



OBSERVATOIRE DU SAHARA ET DU SAHEL
SAHARA AND SAHEL OBSERVATORY



ADAPTATION FUND

SRI FARMERS GUIDE

SYSTEM OF RICE INTENSIFICATION (SRI)

.....Building climate resilient rice production systems

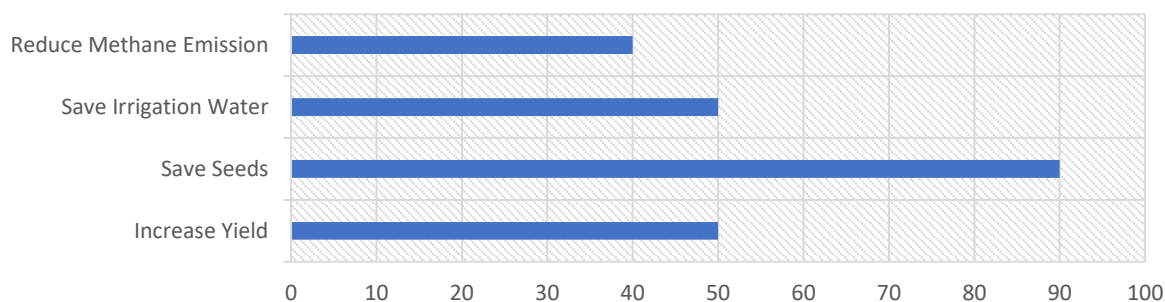
RICOWAS

“Scaling up Climate-Resilient Rice Production in West Africa”

(Benin, Burkina Faso, Cote d'Ivoire, Gambia, Ghana, Guinea Conakry, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo).



Benefits of SRI (%)



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Background

RICOWAS project was developed to improve the climate change resilience and increase rice systems productivity of smallholder farmers across West Africa. The project aims at improving and scaling up the System of Rice Intensification (SRI) and Sustainable Land and Water Management (SLWM) in West Africa building on the SRI-WAAPP regional project results. The project is implemented at regional level by the Sahara and Sahel Observatory (OSS), financed by the Adaptation Fund (AF) and implemented in 13 ECOWAS countries.

Principles of SRI

System of Rice Intensification was built on four principles.

- i. Early and healthy plant establishment,
- ii. Minimize competition between plants,
- iii. Build fertile soils rich in organic matter and soil biota,
- iv. Manage water carefully through Alternate wetting and drying

Benefits of SRI

- Increase yield 20 -50%,
- Save seeds (> 90%),
- Save water (30-50%),
- Use less fertilizer to increase productivity of rice crop and
- Reduce methane emission into the atmosphere by 50%.

Site selection

- Choose flat or gentle sloping site with high water retention capacity, free from flood, erosion and shade.
- Land should have high organic matter content.



Figures 1. Site with high water retention and high organic matter content suitable for rice cultivation

Land preparation

- Good preparation of soil is essential to ensure effective yield.
- Important to break top 20cm of topsoil in SRI for good crop growth and establishment.
- Prepare land with organic manure that is thoroughly mixed.
- Build earthen bound/basin to control field water.
- Create good water ways and outlet for easy irrigation and flood control.



Figures 2. Land preparation activities including Ploughing, Puddling, Leveling and Bunding

Recommended seed varieties

- Any type of rice variety from reliable source can be used for SRI.
- Seeds of same variety are uniform in shape, size and color.
- Ensure seed have at least 90% viability.



Figures 3. Selection of improved varieties is essential in rice cultivation

Seed preparation

- Soak seed in salt water to separate bad seeds and chaffs from good seeds.
- Seed at bottom of water container initiate and fastens germination on nursery bed.
- For direct seeding, soak seeds in a bucket of water for 24 hours, dry under shade for 12 hours before planting.



