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New seeds for poor women?
Reflections on the Multinational New Rice for Africa (NERICA)
dissemination project
in Sierra Leone

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Abstract

The introduction of new farming technologies, such as high-yielding varieties, has for long been regarded as one of the best strategies to increase agricultural production, and to combat poverty and food-insecurity. Since around 2005, New Rice for Africa (Nerica) is one of the main development strategies for combating such issues in Sierra Leone, and in many other African countries. Africa Rice Center, the funding agency, has promoted Nerica as a pro-poor and women-friendly technology although, very few impact and dissemination studies have been conducted on Nerica's actual performance as well as of poor farmers' perceptions of the technology.

This study aims to help fill such gaps by researching the dissemination and adoption process of Nerica in Sierra Leone, by a) studying what determines the process of adoption and, b) studying how poor women farmers' actually experience Nericas. Two of the four districts under the Nerica dissemination project were targeted, Kambia and Moyamba as well as one district where Care Sierra Leone work with Nerica, Koinadugu. In total, 17 farmer associations were targeted and 41 people were interviewed, as well as other stakeholders, in a semi-structural manner both individually and in focus groups. Methods such as wealth-rankings and participant observation also formed part of the study.

With assistance from recognized adoption and diffusion theories, I show how adoption decisions on Nerica are affected by a) the dissemination of information and management, b) the technological attributes of Nerica as well as, c) farmers socio-economic conditions and constraints (i.e. access to labour, land, and extension services). I argue that farmers' socio-economic conditions and constraints particularly, determine their initial access to Nericas. Since virtually all parts of the Multinational Nerica dissemination project in Sierra Leone is skewed in favour of the more socio-economic powerful: information dissemination, targeting strategies by extensions' and reliance on local farmer associations. This has implications for poor women's abilities to access Nerica since poor women often lack access to precisely the socio-economic conditions termed important to become targeted. Consequently, the women-friendly targeting aims of having a gender parity of 80 percent women and 20 percent men enrolling in the project have not been met. I argue that one of the explanations behind this is a low correlation between the high targeting aims of the project and extensions' actual targeting strategies, since extensions' are lacking directives and awareness on how to work with power dimensions and gender issues in the field. I therefore criticise the claim that Nericas are pro-

women and pro-poor, in the case of Sierra Leone. Although, there exist positive examples on how Nerica for some women have been the catalyst for changing access to resources.

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The MFS Scholarship Programme gives Swedish university students the opportunity to carry out fieldwork in a Third World country. The extent of the work can lead to Bachelors or Masters Degree. The studies focus on areas and issues of relevance for development problems, and are conducted in countries supported by Swedish development assistance.

Sida's main purpose with the MFS Scholarship Programme is to stimulate the students' interest in, and increase their knowledge about, as well as their understanding for, developing countries and development issues. The MFS scholarships provide the students with practical experiences of the conditions of development. A further aim for Sida is to strengthen co-operation between Swedish University Departments, Institutes and organisations in countries in Africa, Asia and South- and Central America.

The Department of Social and Economic Geography at Lund University is one of the departments that administer MFS Programme funds.

Acronyms

ABD	African Bank for Development
ADF	African Development Fund
ARC	Africa Rice Center
CGIAR	Consultative Group on Agricultural Research
DFID	UK Department for International Development
F/A	Farmers Association/s
FAO	Food and Agricultural Organization
JICA	Japan International Cooperation Agency
MAFFS	Ministry of Agriculture Forestry and Food Security
NRDS	National Rice Development Strategy
PRSP	Poverty Reduction Strategy Paper
RIU	Research into Use
SADev	Sustainable agricultural development
SLARI	Sierra Leone Agricultural Research Institute
SMP	Seed Multiplication Programme
UNDP	United Nations Development Programme
WARDA	West Africa Rice Development Association
WFP	World Food Programme

