



The Republic of the Gambia  
Ministry of Agriculture



---

**NATIONAL RICE SEED DEVELOPMENT STRATEGY (2022-2030)**

---

NOVEMBER, 2022

## EXECUTIVE SUMMARY

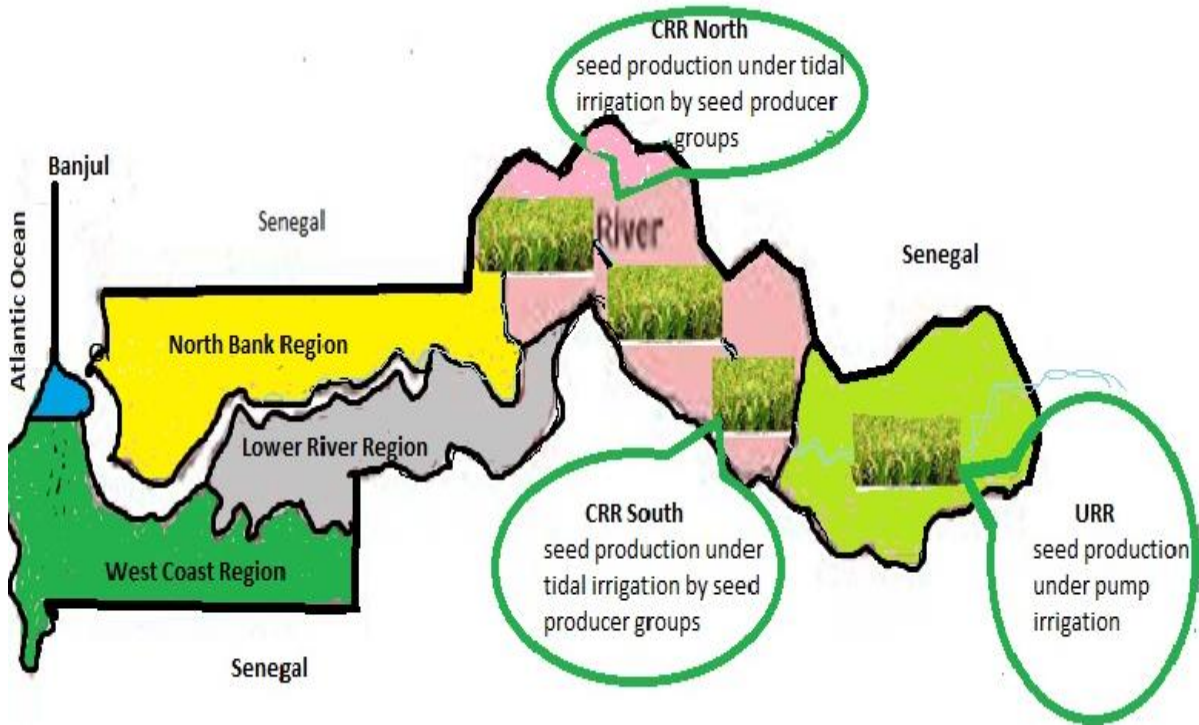
The Gambia is an agricultural country, with an estimated 70% of the population depending on agriculture for food and income. The country has a total arable land area of 558,000ha and about 323,640ha or 58% is cropped annually. In addition, agriculture accounts for about 26% of Gross Domestic Product (GDP) as at 2021 and approximately 90% of domestic export earnings. The Gambia has a total of 216,121 ha of lowland ecologies suitable for rice production, out of which about 81,120 ha are considered suitable for pump irrigation. Correspondingly, per capita rice consumption in The Gambia is 117kg, some 106% above the world average of 56.9kg. The annual requirement stands at about 275,257 tons in 2021 of which only 19% is produced locally and the deficit is met through importation. And this claims a large chunk of the national foreign exchange reserves.

Rice seeds are presently produced and distributed through both the formal and informal sectors. Under the formal sector, the National Seed Secretariat serves as the public arm of Government charged with the responsibility of seeds and seed related matters. Whereas the National Agriculture Research Institute (NARI) is responsible for production/sourcing of breeder seeds and its maintenance, NSS has the mandate of supervising and ensure quality assurance for all categories of seeds in the country and provides certification. Certified seeds are produced by the formal sector which comprises seed companies and producer groups and the most prominent ones are situated in the Central River Regions of the country.

Rice seed distribution channels are not well defined because of the rudimentary nature of the entire rice seed sector. However, this scenario is changing slightly with the coming of some private seed companies into the rice sector. Seasonal rice seed distribution as aid to rice farmers by agricultural projects, NGOs and other development partners is the predominant way through which rice seed circulates or moves from one point to another in the country.

Improved rice production and productivity will have positive rural income-effect and scarce foreign exchange saving-effect. All of these will have positive impact on overall national socioeconomic growth and the ultimate goal of the Government to utilize innovative measures to effect a shift from the subsistence rice production to a vibrant commercially-oriented production system with an enhanced value addition chain. This will be difficult to attain without a concerted National Rice Seed Development Strategy. A vibrant rice seed sector will play a very pivotal role in the attainment of the national goals set in the NRDS II, therefore, putting in place sound policies and strategies is a prerequisite for the realization of the overall goals of attaining rice self-sufficiency targets set out in the NRDSII.

## MAP OF THE GAMBIA



**Figure 1:** Map of The Gambia showing the Six Agricultural Regions indicating the Predominant Rice Production Areas of the country

## ACKNOWLEDGEMENTS

First and foremost, the Ministry of Agriculture (MOA) is very grateful to the Islamic Development Bank (IsDB) for funding the process of revising the Seed Road Map of 2014 into the more vibrant National Rice Seed Development Strategy. The leadership roles played by the National Agriculture Research Institute (NARI) and the National Seed Secretariat (NSS) in the organization and development of this strategy are highly recognized and well appreciated.

Secondly, the members of the reviewing team who came from different institutions under the MOA and Farmer Organizations have taken time to thoroughly review and update the strategy. Their collective effort is what yielded the insightful information contained in the document. The Ministry, therefore, acknowledges their contributions and is very grateful for their efforts. Special mention must be made of the rapporteur Dr. Lamin B. Sonko, who incorporated all comments and contributions, and drafted the document.

Thirdly, the strategy was prepared under the technical guidance of the Coalition for African Rice Development (CARD). The technical guidance and personal contributions by the CARD consultant designated for this assignment, Mr Mike Nasamu has been very significant to the development of this document. The Government is, therefore, very grateful to CARD and specifically the designated consultant for his support.

The Ministry is of the opinion that effective implementation of the RSDS will bring monumental successes in the national quest for self-sufficiency in rice production within the shortest possible time.

## ACRONYMS AND ABBREVIATIONS

AGRA	Alliance for Green Revolution in Africa
ANR	Agricultural and Natural Resources
AVCDP	Agriculture Value Chain Development Project
CARD	Coalition for African Rice Development
CBOs	Community Based Organizations
CPCU	Central Projects Coordination Unit
DOA	Department of Agriculture
DPs	Development Partners
FAO	Food and Agricultural Organization of the United Nations
GBOS	Gambia Bureau of Statistics
GDP	Gross Domestic Product
GIRAV	Gambia Inclusive and Resilient Agricultural Value Chain Development Project
GNAIP	Gambia National Agricultural Investment Plan
IRRI	International Rice Research Institute
JICA	Japan International Cooperation Agency
MOA	Ministry of Agriculture
MT	Metric tons
NACOFAG	The National Coordinating Organization for Farmers Association in The Gambia
NARI	National Agriculture Research Institute
NDP	National Development Plan
NEPAD	New Partnership for Africa Development's
NERICA	New Rice for Africa
NRDS	National Rice Development Strategy
NSC	National Seed Council
NSC	National Seed Council
NSS	National Seed Secretariat
ROOTS	Resilience of Organizations for Transformative Smallholder Agriculture Program
RRVCDP	Regional Rice Value Chain Development Project
RSDS	Rice Seed Development Strategy
RVCTP	Rice Value Chain Transformation Program
VRC	Variety Release Committee

## LIST OF TABLES AND FIGURES

### TABLES

Table 1: Institutions Responsible for Rice Seed Production, Inspection and Supply.....	4
Table 2: Technical Capacity of NARI in Breeder Seed Production .....	6
Table 3: Technical Capacity of NSS in Foundation Seed Production .....	6
Table 4: Current Production, Location and Cultivated Area of Rice Seed in the Last 3 Years .....	7
Table 5: Suitability of Varieties by Ecology.....	8
Table 6: Popular Varieties Promoted by Government.....	9
Table 7: Varieties seen to be Dual Purpose by farmers (Commercial and Subsistence).....	9
Table 8: Name of Institutions and Titles of Officers in Charge of Production and Inspection of Each Class of Seed.....	10
Table 9: Varietal Purity Standards.....	10
Table 10: Field Inspection Procedures and Institutions Responsible .....	10
Table 11: Seed Testing Laboratory Procedures and Institutions Responsible.....	11
Table 12: Current Capacity for Quality Control (Breeder, Foundation and Certified Seeds) .....	12
Table 13: Stakeholders and their Roles in the Rice Seed Value Chain .....	13
Table 14: Price of Certified Seed at Farm Gate and at Market.....	14
Table 15: Rice Seed Needs to meet the Production Target of the NRDS II by the Year 2030 .....	22
Table 16: Target Annual Production per Type of Seed and Gaps to be Filled.....	22
Table 17: Annual Gap between Current Production and Targeted Production .....	23
Table 18: Gap between Required and Available Human Resources for BS Production .....	24
Table 19: Gap between Required and Available Human Resources for Seed Inspection .....	24
Table 20: Areas for Possible Intervention in Seed Production.....	25
Table 21: Areas for Possible Intervention in Seed Inspection.....	26
Table 22: Possible Areas of Intervention in Breeder Seed Development and Supply.....	27
Table 23: Possible Areas of Intervention in Foundation Seed Production and Supply .....	27
Table 24: Possible Areas of Intervention in Certified Seed Production and Supply .....	28
Table 25: Possible Areas of Intervention in Seed Distribution.....	28
Table 26: Possible Areas of Intervention in Financing Seed Supply.....	29
Table 27: Possible Areas of Intervention in Seed Quality Control.....	29