Figures 4. Seed soaking in water to separate immature seed from good ones

Nursery bed preparation

- Nursery site should be very close to the field.
- Have reliable source of water close by for frequent watering.
- Keep nursery free from predators (rats, birds, ants etc).
- Mix equal parts of soil, compost/well dried fine manure and sand to create a well textured fine soil.
- No need to add chemical fertilizers.
- Make a raised bed with mixed soil to a height of 10-15 cm.
- Level the soil surface very well to make it smooth and flat.
- Size of SRI nurseries is 1% of the size of the field i.e. 100 square meters of nursery is required to transplant 10,000 square meters or 1 hectare (ha).
- Beds size are ideally 1m x 5m but could be up to 1m x 10m.
- Mark out the beds in rectangular form using rope and stake.
- 8 to 13 kg of seed is required to transplant 10,000 square meters (1 ha).
- Water the nursery 1-2 time a day.
- Always use thin dry grass to mulch bed against damage by birds, insects and rodents.
- Remove dry leaf grass cover two days after seeds have germinated.
- Allow plants to grow to the 2-leaf stage, between 8-12 days.
- Transplant immediately, maximum 15 to 30 minutes after removal from nursery

Field Area	Size of Nursery	Nursery Dimension	Amount of Seed
100 m ²	1 m ²	1m x 1m	60g - 100g
1,000 m ²	10 m ²	1m x 10m	600g - 1 kg
10,000 m ² or 1 ha	100 m ²	1m x 100m	6-10 kg

Table 1. Nursery size by field area and seed rates



Figures 5. Raised nursery bed preparation and management

Transplanting

• Field Making

- Mark field 25 x 25cm using rope, rake, roller marker to facilitate transplanting.
- Wider spacing of plants permits more air circulation around the plants



Figures 6. Field marking using rake to mark the field before transplanting/seeding

• Transplanting

- Water the nursery bed thoroughly 6-12 hours before transplanting.
- Shallow transplant 1-2 cm depth early at 2 leaves stage 8-12 days after germination.
- Young seedlings are transplanted in line at 25 x 25cm in grid formation.

- Plant only one seedling per stand.
- Seedling pushed into soil with the roots forming an L-shape and not a J-shape



Figures 7. Transplanting of young rice seedlings using rope



Figures 8. Transplanting of seedlings using grit marking/established plots

- **Direct seeding**

- Direct seeding can be done in rainfed condition when transplanting is difficult.
- Two seeds/ hill pre-germinated seed can be planted with zero thinning.
- Use hand seeding or use mechanical seeders if available to sow seeds



Figures 9. Pre-germinated seed and planting of paddy using direct seeded method



Figures 10. Mechanical Seeders can be used for direct seeding method



Figures 11. Direct seeded rice field using manual planting of two pregerminated seeds.

Weed management

- Weed control is among key activities in the SRI system.
- Manual hoe and mechanized weeder to control weed are recommended.
- Herbicides should not be used to control weeds in SRI system.
- Manual weeding of the fragile seedlings necessary in the 1st and 2nd week after transplanting.
- Four weeding operations required to ensure a good formation of tillers which characterises SRI.
- Weeding depth should be about 1-2 cm to minimize roots damage.
- Rotary weeder of different types recommended for SRI system.
- A rotary weeder smoothens weeds in between rows, aerate soil levelling the field.



Figure 12. Manual weed control by hand.



Figures 13. Different locally fabricated standing suitable in SRI system



Figures 14. Using manual and motorize rotary weeder to control weed in paddy field

Fertilization

- Organic manure is best fertilizer in SRI.
- 5 – 20 tons of organic manure per hectare recommended as determined by nutrients OM nutrients concentration.
- Apply OM before ploughing to allow it to be buried in the soil.
- Only use mineral fertilizers to overcome nutritional deficiencies.
- UREA super granules will be applied at 3-4 weeks after transplanting.



Figures 15. Sources of organic manure from cattle dung to poultry manure



Figures 16. Compost manures produced from rice husk and wood dust

Water management

- Keep soil humid 2 weeks after transplanting and allow plant to be established.
- Then allow the soil to become dry between each watering cycle called Alternate Wetting and Drying (AWD).
- Introduce 1-2 cm shallow layer of water at vegetative phase, then allow field dry till cracks in the soil become visible. irrigate 7-10 days, based on soil conditions and weather.
- For reproductive phase, irrigate abundantly and regularly during flowering and grain filling periods.
- Keep plot dry during the maturation phase about 2 weeks before harvest.