Table of Contents

TABLE OF CONTENTS	5
CHAPTER 1. INTRODUCTION	6
1.1 BACKGROUND AND MOTIVATION	6
1.2 PURPOSE OF THE STUDY	7
1.3 RESEARCH QUESTIONS.....	7
1.4 BACKGROUND ON NERICA.....	8
1.5 NERICA IN SIERRA LEONE	9
<i>Figure 1.5.1 The organization of the multinational NERICA dissemination project in Sierra Leone.</i>	12
CHAPTER 2. METHODOLOGY	13
2.1 DATA COLLECTION AND ANALYSIS	13
2.2 METHODOLOGICAL STARTING POINTS	14
2.3 LIMITATIONS OF THE STUDY	15
CHAPTER 3. LITERATURE REVIEW/THEORETICAL FRAMEWORK	16
3.1 DIFFUSION AND ADOPTION OF NEW TECHNOLOGIES	16
3.2 THE COMPLEXITY AND DIVERSITY OF LOCAL KNOWLEDGE- AND SEED SYSTEMS OF SIERRA LEONE.....	17
3.3 GENDER ASPECTS OF RICE FARMING IN SIERRA LEONE.....	19
CHAPTER 4. ADOPTING NERICAS – WHAT DETERMINES THE PROCESS OF ADOPTION?	21
4.1 DIFFUSION OF INFORMATION AND MANAGEMENT.....	21
4.2 HOW DO FARMERS PERCEIVE THE ATTRIBUTES OF NERICAS?	24
<i>Table 4.2.1 Pattern of rewards for different crops</i>	25
4.3 FARMERS ASSOCIATIONS UNDER THE MNDPSL	29
4.4 HOW PRO-POOR WOMEN ARE NERICAS?	31
4.5 POSITIVE EFFECTS OF WOMEN-FRIENDLY TARGETING.....	34
CHAPTER 5. THE ISSUE OF ACCESS TO DEVELOPMENT INPUTS FOR VULNERABLE GROUPS	36
5.1 SYNTHESIS.....	36
REFERENCES	39
APPENDICES	46
<i>Appendix 1.1 Map over farmer associations interviewed</i>	46

Chapter 1. Introduction

1.1 Background and motivation

Sierra Leone is still recovering from the effects caused by the civil war, which tormented the country between 1991-2002. A rebuilding process has been taking place in recent years, and Sierra Leone has been experiencing economic growth and relative political stability (RIU 2008). Still, Sierra Leone remains one of the poorest countries in the world with foreign aid contributing to about 40 percent of the government's annual budget (Woolcombe 2009). Sweden is one of the donors and contributed 14 million Swedish crowns in 2008 (SIDA 2009). 70 percent of Sierra Leoneans live on less than a dollar per day, with unemployment and food insecurity being two of the major challenges (DFID 2009). A majority of the poor live in the countryside and work in agriculture, which employs 75 percent of the labouring population (RIU 2008:2).

88 percent of the total area under agricultural production is devoted to rice cultivation in Sierra Leone. Rice is also a crucial component in the daily diet of most Sierra Leoneans. Farming in the country could be regarded as "hard", with generally low yields and input levels in the subsistence production, as well as poor transport and marketing systems (Jackson et al 2007:5). These conditions constrain the comparative advantage domestic rice production has on imported rice and are among the reasons for Sierra Leone only meeting 71 percent of its total rice requirements. Other reasons include a growing demand for rice (see Jackson et al 2007, PRSP II 2009).

Given the numbers of poor people working in the farming sector, increased agricultural production is often regarded as one of the best means to combat poverty and food insecurity, and to intensify the agricultural sector, as well as develop a country by raising GDP-figures. Historical precedents for concentrating on agricultural development, among other sectors, in order to reach general growth stretch back to 18th century (Lipton 2005:viii). Jackson with colleagues estimate that a 15 percent increase in rice yields would lift 80 000 persons out of food poverty and lift 50 000 out of general poverty in Sierra Leone (Jackson et al 2007:5).