### FIGURES

Figure 1: The National Demand for Rice and Projected Values to 2030 .....	2
Figure 2: Governance Structure of the Implementation of the RSDS .....	19

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	i
MAP OF THE GAMBIA.....	ii
.....	ii
ACKNOWLEDGEMENTS .....	iii
ACRONYMS AND ABBREVIATIONS .....	iv
LIST OF TABLES AND FIGURES.....	v
1. INTRODUCTION .....	1
2. REVIEW OF NATIONAL RICE SEED SECTOR.....	3
2.1 Legislation, Policy, Institutions and Planning Aspect .....	3
2.1.1 Legislations.....	3
2.1.2 Policy .....	3
2.1.3 Institutional Frameworks .....	3
2.1.4 Planning.....	4
2.2. Seed Production.....	5
2.2.1 Quality Assurance.....	6
2.2.2 Human Resources .....	8
2.2.3 Notable Initiatives.....	12
2.3 Supply.....	13
3. CHALLENGES IN NATIONAL RICE SEED SECTOR .....	15
3.1 Legislation.....	15
3.1.1 Policy .....	15
3.1.2 Institutional Challenges .....	15
3.1.3 Planning .....	15
3.2 Production .....	16
3.2.1 Quality Control.....	16
3.3 Supply.....	17
3.4 Financing.....	17
4. VISION AND SCOPE.....	18
4.1 Position of Rice Development Strategy .....	18
4.2 Vision of the National Rice Seed Development Strategy .....	18
The National Rice Seed Development Strategy of the Gambia is anchored on a vision of doubling production of improved quality rice seed from the current 18% by the year 2030. ..	18
4.3. Goal and Scope of the National Rice Seed Development Strategy.....	18
4.4. Objectives of the National Rice Seed Development Strategy .....	18
4.5. Implementation Arrangements of the National Rice Seed Development Strategy .....	18
4.6. Funding Sources.....	19
5.1. Strategic Principles and Approaches.....	20
5.2. Ecosystem Based Seed Development Approach.....	20
5.3. Legislation, Policy and Institutions.....	21

5.4. Seed Production and Inspection .....	21
5.5. Seed Supply/Marketing .....	21
5.6. Target Setting and Gap Identification .....	21
5.6.1 Gap Identification .....	23
5.7. Priority Areas for Possible Intervention .....	25
5.7.1. Legislation, Policy, Institutions and Planning .....	25
5.7.2. Seed Production and Inspection .....	25
5.7.3. Supply and Marketing .....	26
ANNEX 1: Main challenges within the seed value chain, causes and effects on seed sector enhancement and possible solutions .....	30



## 1. INTRODUCTION

The Gambia is a small country located in the west coast of Africa with a total area of 10,689 square km, a population of 2,335,504 (2019 GBOS estimate). About 40% of the population is concentrated in the urban areas while 49% is living in the rural areas with 60% of total population under 25 years of age. The Gambia is an agricultural country, with an estimated 70% of the population depending on agriculture for food and income. The country has a total arable land area of 558,000ha and about 323,640ha or 58% is cropped annually. In addition, agriculture accounts for about 26% of Gross Domestic Product (GDP) and approximately 90% of domestic export earnings. The Gambia has a total of 216,121 ha of lowland ecologies suitable for rice production, out of which about 81,120 ha are considered suitable for pump irrigation. Correspondingly per capita rice consumption in The Gambia is 117kg of which over 50% are imported. In 2017, it was estimated by the Ministry of Trade that close to US\$84 million was spent on rice importation alone, thus claiming a large chunk of the national foreign exchange reserves. In the light of this paradox the Rice Seed Development Strategy (RSDS) is founded on a vision of “self-sufficiency in rice seed production” by the year 2030. The modalities for achieving this set target will be by closing the identified gaps. This strategy is aimed at identifying these gaps and advancing possible intervention options to ameliorate them.

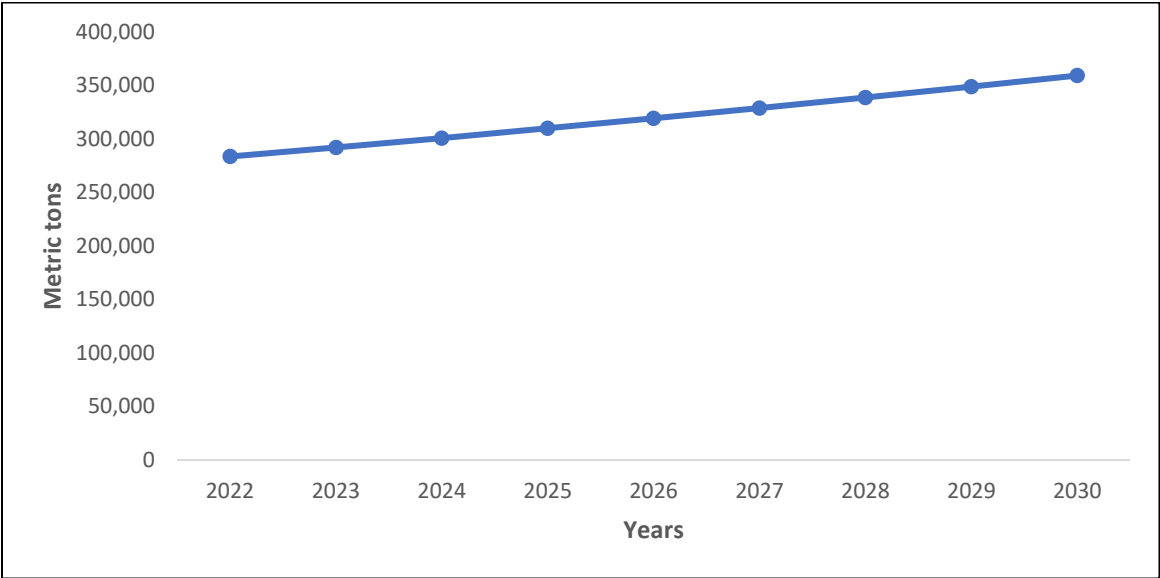
The Gambia lies between latitudes 13° N and 14° N and longitudes 16° W and 14° W except on the Atlantic Coast, the country is surrounded on all sides by Senegal. It is a narrow strip of land, over 400km long and 30 to 50km wide on both sides of The Gambia River, which bisects it. The Gambia is one of the mostly densely populated countries in Africa with approximately 128 inhabitants/km<sup>2</sup>, with a population growth rate of 2.8%. The climate of The Gambia is characterized by a “Sudano-Sahelian” type of climate with a short rainy season from June to October and long dry season from November to May. Maximum precipitation occurs in August and September. The mean annual rainfall which at its height was 1,100mm (1968), now, stands at 900mm. Water resources comprise seasonal rains, ephemeral ponds and depression storage, inflow of River Gambia and two aquifer systems underlying the entire country. The general agro-ecology is predominantly drought sahelian shrub land.

Crop production is carried out in three agro-ecological zones VIZ; Sahelian (<600mm) confined to some parts of central river north; Sudano-sahelian (600-900mm) occurring in north bank, lower river, central river and upper river regions; and Sudano-Guinean (>900mm) found in western, western north bank and southern upper river regions. Land and soil characteristics influence, to a great extent, crop production choices. It is estimated that proportions of suitable uplands actually cultivated range from 57% in Western Gambia to 100% in Eastern Gambia (DeCose, 1992), with the latter having an additional 37% of farms on marginal lands.

Generally, crop production has a wide year to year variation, as it relates to the amount and distribution of rainfall. Groundnut remains the priority cash crop in the Gambia. It is the most intensely cultivated crop and the production process fairly mechanized using animal-traction. The

most important cereal crops grown in the Gambia include rice, millet, maize, and sorghum, as they constitute the staple foods. Rice is the main cereal, because it is consumed in the largest quantity (117kg/person/year) and is grown along the entire topo sequence (strictly uplands to deep flooded environments).

Approximately 300,000ha is put under cultivation for all the major crops. This represents 55% of the total arable land of which groundnuts takes up 40%, followed by millet with 32%, sorghum with 8.6% and maize with 5.6%. The other crops including rice whose importance as a major cereal keeps growing, together accounts for 9% of the total cultivated area. The average total crop production is 337,647 metric tons with groundnuts accounting for 150,000 metric tons in an average year.



**Figure 1:** The National Demand for Rice and Projected Values to 2030

## 2. REVIEW OF NATIONAL RICE SEED SECTOR

### 2.1 Legislation, Policy, Institutions and Planning Aspect

#### 2.1.1 Legislations

The Government of the Gambia is cognizant of the fact that to resuscitate rice production, a functional and sustainable rice seed system has to be in place that will enhance the availability and affordability of good quality rice seeds to rice growers nationwide at all times. To this effect, a National Seed Policy has been prepared and the first ever seed production and marketing Act, has been enacted by the National Assembly in 2014. This Act, Provides the overall legal framework for the regulation, promotion and control of varietal release, seed production, marketing, and seed import/export and quality assurance of seeds. The National Seed Secretariat (NSS) was established in 2014 to oversee the implementation of the Policy and the Seed Act in order to attend the desired objectives of producing and distributing enough quality seeds in the country.

