Mangrove swamp rice production in West Africa

■ M. AGYEN-SAMPONG. *Agronomist, Research Consultant*

mots-clés : RIZICULTURE MANGROVE PRODUCTION AFRIQUE DE L'OUEST

keywords : RICECULTURE MANGROVE PRODUCTION WEST-AFRICA

Mangrove swamp rice cultivation, located in coastal areas where the population is relatively dense, is one of the oldest forms of rice culture in West Africa. Of approximately 1.2 million hectares of mangrove swamp in West Africa about 200 000 ha is cleared for mangrove swamp rice production in Guinea Bissau, the Gambia, Guinea, Senegal and Sierra Leone. The mangrove swamp rice areas in West Africa cover a wide range of climatic conditions from dry tropical climate (savanna) with 800 mm or less rain in Casamance (Southern Senegal) to humid tropical climate with about 4 000 mm of rain in Sierra Leone and Southern Guinea.

The prevalent vegetation consists principally of *Rhizophora nitida*. The mangrove soils are rich in pyrites (iron sulphides) and are therefore potential acid sulphat soils with poorly differentiated horizons. On empoldering and drying, *Rhizophora* soils tend to become too acidic from oxidation of pyrite for rice growing.

Successful cultivation of rice in the mangrove swamps depends on the length of salt free period which is the result of an interplay of the volume of fresh water available and salt water intrusion from the sea. Area that are tidally flooded throughout the year is often referred to as the « tidal mangrove swamp ». Between the tidal swamps and the uplands lie the so called « associated mangrove swamps » which are characterised by excessive grasses and sedge weeds with few broad leaves.

The feasibility and success of growing rice in mangrove swamp are therefore dependant on the ability to recognise and delineate soils with salinity and acidic problems and to devise methods of management by which yields can be increased or new land brought in production.

In low rainfall areas of the north - Casamance and Guinea Bissau, due to the excessive saline soils bordering the rivers, rice fields are located in « associated mangrove swamps » and empoldered to prevent incursion of saline water during the cropping season. Again, the rice in the polders is nearly always planted on ridges. The ridges play important part in water control and leaching salt and acids from the soils. In the high rainfall environments of Sierra Leone and Guinea most of the mangrove swamp rice are cropped in the tidally flooded areas where empoldering and ridging are not required. However, in the wetter zones, salinity downstream along some rivers is high enough to warrant empoldering during cropping season.

DISTRIBUTION AND IMPORTANCE OF MANGROVE SWAMP RICE.

Mangrove swamp rice accounts for about 10 % of the total regional production, with farmers averaging about 2 t/ha paddy annually as compared with 1 t/ha obtained in most other rice environments in the region. Soils are generally more fertile than in the other environments since the tidal flooding regularly deposit silt on the land.

Country	Area under mangrove swamp rice (ha)	Rice area (%)	Rice Production (%)
Guinea Bissau	90 000	80	80
The Gambia	10 000	52	54
Guinea	64 000	12	18
Senegal	10 000	20	16
Sierra Leone	35 000	6	12
Nigeria	5 000	—	—

Source : WARDA, 1983.

Tab. 1 : Distribution of mangrove swamp rice area and production in West Africa.

The relative importance of mangrove swamp rice cultivation varies from country as indicated in Table 1.

CONSTRAINTS TO RICE PRODUCTION IN MANGROVE SWAMP

Research findings have indicated that the farmer can double his output but yield remains low which could be due to constraints below :

PHYSICAL/ENVIRONMENTAL

Variation in salt-free period and in depth and duration of tidal inundation of these swamps also impose serious limitations of the type of rice that can be grown successfully in different mangrove swamps.

Salinity and acid sulphate conditions are the major problems encountered on adverse soils in mangrove swamp environments.

Intensities vary depending on climate, hydrology, relief and method of land management.

The advent of lower rainfall especially in the Sahelian/Savanna zone during the last two decades has aggravated the constraints to rice production soils among which are the following :

— Toxicity from Al and Fe

— Deficiencies of phosphorus and N

— Salt injury

— Brown spot infestation

— Acidity

BIOLOGICAL CONSTRAINTS

Varieties : Low yielding varieties most of them are susceptible to pest and environmental stresses of mangrove swamp.