According to the 2008 UN Human Development Report, Sierra Leone has the worst gender inequality in the world (UNDP 2008). Women also perform the majority of the subsistence farming in the country, and are among the poorest of the poor (Kroma 2002). The benefits of poverty reduction strategies, in the form of agricultural projects targeted towards

women, are threefold; increased agricultural production, poverty reduction and increased empowerment of women.

Other regions in West Africa and Asia have partly solved similar food and poverty dilemmas by introducing of new technologies, such as – high-yielding rice varieties like the New Rice for Africa (Nerica) (FAO 2006). Nerica was introduced to Sierra Leone in 2004. So far, no studies on the subject have been conducted (JICA 2006).

In summary, Sierra Leone shows many of the typical characteristics of the most disadvantaged countries in the world, since it is a poor country affected by war, with a large part of the working population involved in agriculture, and it exhibits a high rate of poverty with women being particularly affected. Furthermore, during the past decades, agricultural growth in Sierra Leone has relied more on land-extensive cultivation practices rather than on land-intensive ones, which leaves room for possible intensification techniques such as Nericas (Jackson et al 2007).

1.2 Purpose of the study

The purpose of this study is to research the dissemination and adoption of Nerica in Sierra Leone and relate this to poor farmers' and especially poor women farmers' experiences of the technology in relation to ARC's aims and claims, such as that Nerica is pro-poor and pro-women. The study will also discuss the process by which Nericas are adopted and some of its positive and negative effects. The formation of bottlenecks in the dissemination process will be outlined.

1.3 Research questions

On dissemination:

- How is the Nerica dissemination project organized, and how does it function?
- What determines adoption decisions on Nerica?
- What are the incitements for poor people to adopt, or not adopt, Nerica?
- What are the opinions about, and experiences of, growing Nerica among poor women in Sierra Leone?

1.4 Background on Nerica

Nerica was developed by Africa Rice Center¹ (ARC) in 1996 by interbreeding² “the high-yielding *Oryza sativa* of Asian origin and the low yielding *Oryza glaberrima* of African origin through embryo rescue techniques” in the year 1996 (NRDS 2009:13). In 2000 the technology was named Nerica, or Nericas seeing as the technology includes numerous varieties. In 2005, 18 upland varieties as well as several lowland varieties were released in West Africa, after participatory variety selection among farmers (WARDA 1998).

The general objective of the development of Nericas is to alleviate poverty and increase the member countries’ food security by increasing the productivity and profitability of the rice sector in “sustainable ways” (WARDA 1998). According to ARC, Nerica has qualities derived from both rice strains such as being high-yielding, of short duration character, soil-nutrient responsive, and tolerant against local stresses such as drought and weeds. Moreover, the organisation claims that Nerica is as a pro-poor³ technology, since it was designed with respect to poor people’s problems and conditions/livelihoods, such as low yields and minimal application of inputs. Furthermore, ARC argues that the Nericas, which are predominantly upland varieties, particularly benefit women farmers, since upland rice production in general, is dominated by women cultivating, traditional low-yielding varieties (Agboh-Noameshie et al 2007:2). Supporters have also claimed that Nerica could be regarded as a cornerstone in the process of making a green revolution happen in Africa (Grain Briefing 2009). The Nerica project’s focus on short, high-yielding rice varieties and fertilizers resembles the strategies which facilitated the green revolution in Asia (see Manning 2000).

The design of Nericas and the attempt to focus on needs and interests of poor small-scale farmers, and especially women farmers, can be regarded as an effort to try to avoid some of the negative effects and/or poor outcomes experienced by these groups during the green revolution in Asia, as well as during earlier development interventions in Africa and to create a more equitable “green revolution” (for a discussion see Jiggins 1986, Basile 2001, Doss 2001).

¹ Formerly known as West Africa Rice Development Center (WARDA).