#### 2.1.2 Policy

The Government of The Gambia's strategy to address critical constraints to fast and sustainable development of the agricultural sector includes policy initiatives outlined in the Agricultural and Natural Resources (ANR) sector. One such important initiative is the formulation and validation of the ANR Sector Policy Framework, 2009-2015, which is fully aligned with national goals of *Vision 2020*, and the National Development Plan (NDP) 2018-2021. The policy focuses on key areas that will accelerate the modernization of agriculture, improve productivity and competitiveness, and enhance commercialization, particularly of smallholders, by laying a solid foundation for a sustainable and inclusive growth in agricultural sector. To operationalize the ANR policy, the Government has developed the Gambia National Agricultural Investment Plan (GNAIP). Ensuing from the African Union's New Partnership for Africa Development's (NEPAD) Comprehensive Africa Agriculture Development Program (CAADP) framework, GNAIP re-emphasizes national goals for agricultural development and food security.

The government has initiated a number of strategies aimed at revitalizing most of the critical sub-sectors to accelerate the achievement of the objectives of the ANR. A National Rice Development Strategy (NRDS) has been formulated, under the auspices of the Coalition for African Rice Development (CARD) funded through Japan International Cooperation Agency (JICA), Alliance for Green Revolution in Africa (AGRA) and a consortium of development partners and financial institutions. A seed policy has also been enacted in 2014 and updated in 2018 to guide the production, processing

#### 2.1.3 Institutional Frameworks

In the Gambia, rice seeds are presently produced and distributed through both the formal and informal sectors. Under the formal sector, the National Seed Secretariat serves as the public arm of Government charged with the responsibility of seeds and seed related matters. Whereas the

National Agriculture Research Institute (NARI) is responsible for production/sourcing of breeder seeds and its maintenance, NSS has the mandate of supervising and ensure quality assurance for all categories of seeds in the country and provides certification. Certified seeds are produced by the formal sector which comprises seed producer groups and the most prominent ones are situated in the Central River Regions of the country where dry season rice multiplication under tidal irrigation over rides wet season rice seed production.

Rice seed distribution channels are not well defined because of the rudimentary nature of the entire rice seed sector. However, this scenario is changing slightly with the coming of some private seed companies into the rice sector. Seasonal rice seed distribution as aid to rice farmers by agricultural projects, NGOs and other development partners is the predominant way through which rice seed circulates or moves from one point to another in the country. Overall, the rice seed sectors both formal and informal have great potentials to be tapped if their capacities are built. However, the quality assurance efforts under taken by NSS must be strengthen if these efforts are to be meaningful.

#### 2.1.4 Planning

In the absence of clear national projection on demand and supply of breeder, foundation and certified seeds for the rice sub-sector to guide the process in the rice seed value chain, there is no budgetary allocation in the annual national budget for rice seed production. Before there was no forum through which dialogue amongst public- and private stakeholders involved in rice seed production could take place. Now that the NSS has been established and the National Seed Council (NSC) formulated, it is envisaged that public-private partnership in the rice seed sector will be greatly enhanced. Proper planning is also expected to be enhanced by making national projections on demand and supply of these three seed classes.

**Table 1:** Institutions Responsible for Rice Seed Production, Inspection and Supply

		Name of Institution	Roles/ Responsibility	Legislations/Policies determining responsibility
Breeder Seed	Production	NARI	Sourcing of breeder seeds from AfricaRice, IRRI and NARS	National Agriculture Research Policy
	Inspection	NSS	Purification of improved breeder seeds	National Seed Policy and seed act
	Supply/ distribution	NARI	Provision of breeder seed for foundation seed production	National Seed Policy and seed act
Foundation Seed	Production	NSS	Sourcing and Production	National Seed Policy and seed act

	Inspection	NSS	Field inspection and laboratory testing	National Seed Policy and seed act
	Supply/distribution	NSS	Provision of foundation seeds to certified seed growers	National Seed Policy and seed act
Certified Seed	Production	Seed producer groups, Individuals seed producers, NGOs and seed producing companies and farmer's platform	Provision of certified seeds for the general farming public	National seed policy and seed act
	Inspection	NSS	Field inspection and laboratory testing	National seed policy and seed act
	Supply/distribution	Producer groups, individual seed producers, agriculture extension, seed dealers	Provision of certified seeds	National seed policy and seed act

## 2.2. Seed Production

In the Gambia, by virtue of its nature, The National Agricultural Research Institute (NARI) is charged with the responsibility of producing breeder seeds through its breeding activities carried out by the Crops Research Directorate. Foundation seeds are produced by the NSS under tidal and pump irrigated systems both in the dry and wet season mainly at its Sapu field. Certified seed on the other hand is produced by seed companies which are just newly coming up in The Gambia. The three upcoming ones that are involved in rice seed production includes: Maruo Farms, Salifu Mballow and Sons Company Ltd and MiRA Farms. As there are very few private companies that deal in rice seeds currently, community-based rice seed producer groups produce bulk of the certified seeds that circulate in the country and the most prominent ones are situated in the tidal irrigated perimeters of Central River Region, North and South, where dry season rice seed production dominates (January-May). Below are the most prominent community-based rice seed producer groups;

1. Wellingara Rice Seed Producers Association, CRR, South
2. Jahally Rice Seed Producers Association
3. Madina Nfally Rice Seed Producers Association
4. Saruja Rice Seed Producers Association
5. Sukuta Rice Seed Producers Association

Until the recent introduction of the NERICA L-19 Sub1 and Orylux varieties by the Rice Value Chain Transformation Program (RVCTP), there were no reliable data on the amount of rice seed produced per unit area for rice seed production each year per variety. What is known are the organizations/groups involve, production sites, ecology, seed classes and the varieties produced. Also, there is no distinction between varieties by farmers on the bases of varieties for commercial purposes or varieties for subsistence purposes. The varieties are used for both purposes.

**Table 2: Technical Capacity of NARI in Breeder Seed Production**

Specialization	Number of Technical personnel	Capacity of Technical personnel		Size of land covered per technical personnel	Geographical areas covered per technical personnel	Means of transport (with remarks)	Budget per Technical personnel (with Remarks)
		Knowledge (with Remarks)	Experience (with Remarks)				
Researchers	2	MSc and M.phil	20 Yrs and 5 yrs	0.5 ha	Sapu research station	4X4 Double cabin	
Technicians	6	4 HND 2CGA	10-15 Yrs 2Ys, 30 yrs	0.5 ha	Sapu Research Station	Motor cycles	
Workers/ Labors	4	N/A	1 (40 yrs) 3 (15-20 yrs)	0.5 ha	Sapu Research Station	N/A	
Total	12						

**Table 3: Technical Capacity of NSS in Foundation Seed Production**

Specialization	Number of Technical personnel	Capacity of Technical personnel		Size of land covered per technical personnel	Geographical areas covered per technical personnel	Means of transport (with Remarks)	Budget per Technical personnel (with Remarks)
		Knowledge (with Remarks)	Experience (with Remarks)				
Seed technologist	2	MSc, M.phil	>10 Yrs	20 ha	Sapu research station	4X4 station wagon	N/A
Technicians	8	1 BSc 5 HND 2 CGA	>10 Yrs >10 yrs 5 yrs	20 ha	Sapu Research Station	Motor cycles	N/A
Workers/ Labors	11	N/A	>10 yrs	20 ha	Sapu Research Station	Bicycles	N/A
Total	21						

### 2.2.1 Quality Assurance

The National Seed Secretariat of the ministry of Agriculture is responsible for quality assurance. One part of quality control is field based and the other is laboratory based. The field-based quality control activities include seed field inspection (Three times maximum during the crop cycle) to look for (off-types, recommended isolation distances, field sanitation, pests and diseases etc.) and seed sampling. The laboratory-based ones are seed viability tests (Germination and Moisture Content), seed physical purity tests (Inert Matter, weed seeds, other crop seeds, broken seeds etc.).

### 2.2.1.1 Methods

Currently, seed quality control is basically based on two methods i.e., field based and laboratory-based methods. For the field-based methods, field inspection forms the bases of operations. During field inspection, attention is paid on the following key things: presence of off-types, recommended isolation distance, field sanitation, pest and disease incidents, cropping history of the seed field etc. Seed fields are inspected at least three times in the crop cycle (Vegetative phase, Reproductive phase and Maturity phase) and each inspection involves the participation of the quality assurance unit of NSS.

Upon arrival at the seed fields of plots, depending on the experience of the staffs, two staff are paired to work together. One person into the plot in a schematic manner to take counts using one meter stick, while the other staff enters the figures given by the person inside the plot. Basically, two counts are made, the first count is on the number of rough panicles or number of off-types per meter square and the second count is on the number of panicles on one meter square. The results from the two counts are used to calculate the percentage varietal purity (VP) of that particular plot on the spot and provide the results to the producer and advice the owner of the plot accordingly.

