that they felt very satisfied with what we explained as we have experience in the field of agriculture. Every new agricultural method should be researched for least for three or four years, according to them, because one year isn't enough for SRI trials. Then with longer knowledge, we can extend the new methods to farmers.

The governmental agriculture research persons said that with transplanting one young seedling, the plant has good tillering and growth that is very impressive for us, and that SRI methods have more advantages than traditional methods. For instance, SRI doesn't need fertilizer application. This brings benefits to our farmers because they are poor, and the 25-year war has destroyed every agricultural infrastructure system. If we don't use fertilizers, our soil can be freed from diseases, and our crop will have better taste and better quality in the market. We thank to AKF because if this program can be a success, it can bring a tremendous change in Afghan views of agriculture. More than 85% of our populations are busy with agriculture and livestock affairs. We hope that our farmers will be convinced by seeing the results of these new practices, and one day the majority of our irrigated land will be transplanted with SRI methods. In one picture (Figure 2), we show one SRI seedling that was transplanted at the age of 12 days, and after 96 days it had produced 120 tillers. What a huge number of tillers! Thanks to SRI tillering.

One thing should also be mentioned. SRI seed soaking is completely different from traditional or conventional method as SRI method involves seed soaking for 24 hours or sometimes it can be u to 40 hours. It depends on the climate as to when it germinates and should be sown in the seedbed. According to traditional methods here, farmers soak their seeds for one week, until the seeds have long white roots and then they start sowing the nursery plot which has standing water. SRI nurseries are dry nurseries, not flooded. Also SRI method needs **One Kg seed per Jerib** but in Afghanistan for traditional method farmers need **21 or 28** Kgs per Jerib thus this is a huge differences between SRI and None SRS. In SRI method farmers can **safe 20 or 27 Kgs** of seeds per Jerib this is another benefits for farmers.

As mentioned above, SRI is presented in terms of different steps. Below are the steps that we presented to groups of farmers.

Step 1: Seed selection and Soaking

Step 2: Seed-bed preparation

Step 3: Seed sowing

Step 4: Land preparation

Step5: Marking of the field

Step 6: Transplantation of young seedlings

Step 7: Weeding

Figure 3: Pictures of how the SRI steps were explained in presentations to GAA and farmers under PMIS project. They also show explaining to GAA and PMIS farmers during exposure trips to PMIS SRI demo plots.

PMIS SRI team explaining all the SRI steps using a projector to German Agro Action farmers from Kunduz and to PMIS farmers from Kelagai and Jangharoq. They are paying attention to the presentation keenly and with much enthusiasm.

GAA and PMIS farmers visiting PMIS SRI demo plots.

Ghiasudin, GAA NRM officer, holding a SRI plant with a huge mass of mud around its roots. It is so heavy that it is hard for him to hold the plant up.

The above steps were first presented to farmers and then were followed by more details. We answered any questions they might ask right after the presentation. After answering their questions, we then took the farmers to the SRI demo plots. Farmers and GAA engineers with AKF SRI team are seen in the pictures visiting SRI demo plots and observing them closely. At heading time, farmers and engineers are shown counting SRI tillers and panicles. The huge mass of mud shown in Figure 3 indicates how SRI roots are strong and healthy. When we measured the root, it was 40 cm long; compared to traditional method rice, SRI roots are 10 to 15 cm longer. Long roots can get more nutrients from the soil. This is one of the benefits of SRI practices.

Figure 4: Photos of SRI harvesting and of SRI workshop

SRI harvesting at Shamsudin's SRI demo plots in Old Baghlan: Sakhidad Khan, one of the SRI team members, is taking part in the SRI harvesting.

SRI workshop organized to share SRI activities and SRI yields to farmers and to get feedback from farmers.

Arbab Aleem, one of Kelagai farmers, who has some recommendations regarding SRI practices, is explaining these.

Here we are writing down farmers' suggestions, recommendations and feedback.

Results with SRI and traditional methods comparing yield from **1m x 1m** areas was done by SRI core staff. This indicated that traditional yield can be more than SRI if the new methods are not appropriately adapted to local conditions. Although the plant growth with SRI was impressive, the first SRI trials did not produce as much yield as we had expected. This was for reasons which we now understand better.

Some comments regarding SRI and Non-SRI practices:

Non-SRI Methods

- With traditional methods, farmers have applied fertilizers. This must be taken in account.
- Traditional transplanting uses seedlings older than with SRI, about 35 to 40 days at time of transplanting. Should this be now changed?
- Which is the best distance? We know we should increase the distance between plants.

SRI Methods

- The soil at Baghlan Agriculture Faculty research farm (BAFRF) for SRI demo plots was unfertile, as farmers acknowledged. This was the first time that rice has been cultivated there by SRI or by any other methods.
- With the Old Baghlan SRI demo plots, farmers didn't follow up as should have been done.

- For example, for these plots, animal manure wasn't applied as had been agreed in the contract, and as we had insisted with the farmer. At the time for application, instead of applying manure, he made some excuses and merely applied some ashes.
- Weed control was done 50% manually, and SRI shouldn't be done like that, because this gives no soil aeration compared to use of Mandava weeder.
- Weeds that were close to the hills and remained after weeding were weeded manually.
- Old Baghlan SRI demo plots remained without water for more than 10 days, and this can have affected yield.