² Monty Jones, a plant breeder of Sierra Leonean origin, was in charge of the development of Nerica. Jones was earlier connected to the Sierra Leone Agricultural Research Institute (SLARI) at Rokupr (Mohapatra 2007).

³ Pro-poor agricultural technologies (PPAT) could be defined as means to reach pro-poor growth, and as technologies that are serving the contextual interest of the poor. PPAT are technologies that a) poor people have a capacity to adopt and, b) are raising the incomes and the productivity for the poor in different ways (see Kappel et al 2005).

ARC has been heavily subsidized by funds from the Japanese International Cooperation Agency (JICA), Rockefeller Foundation, UNDP and others, and funding was further increased in an attempt to stimulate the production of Nerica among West African countries in particular (WARDA 2008:45). In 2005, the African Development Bank (ADB) granted seven West African countries loans of 35 million dollars to encourage the dissemination and production of Nericas in tandem with investments made by the countries' governments and other development agencies. Sierra Leone was one of those countries (ADF 2003).

1.5 Nerica in Sierra Leone

Food security and increased agricultural production have been major development priorities in post-war Sierra Leone since 2002, when the former president of Sierra Leone, Mr Kabbah, initiated Sierra Leone's Food Security programme "Operation Feed the Nation" with the aim of reaching a level of food security in five years time (Jackson et al 2007). The programme was followed by policy papers such as the Poverty Reduction Strategy Paper (PRSP-SL II), which highlights the crucial role agriculture plays in Sierra Leone's post-war strategies regarding rehabilitation, food security⁴, employment and economic growth (PRSP-SL 2005). Synergetically, the rice sub-sector was emphasised since rice forms the bulk of the daily diet for most Sierra Leoneans, and almost all farming households cultivate the grain. Moreover, 88 percent of all area under agricultural production in the country is devoted to rice. 2/3 of this area is devoted to upland rice production and 1/3 is devoted to lowland/swamp production (Jackson et al 2007).

Reviews pointed out the problems of the rice-sector with particular concern for small-scale farmers. Post-war plans included facilitating the return of displaced persons to their farming homesteads and rehabilitating farms. The sector's general problems included low yields, low levels of mechanisation and inputs, poor market links, and high transport costs (PRSP-SL 2005). Strategies were outlined to intensify the rice production of the country through the diffusion of improved rice varieties, to enhance the accessibility of inputs and to embark on rice management training through farmer field schools (Jackson et al 2007).

President Kabbah's optimistic food-security aim was never realised, but the country's rice production increased from 422 065 metric tons in 2002 to 637 983 in 2007, which raised the

⁴ "Access by all people at all times to sufficient food to meet dietary needs for a productive and healthy life" (USAID 1992:1).

level of rice self-sufficiency from 57.4 to 71 percent. Pre-war rice production was around 500 000 metric tons per annum. On the other hand, the population has increased from around 4 million to 7.3 million since the beginning of the 90s (NRDS 2009, UNDP 2010). The national assets based headcount for poverty also show that such poverty has decreased from 67.5 percent in 2003 to 61.6 percent in 2007 (PRSP SL II 2009:42-43).

The multinational Nerica dissemination project in Sierra Leone (from now on MNDPSL) is one of the main strategies for combating problems facing the country's rice sector since the off-season of 2005, although participatory variety selection on Nerica began in 1997 (PRSP SL Progress Report 2006:6). As table 1.3.1 (below) indicates, MNDPSL is financed in tandem by The Government of Sierra Leone (GovSL), ADB, Japan International Cooperation Agency (JICA) and other stakeholders, and is directed by both SLARI at Rokupr and the Ministry of Agriculture and Food Security of Sierra Leone (MAFFs). The latter has for the purpose of Nerica created a Project Coordination Unit (PCU) which coordinates the project in cooperation with national and local extension systems.