**Table 4:** Current Production, Location and Cultivated Area of Rice Seed in the Last 3 Years

Seed Classes	Total production/ procurement amount (MT)	Name of production stations	Production amount per station (MT)	Cultivated area per station (ha)
Breeder Seed	NERICA L19-sub 1 = 0.650 = Orylux 0.600(Production)	Sapu	0.650	0.111
		Sapu	0,600	0.111
Foundation Seed	41	Sapu	48 MT	15 ha
Certified Seed	426	Jakhally pacharr	426	200

<Year 2014>

Seed Classes	Total production/ procurement amount (MT)	Name of production stations	Production amount per station (MT)	Cultivated area per station (h)
Breeder Seed	NERICA L 19 Sub1= 0.500 Orylux 6 = 0.450	Sapu	0.500	0.925
			0,450	0.925
Foundation Seed	27.6 MT (Production)	Sapu	27.6	9,5ha
Certified seed	NERICA L19-sub1- 28,200 Orylux 6 = 31.050	Wellingara	28.0200	15
		Wellingara	31.050	15

<Year 2020>

Seed Classes	Total production/ procurement amount (MT)	Name of production stations	Production amount per station (MT)	Cultivated area per station (ha)
--------------	---	-----------------------------	------------------------------------	----------------------------------

Breeder Seed	NERICA L19–sub 1 = 0.600 Orylux 6 = 0.550 (Production)	Sapu	0.600	0.925
			0.550	0.925
Foundation Seed	17MT (Production)	Sapu	17 MT	5 ha
Certified seed	Sahel134 = 90.15mt	Niani Sukuta	90.15	38
	WAB 105 = 8.6mt	Niani Sukuta	8.6	2
	IET – 3137 = 82mt	Jakhally	82	20
	FARO44 = 50.15mt	Madina Umfally	50.50	20
	Sahel 134 = 80mt	Wellingara	80	20

<Year 2019>\

## 2.2.2 Human Resources

The Gambia rice seed sector is generally characterized by gross inadequacies in the number of highly trained and skilled human resources for seed inspection, to carry out seed quality assurance operations both in the field and laboratory.

### 2.2.2.1 Human Resources for Seed Production

Currently the National Agricultural Research Institute (NARI) through its rice breeding component is responsible for the provision of breeder seeds. Given the present number and qualification of staff working in this unit, and the financial and material resources at their disposal to execute this huge task, it is impossible to achieve the desired results in the provision of breeder seeds.

**Table 5:** Suitability of Varieties by Ecology

Agro-Ecological Zones	Name of Varieties
Irrigated Lowland	IET 3137
	WAB 105
	TNS 14
	IR 19746
	ITA 212
	Sahel 134
	TCS 10
	WAR 1
	WAR 77
	Jasmine 85
	BG 90-2
	Purple check
	Rain-fed Lowland
BG 90-2	
ITA 212	
TNS 14	
Jasmine 85	
Sahel 134	
Rain-fed Upland	WAB 105
	IR 19746
	P 163



	NERICA 1, NERICA 2, NERICA 4, NERICA 6, NERICA 14
Mangrove	ARICA 6, & 11

**Table 6:** Popular Varieties Promoted by Government

Agro-Ecological Zones	Name of Varieties
Irrigated Lowland	NERICA L-19 Sub1
	Orylux 6
	Sahel 177
	Sahel 134
	Sahel 210
	ISRIZ 7
	FARO 44
Rain-fed Lowland	WAB 105
	Orylux 6
	Sahel 134
Rain-fed Upland	WAB 105
	NERICA 4
	NERICA 6
Mangrove	ARICA 6 & 11

**Table 7:** Varieties seen to be Dual Purpose by farmers (Commercial and Subsistence)

Agro-Ecological Zones	Name of Varieties	Seed Category (Market and/or Subsistence)
Irrigated Lowland	NERICA L-19 Sub 1	Both
	Orylux 6	Both
	Sahel 177	Both
	Sahel 134	Both
	FARO 44	Both
Rain-fed Lowland	WAB 105	Both
	Orylux 6	Both
	Sahel 134	Both
Rain-fed Upland	WAB 105	Both
	NERICA 4	Both
	NERICA 6	Both
Mangrove	ARICA 6 & 11	Subsistence

**Table 8:** Name of Institutions and Titles of Officers in Charge of Production and Inspection of Each Class of Seed

		Name of Institutions	Title of Officer-In Charge
Breeder Seed	Production	NARI	Senior Research Officer,
	Inspection	NSS	Principal Seed Officer,
Foundation Seeds	Production	NSS	Principal Seed Officer
	Inspection	NSS	Principal Seed Officer
Certified Seed	Production	Seed producer groups, individual farmers	Secretary/ Individuals
	Inspection	NSS	Principal seed officer

**Table 9:** Varietal Purity Standards

	Physical Purity (%)	Varietal purity (%)	ECOWAS varietal purity (%)
Breeder Seed	98	99.9	99.90
Foundation Seed	98	99.9	99.90
Certified Seed	99.7	99.7	99.70

### 2.2.2.2 Human Resources for Seed Inspection

The national Seed secretariat is an autonomous agency within the ministry of Agriculture is charged with foundation seed production and quality control duties nationwide. The NSS is currently under staffed by virtue of its enormous mandate.

**Table 10:** Field Inspection Procedures and Institutions Responsible

	Organizations/ institutions in charge of inspection	Frequency and timing of Inspections	Items for Inspection	Inspection Methods	Quality Standard for Inspection
Breeder Seed	NSS	At least 3 times in the production cycle (Vegetative, Reproductive and Maturity stages)	Isolation distant	Use of measuring tapes/quadrant/GPS	5 Meters and above
			Plant spacing	Varietal descriptors	20cm x 20cm
			Field sanitation	Visual assessments	Should be weed free
			Off-types	Visual observation or assessment of off-types (Very good knowledge of the variety is required)	0 % off-type (All off-types are removed)
			Incidences of pests and diseases	Taking scores of pests and disease incidents	0.01% pest free

Foundation Seed	NSS	At least 2-3 times in the production cycle (Vegetative, Reproductive and Maturity stages)	Off-types	Visual observation or assessment of off-types (Very good knowledge of the variety is required)	1.5 to 2 % off-type (all off-types should be removed)
			Isolation distant	Use of measuring tapes	3 meters
			Field sanitation	Visual assessments	99% weed free
Certified Seed	NSS	At least 2-3 times in the production cycle (Vegetative, Reproductive and Maturity stages)	Off-types	Visual assessments	5% off-types (all off-types removed)
			Isolation distant	Use of measuring tapes	3 meters
			Field sanitation	Visual assessments	98% weed free
			Plant spacing	meter stick	20cm x 20cm
			Incidence of pests and diseases	Taking scores of pests and disease incidents)	0.01% pest free

**Table 11:** Seed Testing Laboratory Procedures and Institutions Responsible

	Organizations / institutions in charge of inspection	Items for Inspection	Inspection Methods	Quality Standard for Inspection
Breeder Seed	NSS	Germination percentage	Laboratory analysis	99%
		Moisture content	Laboratory analysis	14% and below
		Physical purity	Laboratory analysis	98%
		Maximum number of red rice	Laboratory analysis	Zero
Foundation Seed	NSS	Germination percent	Laboratory analysis	80%
		Moisture content	Laboratory analysis	14% and below
		Physical purity	Laboratory analysis	98%
		Percentage of other crop seeds	Laboratory analysis	10 seeds/kg
		Inert percentage	Laboratory analysis	2%
		Percentage noxious weed seeds	Laboratory analysis	10 seeds/kg
		Maximum number of red rice	Laboratory analysis	Zero
Certified Seed	NSS	Germination percent	Laboratory analysis	80%
		Moisture content	Laboratory analysis	12% maximum
		Physical purity	Laboratory analysis	98%
		Percentage of other crop seeds	Laboratory analysis	0.10%
		Percentage weed seeds	Laboratory analysis	0,10%

		Maximum number of red rice	Laboratory analysis	2 seeds/500g
		Inert percentage	Laboratory analysis	2%

**Table 12:** Current Capacity for Quality Control (Breeder, Foundation and Certified Seeds)

	Number of inspectors	Capacity of inspectors		Size of land covered per inspector	Geographical areas covered per inspector	Means of transport (with Remarks)
		Knowledge (with Remarks)	Experience (with Remarks)			
Breeder Seed	7	BSc (3) HDA (3) CGA (1)	5 Years 10 Years 5 Years	0.5 ha	1 region 1 region 1 region	Motor cycles
Foundation Seed	7	BSc (3) HND (3) CGA (1)	5yrs 10 yrs 5 yrs	9.5 ha	1 region 1 region 1 region	Motor cycles
Certified Seed	7	BSc (3) HND (3) CGA (1)	5 Years 10 Years 5 Years	200	2 regions	Vehicles Motor cycles
Total	21					

NOTE: The same officers are responsible for inspecting both foundation and certified seed

### 2.2.3 Notable Initiatives

In recent times several interventions were undertaken by various stakeholders in the production, procurement and distribution of rice seeds to farmers as aid. Some of the key notable interventions are itemized below:

- In 2019, the P2RS project supported the production of 310.9 MT of foundation seeds and funded the training of 59 seed growers on seed production techniques
- AVCDP supported rice varietal mapping, installation and training on lab equipment, and production of 44.75 MT of foundation seeds in 2019
- FAO recruited a consultant to capacitate the NSS on seed certification procedures and also funded seed fairs
- The Rice Value Chain Development Project (RVCTP) has supported the production 411 MT of certified seeds of NERICA L-19 Sun1 and Orylux6 are being distributed countrywide
- The GIRAV project also provided 200 MT of certified rice seeds distributed to farmers in the 2022 production season
- The RRVCD project has an amount of \$709,200 earmarked for use on procurement of pre- and post-harvest implements, agrochemicals, customized storage bags, seed sampling bags, rehabilitation of one seed store and seed multiplication fields and upgrading the Sapu seed testing laboratory for the NSS all geared towards enhancing their capability to supervise the production, distribution and marketing of quality seeds.
- The ROOTS project supported the purchased and distribution of 5.3 MT of certified seeds, 70 cartons of herbicides and 160 bags fertilizer (urea).