Table 1: Comparison of results for SRI and conventional methods of paddy for SRI plots in Baghlan (Old Baghlan)

S/N	Particulars	Group 1	Group 2	Group 3	Group 4
1	Variety used and methods	Surkha Zerati (Medium-Sardah) -- SRI methods	IR-66 -- SRI methods	Surkha Zerati (Long-Sardah) -- Traditional methods	Surkah Zerati (Medium-Garma) -- Traditional methods
2	No. of hills/m^2	16	16	23	24
3	No. of tillers/m^2	280	396	436	471
4	No. of grains/panicle	120	95	61	89
5	Total fresh weight/m^2 (grain + straw) (grams)	1,616	1,533	2,800	3,000
6	Total dry weight/m^2 (grain +straw) (grams)	1,325	1,345	2,000	2,300
7	Total weight of grain/m^2 (grams)	300	533	550	900
8	Net weight of grain/m^2 (grams)	200 (2 T/ha)	400 (4 T/ha)	500 (5 T/ha)	800 (8 T/ha)
9	Weight of chaff/m^2 (grams)	1,025	812	1,450	1,400
10	Height of plants (meters)	0.74	0.58	0.91	0.93

Note: Traditional paddy soils were soaked for 30-40 days; our SRI crop was grown in a place that remained without water for 10 days which may have affected yield adversely.

Comparison of results for SRI and conventional methods of paddy for SRI plots in Baghlan (Baghlan Agricultural Faculty)

S/N	Particulars	Group 1	Group 2
1	Variety and method	Surkha Zerati (Medium-Sardah) – SRI methods	Surkha Zerati (Medium-Sardah) -- SRI methods
2	No. of hills/m^2	16	16
3	No. of tillers/m^2	399	290
4	No. of grains/panicle	102	82
5	Total fresh weight/m^2 (grain +straw) (grams)	1,983	2,200
6	Total dry weight/m^2 (grain +straw) (grams)	1,741	1,475
7	Total weight of grain/m^2 (grams)	333	367

8	Net weight of grain/m^2 (grams)	300	233
9	Weight of chaff/m^2 (grams)	1,408	1,180
10	Height of chaff (meters)	0.80	0.84

Note: This land was full of reeds. When farmers came during transplanting, they said, "You won't get any yield because the land has weeds and it is unfertile."

Comparison of results for SRI and conventional methods of paddy for SRI plots in Takhar (Taloqan)

S/N	Particulars	Group 1	Group 2	Group 3	Group 4
1	Variety used and methods	Surkha Zerati (Med.-Sardah) SRI methods	Badah (Garma) -- SRI methods	Badah (Garma) – SRI methods	Badah (Garma) -- Traditional methods
2	No. of hills	16	16	16	24
3	No. of total tillers	270	365	280	500
4	No. of grains/panicles	90	85	92	63
5	Total fresh weight/m^2 (grain +straw) (grams)	2,200	1800	2400	4000
6	Total dry weight/m^2 (grain +straw)	1,900	1600	2000	3400
7	Total weight of grain/m^2 (grams)	620	570	630	600
8	Net weight of grain/m^2 (grams)	300	290	320	280
9	Weight of chaff/m^2 (grams)	1280	1030	1370	2800r
10	Height of chaff (meters)	0.90	0.85	1.02	1.0

Note: Traditional soils were soaked almost 30 or 40 days before SRI.

➔ At the SRI workshop, we presented again the SRI steps, adding a final step (step 8th).

Step 1: Seed selection and soaking

Step 2: Seed-bed preparation

Step 3: Seed sowing

Step 4: Land preparation

Step 5: Marking of the field

Step 6: Transplantation of young seedlings

Step 7: Weeding

Step 8: Harvesting

When the steps were presented, we also shared with farmers the experiences that we got with SRI in practical terms, and explained all the SRI advantages to participants very concretely. Farmers said, "When we participated in SRI exposure trips to PMIS SRI demo plots, we saw a huge difference between traditional methods and SRI methods, for instance, in plant growth. Water saving and tillering were excellent; but many grains were empty as is often true for traditional methods too. This agricultural research for one year can't be enough to justify a conclusion yet, so we should investigate more, and AKF should have SRI demo plots next year too."

"This is a new method," they said also. "Every time when a new method is going to be extended to farmers, it faces some constraints and challenges. Also, our farmers are illiterate; therefore, they realize or understand some things late, or their realization and/or understanding is weak." Then we led them in discussion of these new methods, and they gave feedback for us. The suggestions, recommendations and propositions on SRI for next year have been written below.

SRI Team's recommendations for future improvement:

- SRI should be transplanted in May (Jawza), not in June (Saratan).
- SRI requires the implementation of all steps at the right time, e.g., animal manure should be applied at the right time, and weeding should be done at the right time.
- We will improve the support to farmers by bringing them closer technical support from technical staff.
- SRI team needs one Jerib of land to be leased by AKF, where the SRI team can cultivate paddy in both traditional methods and SRI methods for better yield comparison, using all of the SRI methods as recommended.
- We will select some farmers for carrying out SRI practices in their plots.

Criteria for farmer selection

- Farmers should be responsible for all expenditures for their SRI plots; the support from the SRI team is just technical.
- Selected land should be near the street or road so others can see it easily.
- Selected land should be in a safe place.
- Plots should be selected in different places, to evaluate a variety of conditions.
- Selected land should have good water availability.
- Selected land should be fertile.

Farmers' suggestions at SRI workshop

- Farmers need improved seeds.
- Beside SRI plots, there should be traditional plots too cultivated at the same place, for better comparison.
- Select fertile land. First-year trials on poor land were impressive, but farmers want to see the real potential of the new methods.
- Organize farmers' exposure trips at different SRI steps to see each of them in turn.

Harvesting dates of SRI demo plots in Baghlan and Takhar provinces

No.	Farmer names	Harvesting dates
1	Shamsudin	20-Oct-2007
2	Agriculture Faculty	23-Oct-2007
3	Momin Bai	20-Oct-2007
4	Abdul Wohdud	15-Oct-2007
5	Assadullah	15-Oct-2007