Due to post civil war instability, only four of Sierra Leone's fourteen districts are involved in the project; Kambia, Port Loko, Western Area and Moyamba. Irish Aid and NGOs such as Concern SL, Care SL, and Christian Aid have been or are currently working with the technology in other districts, which are not yet covered by the multinational project, such as Koinadugu, Bombali and the Tonko Lilli district (Personal communication Freetown 5/12-09 Bo 15/1-10, Kabala 22/1-10 Freetown 2/2-10).

In 2004, Nerica 1-6 was released and adopted by farmers. In 2007, two lowland varieties L19 and L20 were released and in 2009, Nerica 8-10 were also being multiplied and in some cases, produced in the country. Although it is problematic to calculate, lists of inputs supplies for farmers under MNDPSL point in the direction of that approximately 10 000 farmers are currently taking part in the project⁵ (MAFFs 2009). According to MAFFs, the objectives of the project are to increase yields and intensify the agricultural sector by increasing the levels of inputs, develop feeder roads, create market centres, as well as to assist farmers with tools, management training and analytical skills. In doing so, MAFFs aims to take farmers out of poverty and facilitate economic growth by making use of Nerica technology (personal communication, MAFFS, Freetown 3/12-09).

Overall, the belief in what Nerica can achieve is explicit in all the recent PRSP papers: "enhanced production of Nerica will lead to national self-sufficiency in the short term and to

⁵ Spontaneous dissemination effects among farmers themselves have to be added together with the provision of seeds from NGOs.

food security in the medium to long term” (PRSP SL Progress Report 2006:6). The PRSP-II paper states that it is necessary to intensify “supply chains for inputs (such as) high-yielding seed varieties (like) Nericas and ROK⁶s” (PRSP-II 2009:47).

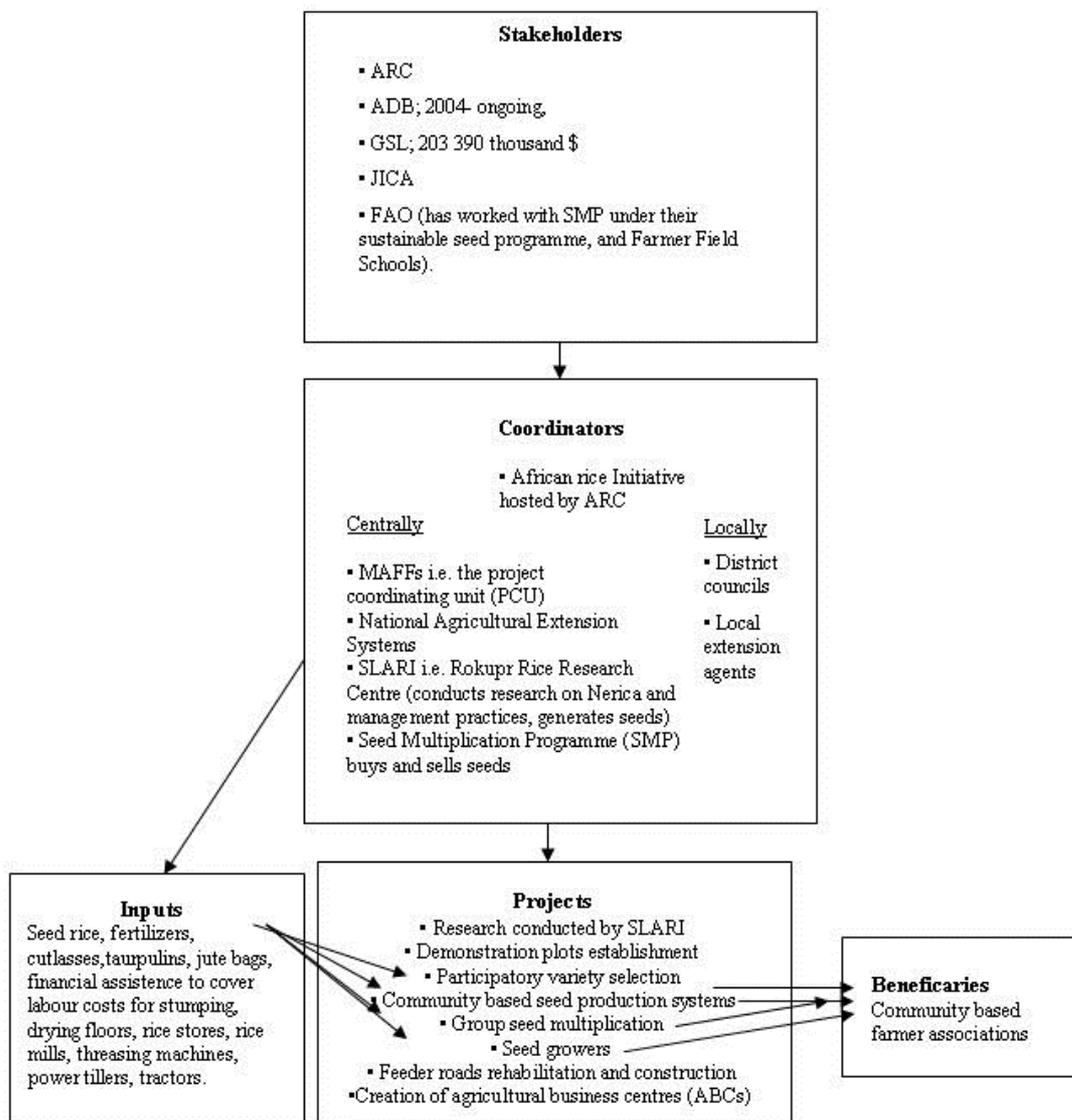
In the National Rice Development Strategy plan of 2009, self-sufficiency in rice production is stated as a goal for 2013 and Nerica is mentioned as a technology that has “brought closer the possibility of offering farmers improved rice varieties that are adapted to local conditions and will allow significantly increased productivity”(NRDS 2009:14)