## 2.3 Supply

Currently, the seed supply chain is not well developed especially for certified seeds largely due to lack of seed companies or seed dealers in the rice seed value chain. The production and supply of breeder seed is done by NARI and foundation seed by NSS. Breeder seeds are sourced from international research organizations like AfricaRice center and IRRI. The breeder seeds are then passed onto the NSS for On-station foundation seed production mainly at Sapu research station under tidal and pump irrigated conditions both in the wet and dry seasons. The foundation seed in some cases is purchased by projects or NGOs for distribution to seed producers for certified seed multiplication

The certified seed production is normally on contract bases between projects and rice seed producer groups, where the project provides the production inputs like fertilizer, foundation seeds and ploughing funds on loan to the seed producers and a contract agreement is signed. At the end of the season, the project buys the seeds from the seed producers for onward distribution as seed aid to rice farmers nationwide for grain production. The seed producers also sell seeds to individual rice farmers at farmer-to-farmer level. Non-governmental organizations also purchase rice seeds from seed growers to distribution as seed aid to rice growers in their intervention areas.

The rice seed supply chain is illustrated below;

NARI Rice Breeding Unit (Breeder seed) → NSS (Foundation seed) → Certified seed producer groups (Certified seed) → Development partners (Agric. Projects, NGOs, CBOs, DPs) → Rice growers (Grain production for consumption).

**Table 13:** Stakeholders and their Roles in the Rice Seed Value Chain

Categories	Stakeholders			
	Market Varieties	Roles played	Subsistence varieties	Roles played
Breeder seed development/ Production/ supply	NARI	Varietal screening, maintenance and purification	NARI	Varietal screening, maintenance and purification
Foundation seed production/ Supply	NSS	On station foundation seed multiplication	NSS	On station foundation seed multiplication
Certified seed production	Seed Growers	On farm seed production	Seed growers	On farm seed production
Distribution of seeds	MoA, DPs, Projects, NGOs and Institutions	Procurement of seeds for distribution to targeted beneficiaries	MoA, DPs, Projects, NGOs and Institutions	Procurement of seeds for distribution to targeted beneficiaries
Financing	MoA, Projects, NGOs and Institution	Provision of financial resources	Projects, NGOs and Institution	Provision of financial resources

**Table 14:** Price of Certified Seed at Farm Gate and at Market

		Currency: (Approximate exchange rate: 1 USD= D50 GMD)	
	Name of Varieties	Farm Gate Price (GMD)	Market Price (GMD)
Irrigated Lowland	NERICA L-19 Sub 1	50.00	80.00
	Orylux 6		
	Sahel 177		
	Sahel 134		
	Sahel 210		
	ISRIZ 7		
	FARO 44		
Rain-fed Lowland	WAB 105	50.00	80.00
	Orylux 6		
	Sahel 177		
	Sahel 134		
	Sahel 210		
	ISRIZ 7		
	Sahel 134		
Rain-fed Upland	WAB 105	50.00	80.00
	NERICA 4		
	NERICA 6		

## 3. CHALLENGES IN NATIONAL RICE SEED SECTOR

### 3.1 Legislation

The challenges of the National Rice Seed Sector are broad-based as there is no separate specific policy on rice seed sector alone. The present policy framework caters for all crops including rice. The policy and legislative aspects of the sector are been addressed gradually. The National Seed Policy was first developed in 2008 and updated in 2018, the National Seed Production and Marketing Act was passed by the National Assemble in 2014 and in October 2015, The National Seed Council (NSC) was inaugurated by the Honorable Minister of Agriculture on behave of His Excellency the President of the Republic. It is evident that these three giant strides are encouraging as they will serve as the foundation stone on which other efforts will be built on.

#### 3.1.1 Policy

The policy and legislative challenges of the rice seed sector include the following; inadequate sensitization on the existence of the National Seed Policy and Act, late formation and inauguration of the NSC and non-existence of budgetary allocation for seed production in the national budget.

#### 3.1.2 Institutional Challenges

Institutional challenges do also exist in the form of inadequate human resources for seed production and certification for all the three classes of seeds (Breeder, Foundation and Certified Seeds), inadequate financial resources for breeder and foundation seed production and seed certification operations, inadequate mobility for staff in the areas of breeder and foundation seed production and seed certification activities and inadequate working tools for breeder and foundation seed production and seed certification activities (Desk top computers, Laptops, GPS, Tablets, Digital Cameras etc.). The rice seed sector also has Infrastructural challenges such as lack of state-of-the-art seed testing laboratories (quality control), lack of state-of-the-art seed processing facilities (Breeder, Foundation and Certified Seeds) and lack of state-of-the-art cold storage facilities for all classes of seeds.

#### 3.1.3 Planning

Planning is very important in the smooth implementation of any seed production system or scheme. The rice seed sector of the Gambia is greatly limited by lack of planning of activities from breeder to certified seed level. A National seed plan was developed in 2018 that encompasses all the major crops including rice but is not being fully implemented, as a result, rice seed production is not well guided, therefore making it almost impossible to allocate a budget line for rice seed production and certification. The rice seed development strategy (RSDS) upon validation will be the operational document for the rice seed value chain in line with the existing Gambia's NRDS framework document.

## **3.2 Production**

Both the formal and informal seed sectors are faced with numerous challenges in rice seed production and can be grouped into; inadequate human resources (number and technical capacity), inadequate financial resources and inadequate infrastructure for seed processing and handling. The institute's capacity to effectively produce and deliver seeds through the formal seed sector channels is limited by the inadequacies in human resources, financial resources and infrastructure. Most of the challenges faced by the rice seed sector are centered on the following areas: Land preparation, Nursery management, Weed Management, Pest and Disease management, Transplanting, Harvesting and Water management

Land preparation is a major challenge for both the formal and informal sectors. The number and age of farm machinery are inappropriate for the area to be prepared, thus, leading to untimely completion of land preparation thereby also affecting other field operations that should follow. Nursery management in certified seed production is a limitation due to low technical capacity of seed producers in nursery management. Weed management is also a big challenge due to scarce hired farm labor to weed the seed fields manually as the usage of herbicides is not a common practice by seed producers. Pests and disease management is another challenge in rice seed production especially for the control of birds that can ravage many hectares of seed fields in a short period of time.

Transplanting is also considered as a challenge due to scarce hired farm labor as it is manually done. Harvesting is manually done using hired farm labor and its scarcity is posing a challenge in rice seed production as this operation is not yet mechanized. Threshing is also another operation that is manually done. A lot of unnecessary time and energy is spent on threshing rice seed because of lack of threshing machines to mechanize the operation that will speed up the process and guarantee the quality of the seeds. Currently most of the rice seed production activities are carried out in the tidal irrigated fields of CRR North and South. The design of the irrigation and drainage system is such that the irrigation canals are also the drainage canals making them dual purpose structures, therefore posing a big challenge in water management in the tidal irrigated rice seed fields.

### **3.2.1 Quality Control**

The National Seed Secretariat (NSS) is the certifying authority and also the custodian of seed quality assurance of all the major field crops that are certifiable including rice. Seed quality assurance is done in two parts. One part is field based and the other is laboratory based all geared towards ensuring seed quality standards are met both at the field and in the laboratory. The field-based quality assurance operations are basically geared towards enhancing two major parameters i.e., genetic and physical purity of the varieties under seed production through regular field inspections to observe the presence of off-types, isolation distances, general field sanitation, pests and disease incidents etc. Field based quality assurance work requires good background knowledge



of the varieties to be inspected (general rice agronomy, morphology, physiology etc.) and field inspection techniques/procedures.

The laboratory-based quality assurance work is meant to investigate and establish the actual viability and also physical purity status of the seeds at the time of sampling by conducting germination analysis, moisture content analysis, physical purity analysis etc.

### **3.3 Supply**

The challenges that face the seed supply system or channels are numerous and greatly affects rice seed circulation and delivery in its right form and quantity. These challenges can be grouped into challenges in the breeder seed development/production, foundation seed production/supply, certified seed production/supply, distribution channels/outlets, financing and quality control.

### **3.4 Financing**

This component of seed production and supply value chain is very critical and is considered as the mover or driver of the entire process. Without financial resources, no seed production and supply activities can be carried out. Not only the availability but the timely availability of financial resources for seed production and supply is indeed key if any meaningful results can be achieved. Key among the challenges in financing seed production and supply are as follows:

- Limited access to credit facilities
- High interest rates

To remedy this situation of gross under funding of seed production and supply mechanisms the following considerations can help improve the system;

- Creation of credit facilities and make them accessible to seed producers
- Advocacy for the reduction of high interest rates for seed producers/farmers

## 4. VISION AND SCOPE

### 4.1 Position of Rice Development Strategy

The National Rice Seed Development Strategy of The Gambia upon validation will be the operational document for the rice seed value chain development in line with the existing Gambia's National Rice Development Strategy (NRDS II) framework document. It is clear that the set objectives in the NRDSII will be difficult to realize in the absence of a sound and functional rice seed production and supply system that will ensure the availability and affordability of good quality rice seeds nationwide.

### 4.2 Vision of the National Rice Seed Development Strategy

The National Rice Seed Development Strategy of the Gambia is anchored on a vision of doubling production of improved quality rice seed from the current 18% by the year 2030.

### 4.3. Goal and Scope of the National Rice Seed Development Strategy

To provide a functional and sustainable rice seed production and supply system that will put equal emphasis on the overall rice seed value chain to ensure the availability of quality rice seed. The RSDS will place emphasis on the lowland production ecologies.

### 4.4. Objectives of the National Rice Seed Development Strategy

**General objective:** To ensure the availability of high-quality rice seeds to farmers at all times

**Specific objectives:**

1. Strengthen the capacity of seed producers and all other actors within the value chain to ensure production of high-quality seed that will increase the farmers' yield
2. To ensure quality of seeds being produced at all levels and a credible supply mechanism
3. Ensure strong institutional linkages for planning purposes and enforcement of seed laws and policies
4. Establish policies to encourage private sector participation in seed business
5. Ensure policies that will make finances available at reasonable interest rates

### 4.5. Implementation Arrangements of the National Rice Seed Development Strategy

The RSDS will be implemented by the Ministry of Agriculture through the collaborative efforts of the National Agricultural Research Institute, National Seed Secretariat, Department of Agriculture and Agricultural projects through the Central Projects Coordination Unit (CPCU). The National Seed Secretariat and the National Seed Council will take the lead in coordination and execution of the activities.