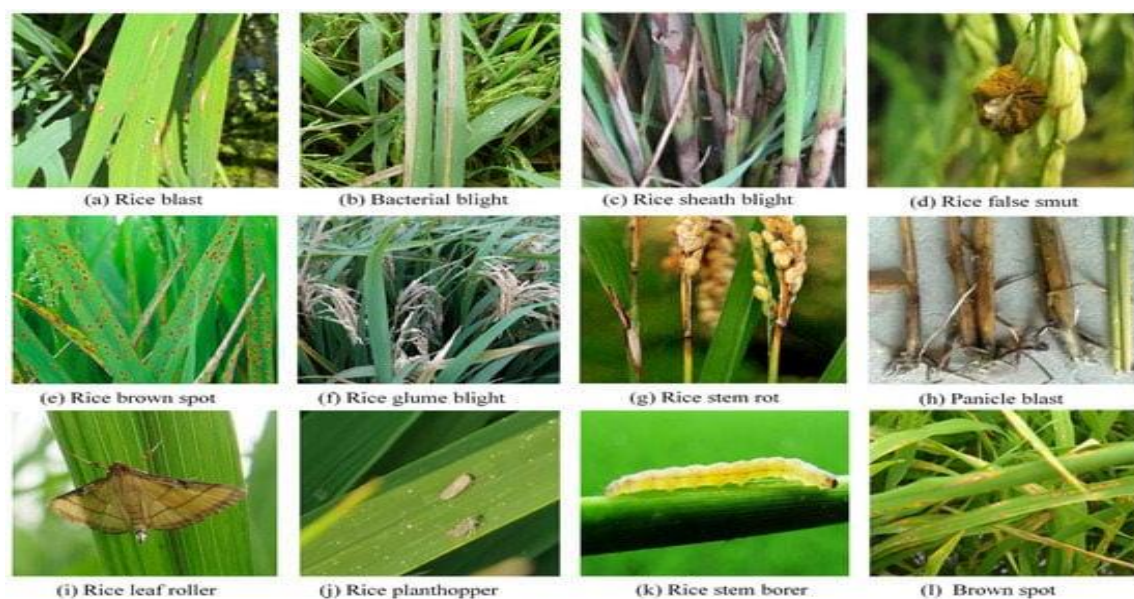
Figures 17. Pattern of alternate wetting and drying practices in SRI system

Pest and disease control

- Look out for signs/symptoms of diseases or insects attack in the field.
- Contact extension agent in case of any signs/symptom of diseases or insect attack.
- Organic spray is preferably recommended in SRI system.
- In most cases, SRI fields have improved resilience towards pest and diseases because of larger roots, thicker tillers and leaves.
- Use Integrated Pest and Diseases Management approach to control pest and diseases.
- Use net or other bird scaring technique to protect your field, 12 to 16 weeks after transplanting



Figures 18. Some symptoms of attack for pest and diseases in rice fields.



Figures 19. Some symptoms of attack for pest and diseases in rice fields.

Harvesting and Post-harvest

- Rice field is ready for harvesting when 80 - 85% of the panicles are yellow or brown.
- This is 4-6 weeks after flowering and about 13 to 16 weeks after transplanting.
- Cut the rice stems with a sickle 20cm above the ground.
- Use mechanical harvesters such rice reaper, if available.
- Bundle the rice stems together in piles such that the panicles are at the top for drying on a tarpaulin.
- Dry the rice for 5 to 10 days after harvesting before threshing.
- Use mechanical thresher, if available to reduce post-harvest losses.
- Do not dry the rice on the bare floor to avoid contamination with dirt and stones.
- Ensure paddy is 12 - 13% dried before bagging.
- Store paddy in an airy, cool and well protected space on a palette.
- Clean and fumigate the store 3-7 days before putting the paddy inside.
- Stack your bags of paddy properly to allow air circulation and easy inspection.



Figures 20. Maturity of paddy field and manual harvesting of paddy rice

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