ARC and ADB state that the Multinational Nerica Dissemination project in Africa⁷ is “being structured to deal with complex gender issues” possibly bearing in mind past project failures to reach out to poor women in particular (WARDA 2008, see Basile 2001). In Sierra Leone, such awareness also seems to be prevalent among the people responsible for the national dissemination of Nerica, several declaring Nerica “a women’s crop” and a female-male ratio of 80-20 percent is the target for farmers enrolling. Gender guidelines for the project in Sierra Leone, as stipulated by the funding agency ADB, further states that women should hold seats in the executive boards of the farmers associations (F/A) involved in the project (personal communication with an extension officer 11/1-10, Moyamba).

⁶ Rokupr Rice Research Station developed the ROK-varieties in the 70s, 80s and 90s “with tolerance or resistance to iron toxicity, salinity, insect pests and diseases for a range of farming systems. Some of the best ROK-varieties were selections from local varieties, exploiting the potential of indigenous knowledge, using minimal level of fertilizers” (NRDS 2009:14).

⁷ By 2008 Nerica has been released in Benin, Burkina Faso, Cote d’Ivoire, DR Congo, Ethiopia, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Liberia, Mali, Mozambique, Niger, Nigeria, Senegal, Sierra Leone, Tanzania, Togo, Uganda as well as the Philippines and India (WARDA 2008:41).

Figure 1.5.1 The organization of the multinational Nerica dissemination project in Sierra Leone (Data obtained from MAFFS 2009, WARDA 2008).



Chapter 2. Methodology

2.1 Data collection and analysis

Due to time limitations, two of the four districts under the MNDPSL are targeted in this study; Kambia and Moyamba. However, interviews were also conducted at various locations in the Koinadugu district to compare how the NGO Care SL works with Nerica as opposed to MNDPSL. Villages in the districts were strategically targeted in order to visit those accessible by the main roads (such as chiefdom headquarters), by feeder roads, and by bush paths (see Jackson et al 2007 for a discussion on representativeness). Moreover, interviews were carried out at the Ministry of Agriculture, with extension officers and district directors as well as with representatives from Care SL and Concern SL. Visits to Njala University and to the SLARI at Rokupr, and to demonstration sites at Motengbeh and Rogbalan also took place.