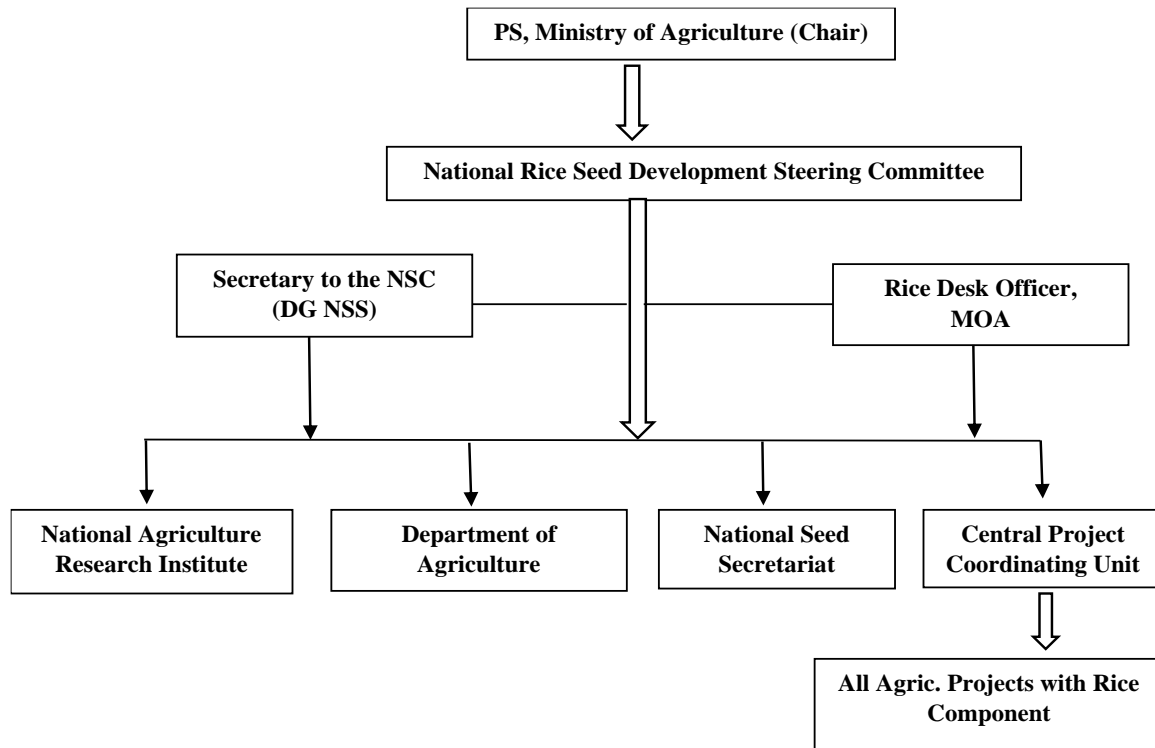
The national level implementation structure of the RSDS will be as follows:

- i. The Permanent Secretary, MOA as Chairperson
- ii. Deputy Permanent Secretary, Projects and Programs, MOA – Rice Desk Officer;
- iii. Director General, NSS - Focal point of the RSDS and Secretary to Committee

- iv. Director General NARI - Co-Secretary
- v. Director General, Department of Agriculture (DOA) - Member
- vi. Coordinator, Central Projects Coordination Unit - Member
- vii. Director, Department of Planning Services, MOA - Member
- viii. President of the apex Farmers' Organization (NACOFAG) - Member

The implementation will be directed by the Permanent Secretary, MOA through the National Seed Council (NSC). The executions of the activities will be carried out by the National Seed Secretariat on behalf of the NSC. The MOA will lead the formulations of policy guidelines related to rice seed in the country and mobilize resources for implementation of its activities.

The National Seed Secretariat will lead in the implementation of the seed regulations, coordinate, administer and carry out all functions of seed quality control and certification. The National rice liaison desk officer will serve as focal point at the level of the ministry and will coordinate and closely communicate with all stakeholders in the rice sector.



**Figure 2:** Governance Structure of the Implementation of the RSDS

#### 4.6. Funding Sources

The funding sources for the implementation of the National Rice Seed Development Strategy of the Gambia will be the government of the Gambia, Development partners and Agricultural Projects.

## 5. STRATEGIES AND PRIORITIES

The implementation of the RSDS will be centered on the following strategic approaches and priority areas: legislation, policy, institutions, seed production, inspection, supply and distribution.

### 5.1. Strategic Principles and Approaches

The strategy will be demand rather than supply driven. It will focus on improving the informal sector which currently dominates the seed supply system through building capacity of farmers on seed selection and safe keeping, while working towards fully establishing the formal system to ensure the production of certified seeds.

The strategic approaches towards attaining the set goal and objectives of the RSDS will be centered mainly on the following:

- i. Upgrading of the irrigated lowland ecology (tidal and pump irrigation) with the potential for all year-round seed production
- ii. Access to market will be a determining factor for the choice of the area
- iii. Encourage agro dealers to engage in seed marketing
- iv. Promoted the highly recognized rice varieties by the national institutions and experts such as: WAB 105, Sahel 134, Sahel 177, ISRIZ 7, FARO 44, NERICA 4 & 6, NERICA L-19 Sub1 and Orylux 6.
- v. Seed inspection officers will be further strengthened to carry out their mandate of seed inspection while efforts will be geared towards ensuring the effectiveness of the recently established seed certification agency
- vi. Create enabling environment for private seed companies to become interested in seed production, this will speed up the transformation to the formal seed system, this could be through subsidy program for seed production, tax incentives etc.,
- vii. In the short run the informal system will be strengthened through capacity building of CBOs to continue to fill the gap as currently obtained.
- viii. Create awareness on the production and usage of quality seeds this will serve as a catalyst to promote the formal seed system

### 5.2. Ecosystem Based Seed Development Approach

The irrigated low land has a comparative advantage with respect to seed production because of the possibility of two season production. Capacity of seed producers in this ecology will be strengthened and existing infrastructures upgraded and new ones developed. Therefore, the strategy will promote seed production in the irrigated perimeters of Central River Region (South and North) and the Upper River Region.

### **5.3. Legislation, Policy and Institutions**

Already established favorable policies will be further promoted such as private sector participation in seed production, marketing and agro dealer's network especially in certified seed, while foundation seeds will also be relinquished to them in the long run.

The enactment and assent of the quality control and marketing regulations and strengthening of the variety release committee (VRC) will be pursued under this strategy. Additionally, the creation of the NSC and its technical arm, the NSS are strategic approaches that are positively transforming the seed sector. Further capacity building to strengthened the personnel in this department need to be vigorously pursued.

### **5.4. Seed Production and Inspection**

The first strategic approach of the National Rice Seed Development Strategy of the Gambia will be to address the capacity needs of breeder, foundation and certified seed production highlighted earlier in this document. The capacity gaps in quality control also will be addressed. The strategic approach will be to provide the required (i) man power, (ii) financial resources (iii) necessary infrastructure and (iv) policy environment to support the establishment of a vibrant, functional, reliable and sustainable rice seed production and supply system through public, producer, private partnerships.

Furthermore, all the three classes of seeds will be given due attention. As stated in seed policy, breeder seeds production will continue to be a public mandate. Foundation seed production will also be a public mandate until such a time when the private sector is able to takeover. Certified seed production is a private sector mandate, through individual seed producers, groups and private seed companies. As stipulated in seed quality control and marketing regulations of the Gambia March 2016, only varieties registered in the National Variety Catalogue will be eligible for certification (Varieties that pass both the VCU and DUS tests).

### **5.5. Seed Supply/Marketing**

Cognizant of the fact that an effective seed supply system will crown all the good efforts put into production and quality control and is supposed to be a private sector led domain. Strategic measures that will create the enabling environment for the private sector to come in and lead in the dispensation of seed supply will be taken. The formation and registration of private seed companies and individual private seed dealers will be highly encouraged.

### **5.6. Target Setting and Gap Identification**

The National Rice Development Strategy aims to increase rice production to about 651, 342 metric tons of paddy by 2030. An average seed rate of 50 Kg/Ha is recommended. At the current productivity level of 3.5 t/ Ha therefore, a seed-grain ration of 1:70 is observed. Approximate amount of rice seeds currently self-supplied by farmers is 82%. Target amount of production to be covered by certified seeds is 18 percent. Under the current awareness status, it is assumed that rice

farmers would replace the seeds on an average of once in 5 years. The target amount of production to be covered by certified seeds will be 36 % from the current 18%.

Based on the analysis of the current rice sector in the Gambia, gaps have been identified which cuts across the entire value chain from seed to seed, and collective measures are required to address all the identified gaps. Therefore, a holistic approach to address all the gaps in the value chain is the best option to be pursued if the set target is to be met.