Pest : weeds diseases, insects and crabs.

SOCIO-ECONOMIC CONSTRAINTS

Farmers are constrained by limited labour, transportation, extension and education, and by lack of credit and imput.

TECHNOLOGY DEVELOPMENT AND DISSEMINATION

Research for development of mangrove swamp rice in West Africa started in the 1920's. The early experimental activities in the Casamance region of southern Senegal, Guinea and Sierra Leone were isolated and unco-ordinated. From its inception in 1934 the Rice Research Station (RRS), Rokupr in Sierra Leone had focussed on varietal improvement aimed at developing superior varieties for cultivation in mangrove swamps. In the late 1960, a series of high yielding early maturing varieties were selected which included BD 2, ROK 4 and ROK 5.

West Africa Rice Development Association (WARDA) established a special project at Rokupr in 1976 to develop technologies for increasing mangrove swamp rice production throughout the region. The approach taken was multi-disciplinary based five broad responsibilities, namely, varietal improvment, soil and crop management, pest management, Technology Assessment and Transfer and Training. Promising techniques were evalueted through on-farm trials in a Technology Assessment and Transfer Programme in Guinea Bissau, The Gambia, Guinea, Senegal, Sierra Leone and Nigeria. Active farmer participation in the technology development was emphasised. As a result a number of appropriate technologies were identified by mid- 1980's.

Thus, in 1990 WARDA initiated a new Network Project for two years, hings, to maximize the transfer of improved technologies, especially to National Agricultural Research Systems working in the mangrove rice environments.

With WARDA's supportive role, the national research scientists undertook extensive varietal on-farm trials to test the acceptability to the farmers and adaptability of the varieties to the various mangrove ecosystems. The outcome of the trials were successful. All the national programmes in collaboration with farmers selected promising rice varieties for multiplication to be distribued to farmers (Table 2).

Gambia	Guinea	Guinea Bissau	Senegal	Sierra Leone
Rohyb 6	BA8A	Allday	B41 40-CPN	CP 4
ROK 5	B38D2	BG 380-2	BR 51-120-2	Rohyb 6
Kuatik Kundur	Ballanta	BG 400-1	ROK 5	ROK 5
WAR 1	Barrka Madina	Palay	WAR 81-2-1-3-2	ROK 10
WAR 77-3-2-2	Dissi Rouge	RD 15	WAR 100-2-15-1	ROK 23
WAR 115-1-2	Kaolaka	Rohyb 4	WAR 115-1-2-10-5	Kuatik Kundur
Kumba Ndingo	Rohyb 6	Rohyb 6		WAR 1
	ROK 5	Sandeya		WAR 77-3-2-2
	Tamba Yegueti	WAR 1		
	WAR 1	WAR 77-3-2-2		
	WAR 73-1-M1			
	WAR 77-3-2-2			
	WAR 100-6-2-1			

Table 2 : Promising Rice Varieties multiplied for Mangrove Swamp Environment in the region.

Often farmers acceptance of any variety was based on some factors other that yield potential. Adoption studies conducted in Sierra Leone and Guinea showed that mangrove swamp rice farmers acceptance of any variety was based on ease of threshing, ease of cooking and the amylose content of rice.

Other acceptance factor noted in The Gambia, Senegal and Guinea Bissau, included, height of crop for ease of harvesting, panicle size, high yielding ability and tillering ability.

CONCLUSION

For over 100 years, swamp rice production in West Africa has been undertaken by farmers with limited inputs under adverse saline and acid sulphate conditions. However, some of the fertile soils have been benefited by regular deposits of silt left during annual flooding. It has been noted that well focussed applied and adaptive research combined with efficient extension activities can sustain yields far beyond 2.0 t/ha during the next decade. Due to declining rainfall there is need for shorter cycle varieties with greater salinity and sulphate acidity tolerance. In addition, future research should also focus on trials such as grain quality, ease of threshing, ease of cooking, amylose content and taste which affect varietal adoption by farmers.