After arriving at the villages, a list was gathered, of all the members in the farmers' association in connection with the Nerica project and a random selection/balloting took place. The targeted people in the association were interviewed in a semi-structural manner, both individually and in focus groups. Participatory observations, wealth-rankings/poverty-mapping and seasonal-calendar drawings as well as exploratory walks and visits to farmers' fields, were also methods I made use of during my stay in the villages (see Mikkaelsen 2005). These qualitative data collection methods aim to understand and identify what is significant locally and even individually, to make sure that "the results and findings are grounded in the empirical world" (Glaser 1998). The primary areas of research in my study centred on how Nerica was disseminated and adopted as well as on local power and gender relations.

Twelve associations under the MNDPSL were targeted, 31 people were interviewed individually and 11 people took part in focus group discussions, which were conducted on four separate occasions.

In Koinadugu, a list was drawn up at the local ministry of all the villages and associations under the Care SL project⁸ and selection took place based on locality due to time-constraints. Five different villages/associations in two chiefdoms were covered and two people were generally interviewed per association.

Data analysis of the material was conducted by first categorising the material into categories according to emergent concepts/subjects in the interviews. Then frequent patterns

⁸ Care Sierra Leone work with lowland Nerica (L19) in their Sustainable Agricultural Development (SADev) project, based in Koinadugu district.

and tendencies were observed and related to earlier theoretical research⁹. Such “coding procedures” derive from Grounded Theory, a method which primarily aims to make assure that the researcher comes to her conclusions by “constant comparisons” between different types of data and an open mind. In this study, I have made use of an interpretive understanding of Grounded Theory rather than an objectivist one (see Glaser for a discussion 1998:128).

2.2 Methodological starting points

This study has its methodological starting point in a hermeneutic ontology and epistemology. Therefore, a basic premise of this study is the recognition that there are multiple realities/worlds out there, and that people’s subjective knowledge and experiences shape their particular world view. I also believe that socio-economic and cultural contexts (understandings of gender, age etc.) affect people’s “opportunities, resources and activities” (Fernando 1998, see Ogato et al 2009). On the other hand, these patterns are dynamic as opposed to fixed and unchangeable. They are destined to be renegotiated and transformed, if for instance, the economic conditions change by the introduction of new technology. However, many factors influence social change and technology is only one of them, as it interacts with the social context in which it is introduced (see Johnny et al 1981). Individual agency is another driving force behind transformations.

The aim of this study is to understand and listen to the participant’s particular experiences as well as to observe the context for these experiences. My approach is therefore holistic, and aims to interpret other people’s subjective interpretations. I am aware that my presence affects the answers and reactions of the interviewees (for a discussion see Devine 2002). I’m also aware that my perspective influences my interpretations. Hence, this study is based on qualitative interpretations of primary and secondary material and does not presume to reveal any definitive patterns of the Nerica growing community in Sierra Leone. Furthermore, this study is built upon normative assumptions, namely that successful agricultural growth should be sustainable and help alleviate poverty.

⁹ This process also takes place while conducting fieldwork.

2.3 Limitations of the study

Firstly, time- and resource constraints affected my ability to conduct interviews in as many villages as I wished, and led to a limited sample size and study area; namely 17 villages located in the Kambia, Koinadugu and Moyamba districts.