**Table 15:** Rice Seed Needs to meet the Production Target of the NRDS II by the Year 2030

NRDS2 target production by 2030 is: 651,342MT/year		
Average amount of seed used = 50 kg/ha; Average yield for BS, FS and CS are: 3.0t/ha, 4.5t/ha, & 5t/ha respectively; Seed-Grain ratio is 1:60 for BS, 1:90 for FS and 1:100 for CS		
Approximate quantity of seeds currently self-supplied by or among farmers is 82 %, target amount of production to be covered by CS is 18%. 651,342t: 2030 target paddy production 100; seed grain ratio of CS		
6,513.42t*0.36 (doubling CS production)		
2,344t: the required amount of CS in 2030		
426t: the current CS production (2021)		
2,344-426= 1,917t		
1,917t: the gap to be filled in the next 9 years		
1,917t/9=213t/yr		
Seeds are renewed every 5 years		
Seed Class	Target amount (MT/year)	Area of land required for production (ha)
Breeder	$72/60 = 1.2$	$1.2/3 = 0.4$
Foundation	$6,513.4/90 = 72$	$72/4.5 = 16$
Certified	$651,342/100 = 6,513.4$	$6,513.4/5 = 1,302.7$

**Table 16:** Target Annual Production per Type of Seed and Gaps to be Filled

Seed Category	Target amount (MT/year)	Current Production/ supply (MT/year)	Gap (MT/year)
<b>Breeder</b>	1.2	1.25 (2021)	surplus
<b>Foundation</b>		48 (2021)	$72-48 = 24/9\text{yrs} = 2.7\text{t/year}$
<b>Certified</b>		426 (2021)	$2,344.6\text{t}-426$ $=1,918.8\text{t}/9\text{yrs}=213\text{t/yr}$

Note: the seed demand by 2030 is 6,513.4t but doubling usage we produce 2,344t

## 5.6.1 Gap Identification

### 5.6.1.1 Production

As shown in table 16, a surplus is noticed in the production of breeder seed, whereas there is deficit in foundation and certified seeds. The crucial issue will be to concentrate in closing the gap in the production of foundation and certified seeds.

Some steps required to improve the quality of seeds including the following:

- Adherence to a well-planned cropping calendar
- Provision of good and high yielding varieties
- Capacity building for the researchers and provision of the right research infrastructures
- Provision of suitable farm machineries for production and post-harvest operations
- Good quality control procedures (Routine field inspection, Laboratory seed testing, creating data base of released varieties for planning purposes)
- Good agronomic practices (selection of pure and viable seeds, good nursery and good water management, timely transplanting and harvesting, Pest and disease management, rogueing off-types))
- Proper drying (14% and below), cleaning, bagging and standardization, labelling and tagging and appropriate storage and handling (on pallets, good ventilation environment, and prevention against rodent attack
- Good transportation to avoid varietal mixture

**Table 17:** Annual Gap between Current Production and Targeted Production

Seed Class	Target amount (MT/year)	Current Production/ supply (MT/year)	Gap (MT/year)
BS	1.21	1.25	0.04
FS	72.37	41	31.37
CS	6,513.4	427	6,086.42

**Table 18:** Gap between Required and Available Human Resources for BS Production

Name of Seed Producing Stations	Researcher		Gap in Number	Gap in Capacity
	Required	Available		
Sapu	5	2	3	Seed Science, Breeding, Pathology, Entomology, physiology, Genetic resource mgt.
Total	5	2	3	

**Table 19:** Gap between Required and Available Human Resources for Seed Inspection

Geographical area	Number of Inspectors		Gap in number	Gap in Capacity
	Required	Available		
CRR/S	15	7	8	-Field inspection procedures -Rice Agronomy -Rice Seed Production Techniques -Seed Laboratory procedures - Entomology -Breeding -Seed technology -Pathology etc.
CRR/N	5	1	4	
Total	20	8	12	

### 5.6.1.2. Seed Supply

The ultimate target of the seed supply system is to address all the factors that limit the supply of rice seeds (quality assurance, financial constraints, distribution etc.). The target of the seed supply system is to accomplish the following;

- Strengthen the seed certification authority
- Strengthen the links between input dealers and seed producers
- Procurement and operationalization of seed processing machines;
- Recruiting and Training of more seed inspectors and extension workers
- Creating the enabling environment for private seed companies and dealers to operate smoothly
- Linking seed producers to financial institutions
- Advocacy for the reduction of high interest rates for seed producers/farmers
- Establishment of appropriate packaging and labeling
- Establish well defined transportation channels for the movement of seed
- Establish appropriate database to monitor the availability of seed
- Improving the infrastructural capacity of NSS and seed value chain actors



## 5.7. Priority Areas for Possible Intervention

### 5.7.1. Legislation, Policy, Institutions and Planning

For the overall goals of both the National Rice Development Strategy (NRDS) and the National Rice Seed Development Strategy be achieved, the following points are recommended for action;

#### Legislation and Policy

- Sensitization on the existence of the Seed Policy and Act
- Liberalization of foundation seed production to encourage private seed companies' investment

#### Institutions

- Train and recruit new personnel for seed production and certification
- Procure additional vehicles and motor cycles for field personnel
- Procure desktops, laptops, printers, photocopiers, GPS, mobile phones, tablets and Digital cameras

#### Infrastructure

- Construct modern seed testing laboratories, seed processing facilities and drying floors

#### Planning

- Develop annual national seed production plan and include an annual seed production budget into the National Budget

### 5.7.2. Seed Production and Inspection

The possible interventions to address the issues that affect the performance of the seed production and inspection aspects of the seed system are highlighted in tables 20 and 21 below.

**Table 20:** Areas for Possible Intervention in Seed Production

Issue	Suggestions	Priority			Funding Source
		Short Term	Medium Term	Long Term	
Land Preparation	-Provide credit facilities for seed producers to access the service of farm machinery -Training of machinery operators	✓			Government, Development partners and NGOs
Nursery Management	Training of seed producers on nursery management and on farm demonstrations	✓			Government, Development partners and NGOs
Weed Management	Use of herbicide and timely weeding	✓			Seed producers

Pest and Disease Management	Adhering to cropping calendar, provision of net traps and explosives	✓	✓	✓	Seed producers, development partners and NGOs
Transplanting	Provision of credit facilities for procurement of planters		✓	✓	Government, development partner and NGOs
Harvesting	Provision of credit facilities for procurement of harvesters, threshers, and tarpaulin		✓	✓	Government, development partners and NGOs
Water Management	Improvement of irrigation and drainage systems	✓	✓		Seed producers, Government, development partners and NGOs

**Table 21:** Areas for Possible Intervention in Seed Inspection

Issue	Suggestions	Priority			Funding Source
		Short term	Medium term	Long term	
Cropping history	Proper production record keeping by seed producers	✓	✓	✓	Seed producers
Isolation distant	Penalties for noncompliance	✓	✓	✓	Government
Area of seed field	Training of seed producers on proper demarcation of seed fields	✓	✓	✓	Government, Development partners and NGOs
Variety under production	Training of inspectors on basic rice agronomy	✓	✓	✓	Government, Development partners and NGOs

### 5.7.3. Supply and Marketing

The supply chain of seeds from breeder to certified seeds should operate as one mechanism if the desired results are to be achieved. There are a lot of commonalities in the constraints and challenges faced in the supply of these three classes of seeds. As each class of seed differs from the other in terms of volume and the institutions that handles the distribution, they will be treated individually in terms of possible interventions in the priority areas as follows;

**Table 22:** Possible Areas of Intervention in Breeder Seed Development and Supply

Issue	Suggestions	Priority			Funding Agency
		Short term	Medium term	Long term	
Inadequate human resources	Capacity building for staff		✓	✓	Government and development partners
Lack of budgetary allocation	Inclusion of budgetary allocation in the national budget	✓	✓	✓	Government
Lack of infrastructure (Cool storage, green house etc.)	Provision of gene bank for germplasm conservation		✓	✓	Government and development partners
Lack of farm machinery	Procurement of farm machinery (production and processing)		✓	✓	Government and development partners
Inadequate working tools (office equip.)	Procurement of office equipment		✓	✓	Government, development partners and NGOs
Lack of screen houses	Construction of screen houses		✓	✓	Government and development partners
Inadequate mobility for field operations	Procurement of vehicles and motor cycles		✓	✓	Government and development partners

**Table 23:** Possible Areas of Intervention in Foundation Seed Production and Supply

Issues	Suggestion	Priority			Funding Source
		Short term	Medium term	Long term	
Inadequate seed testing laboratories	Building of modern seed testing laboratory	✓	✓	✓	Government and Development partners
Inadequate seed processing machines	Procurement of seed processing machines	✓	✓	✓	Government and Development partners
Lack of cold storage	Construction of modern cold storage facilities	✓	✓	✓	Government and Development partners

**Table 24:** Possible Areas of Intervention in Certified Seed Production and Supply

Issues	Suggestions	Priority			Funding Source
		Short term	Medium term	Long term	
Seed certification authority	Strengthen the seed certification agency	✓			Government
Inadequate farm machinery for land preparation	Creation of links between credit facilities and seed producers	✓	✓	✓	Government, Development partners, NGOs and private sector
Inadequate seed processing facilities	Procurement of seed processing machines	✓	✓	✓	Government, Development partners, NGOs and private sector
Inadequate production inputs	Creation of links between input dealers and seed producers	✓	✓	✓	Government, Development partners, NGOs and private sector

**Table 25:** Possible Areas of Intervention in Seed Distribution

Issues	Suggestions	Priority			Funding Source
		Short term	Medium term	Long term	
Poor road net work	Construction of inter village road net work	✓	✓	✓	Government and Development partners
Limited specialized seed dealers	Encouragement and involvement of private sector participation	✓	✓	✓	Government, NGOs and private sector

**Table 26:** Possible Areas of Intervention in Financing Seed Supply

Issues	Suggestions	Priority			Funding Source
		Short term	Medium term	Long term	
Lack of credit facilities	Creation of credit facilities and link them to seed producers	✓	✓	✓	Government, Development partners, NGOs and private sector
High interest rates	Advocacy for reduction of high interest rates	✓	✓	✓	Government, Development partners, NGOs and private sector

**Table 27:** Possible Areas of Intervention in Seed Quality Control

Issues	Suggestions	Priority			Funding Source
		Short term	Medium term	Long term	
Inadequate human resources	Recruit and train existing and additional personnel	✓	✓	✓	Government and Development partners
Inadequate financial resources	Inclusion of budgetary allocation in National Budget for quality control	✓	✓	✓	Government
Inadequate seed testing laboratories	Construction of modern seed testing laboratories	✓	✓	✓	Government and Development partners

**ANNEX 1: Main challenges within the seed value chain, causes and effects on seed sector enhancement and possible solutions**

THEMATIC AREAS	ISSUES/CHALLENGES	CAUSES	EFFECTS	SOLUTIONS	WHO PROVIDES THE SOLUTION	SUGGESTION TO POLICY MAKERS
LEGISLATION/POLICY	limited awareness on the existence of the act and policy	Inadequate sensitization on the existence of the national seed policy and act	low performance of the seed industry	Regional level seminars to create awareness on the existence of the National Seed Policy and Act, the content and functionality Use of mass media (Television, Radio, posters and fliers)	MOA, NSS, DPs, FOs	vigorous sensitization at regional and district levels
INSTITUTIONS	Inadequate human resources for seed production and certification 2. Inadequate mobility for staff 3Inadequate working tools (Desktops, Laptops, GPS, Digital cameras)	low employment of highly qualified personnel, 2. lack of replacement of vehicles over the years 3. inability to procure and replace working tools periodically	limited technical capacity leading to under performance of staff	Provision of highly qualified human resources for seed production and certification 2 Provision of more vehicles and motor cycles 3 Provision of working tools (Desktops, Laptops, GPS, Digital cameras)	MOA, NSS, DPs,	advocate for an increase budget to the institutions, and provision scholarships
PRODUCTION	Breeder seed-					

	Inadequate human resource	1. Inability to train breeders over the years 2. High attrition rate 3. Fewer number of people choosing breeding as a career 4. Lack of training programs on breeding at local high education institutions	1. Weak rice breeding program and 2. inadequate breeder seed	1. Development of training plan for rice breeding	1. The Government - Ministry of Agriculture	1. Development of rice breeding training plan 2. introduction of degree program at local universities on rice breeding
	-Lack of budgetary allocation in the National budget	1. Low commitment and limited funding for research and development	1. Bottleneck in training and retaining breeders	1. Increase government funding for research and development	1. Government of The Gambia - Ministry of Finance and Economic Affairs	1. Levy on Agricultural commodities for research and development 2. Advocate for increase budgetary allocation for research and development
	Inadequate research infrastructures (Cold storage, Screen houses etc.)	1. Limited funding	1. Insufficient supply of breeder seed 2. Inability to conserve germplasm 3. Affects the effectiveness and efficiency of breeder production	1. Establishment and maintenance of the existing breeding infrastructure	1. Government of The Gambia and development partners	1. increase development allocation fund to NARI

	Inadequate farm machinery (Production and Processing)	1. high cost of machineries and lack of spare parts to maintain the existing ones	dilapidated and unserviceable machines	1. Procurement of farm machinery 2. Procurement of more transport to facilitate field operations	Government and DPs	Subsidies on farm equipment
	Foundation Seed					
	Inadequate human resources	1. Inability to recruit enough seed specialists 2. High cost of training technicians 3. Limited scholarship opportunities	1. Weaken the capacity of NSS to produce quality and adequate foundation seeds. 2. Limited manpower to conduct field inspection	1. Increase quality recruitment	1. National Seed Council	1. Introduction of degree program at local universities on seed science
	Inadequate budgetary allocation in National budget	1. Limited funding for research and development	1. Bottleneck in training and retaining seed specialists	1. Increase government funding for research and development	1. National Seed Council - Ministry of Finance and Economic Affairs	1. Advocate for the projects to strengthen NSS instead of procuring seeds from other side sources
	Inadequate seed Processing and testing laboratories and qualified operators	High cost of modern processing and laboratory equipment and consumables	1. Affects effective and efficiency of producing foundation seeds	1. Procurement of modern processing and laboratory equipment 2. Training of laboratory processing machine operators and laboratory technicians	1. The Government - Ministry of Agriculture and development partners	1. Zero tax on seed laboratory equipment
	Inadequate of farm machinery for land preparation	1. high cost of machineries and lack of spare	dilapidated and unserviceable machines	1. Procurement of farm machinery (Production and Postharvest operations)	Government and DPs	Subsidies on farm equipment



		parts to maintain the existing ones				
	inadequate mobility and working tool for staff	High cost of vehicles and maintenance	1. Delay in inspection and monitoring activities	1. Procurement of more transport to facilitate field operations 2. Procurement of field vehicles and motor cycles	Ministry of Agriculture and Development partners	Advocate for more mobility for effective and efficient service delivery
	CERTIFIED SEED					
	Inadequate production inputs (fertilizer, herbicide and pesticide)	1. Lack of local fertilizer manufacturing factories 2. High cost of agro-inputs	1. Low productivity	1. Promote private sector investment in agro-inputs production and distributions  2. Overhaul government fertilizer tenders	Agriculture and Natural Resource Sector	1. Development and implementation of fertilizer policy 2. Encourage private sector investment
	Inadequate seed Processing, packaging, and storage facilities	High cost of modern processing, package and storage facilities	Delay processing resulting in high post-harvest, land loss viability	Acquisition of seed processing, package, and storage facilities	Ministry of Agriculture and development partners	Advocacy for availability of seed processing, packaging and storage facilities
	-Inadequate extension support to seed producers	1. Weak collaboration between NSS and extension 2. High extension farmer ratio	1. Limited coverage on field inspection 2. Seed technology transfer is affected			1. Training of extension agents on seed quality control 2. Development and inclusion of seed science certificate, Diploma,

						Degree programs.
	Inadequate farm machinery (land preparation, Production and Processing)	1. high cost of machineries and lack of spare parts to maintain the existing ones	dilapidated and unserviceable machines	1. Procurement of farm machinery (Production and Postharvest operations)	Government and DPs	Subsidies on farm equipment
MARKETING	Poor road net work					
SUPPLY		1. Type/nature of variety 2. late planting of dry season rice fields 3. Climate change effects in Sahelian regions	High rate of pre-harvest losses;	1. Timely planting of dry season rice fields (cropping calendar)  2. Effective and efficient scaring mechanism	Agriculture and Natural Resource Sector	
INSPECTION/ QUALITY CONTROL	Inadequate human resources	High cost of modern equipment	Affects effective and efficient service delivery	Procurement and training on the use of the tool and equipment	The government of The Gambia	Form linkages with center of excellence
		High cost of vehicles	delay in operation resulting in inefficiency	Facilitate procurement of vehicles and motorcycles	The government of The Gambia	Increase funding for the Ministry of Agriculture

		<ol style="list-style-type: none"> <li>1. Inability to recruit enough seed quality control and certification</li> <li>2. High cost of training technicians</li> <li>3. Limited scholarship opportunities</li> <li>4. Lack of human resource unit</li> </ol>	<ol style="list-style-type: none"> <li>1. Weaken the capacity of NSS to support production of quality and adequate certified seeds.</li> <li>2. Limited manpower to conduct field inspection</li> </ol>	<ol style="list-style-type: none"> <li>1. Increase quality recruitment</li> </ol>	<ol style="list-style-type: none"> <li>1. National Seed Council</li> </ol>	<ol style="list-style-type: none"> <li>1. Introduction of degree program at local universities on seed science</li> </ol>
	Insufficient knowledge of varietal characteristics by some inspectors and Seed certifiers	<ol style="list-style-type: none"> <li>1. Lack training policy at NSS</li> <li>2. Limited knowledge sharing</li> </ol>	<ol style="list-style-type: none"> <li>1. Improper varietal characterization</li> </ol>	<ol style="list-style-type: none"> <li>1. More trainings on DUS and VCU training</li> <li>2. The higher education institution meeting the training demands</li> <li>3. Short-term internship to centers of excellence</li> </ol>	<ol style="list-style-type: none"> <li>1. University of The Gambia and international research institutions</li> </ol>	<ol style="list-style-type: none"> <li>Advocate for development of an MoU with UTG to introduce degree program in Seed Science</li> </ol>
	Inadequate equipment	<ol style="list-style-type: none"> <li>1. Unavailability of the equipment locally</li> <li>2. High cost the equipment</li> </ol>	<ol style="list-style-type: none"> <li>1. Limited analytical capability</li> </ol>	<ol style="list-style-type: none"> <li>Provision of adequate equipment</li> </ol>	<ol style="list-style-type: none"> <li>Government and DPs</li> </ol>	<ol style="list-style-type: none"> <li>1. Strengthen seed laboratories</li> <li>2. Activation of the seed revolving fund</li> <li>3. Levy laboratory fees/charges</li> </ol>
	No reporting system on sub-standard seeds	<ol style="list-style-type: none"> <li>1. Unawareness of seed users</li> </ol>	<ol style="list-style-type: none"> <li>unreported cases</li> </ol>	<ol style="list-style-type: none"> <li>1. Creation of reporting of system</li> <li>2. Awareness creation</li> </ol>	<ol style="list-style-type: none"> <li>NSS</li> </ol>	<ol style="list-style-type: none"> <li>Advocate for the creation of seed reporting system</li> </ol>

PLANNING	Lack of long-term national seed production plan	the necessary institution are lacking	no knowledge of the quantity of rice seed in the system	Develop annual national seed production plan	NSS, NARI, DOA, DOP	Make available logistical support for data collections
	Lack of National budget for seed production	the ministry did not see the need to provide budget for seed	lack of well-developed seed sector	Inclusion of seed production budget into National Budget	NSS, NARI, MOA DOA, DOP	need for separate budget for the seed sector
INFRASTRUCTURE	Lack of State-of-the-art Seed testing laboratories	No budgetary allocation and high cost of establishing	affect the effectiveness and efficiency of seed quality control and certification services	Provision of modern seed testing laboratories	MOA, DPs	provision of modern seed laboratory structure and equipment