Secondly, the lack of comprehensive and accurate baseline material about the farmers involved in the Nerica project, that is regarding participating associations, yields and allocated inputs, made it difficult to draw an exact picture of the extent of the dissemination process. Of the limited information regarding the associations under MNDPSL, some of it proved to be inaccurate when crosschecked with the associations in question. Encounters with two farmer associations that were on the list of project participants revealed that they had never received any support and not even taken part in the project (these two villages visited are therefore not among the 17 villages targeted). Moreover, the lists of inputs were not always accurate. For example, labour compensation, which was set at Le¹⁰ 450 000 per acre to cover additional labour costs such as stumping, had not always been fully provided to the associations (personal communication Bagruwa 10/1-10). Observations of how the extension workers collect and record yields and other information (by hand on individual sheets of paper), and how the head of extension edits the lists turned in to his office provide a partial explanation for the unreliable baseline data.

The lack of baseline material also made it difficult to design the study beforehand – and observations in the field made me shift focus away from analysing the impact of Nerica and towards analysing the dissemination process, since most of the Nerica farmers that I encountered had only recently adopted and begun multiplying Nerica and were cultivating it collectively rather than in private farms.

Thirdly, Sierra Leone is a highly aid-dependent country, and white people seem to be associated with such establishments as observed in the villages visited (Nadoll 2009). Therefore, one can assume that the presence of me, a white westerner, probably influenced the answers given, at times, by my study's participants. It was often believed that development inputs might come their way if they answered in a certain manner when interacting with development stakeholders, even though I pointed out that the discussion was for study purposes in this case. Clearly, post-colonial conditions affected the interaction between me and my participants and the possibility to obtain reliable information. The topics brought up

¹⁰ Sierra Leone's currency is called *Leone*, and abbreviates *Le*. Le 450 000 = 114.504 USD in 2010. 06.21.

during my interviews such as income, expenditures, labour allocation and food security within the household were also likely regarded as sensitive issues. Furthermore, the size of land allocated to Nerica as well as the yield figures were estimates rather than exact figures. This was due to the shortage of measuring devices and because parts of the harvest had already been consumed, given away etc.

Chapter 3. Literature review/theoretical framework

3.1 Diffusion and adoption of new technologies

Everett M. Rogers, an influential writer on the diffusion/adoption of innovations, claims that it is fundamental to *acquire knowledge* of a technology's existence and function, and that a community or individual's acquisition of such knowledge is crucial in determining whether a technology will be adopted or not. In this regard, *the organisation of the knowledge dissemination*, or information of the technologies existence, and management training play a crucial role in "bring(ing) the sceptical ones over" (Rogers 1962). This applies in the context of farm trials as well. This notion can in some part be explained by placing it within the theory of modernisation from whence it came. That is, modernisation theory generally regards technology as a good thing, where "one size fits all", and does not tend to question or problematize technology by investigating the motives and perspectives of its creators as well as the perceptions and conditions of its receivers (Hillbur 1998). Consequently, diffusion of information is regarded as a primary determinant for farmers' adoption decisions.

Akinwumi Adesina and Moses Zinnah, concentrate on *farmers' adoption decisions* and show, with regard to, the dissemination of the improved ROK-varieties in the 80s in the mangrove zones of Sierra Leone, that "farmer perceptions of the technology-specific attributes of the varieties are the major factors determining adoption and use-intensities". They also postulate that farmers' specific conditions such as the sizes of their farms, education and training have a secondary importance for adoption decisions (Adesina et al 1993). Adesina and Zinnah's view can be further related to Chayanov's work which shows that small scale farmers are making "rational" decisions based on a cost and benefit analysis, namely by measuring inputs such as capital and labour against outputs such as yield and market price (Chayanov 1986). Such analysis which takes place both initially, when first gaining knowledge about a technology, and more importantly during the cultivation and harvesting process itself, helps farmers to determine the actual potential of the variety in

question. Moreover, it is quite possible that the variety is compared to other varieties in production in order to determine whether the variety in question is worth adopting (see Chambers 1997). Chayanov adds that managing risks forms a component of the analysis (Chayanov 1986).

Adesina and Zinnah's study does not tell us what caused an adoption – such as if the seeds were distributed together with fertilizers and training, at no cost for the farmers, or distributed by non-market means, traded in kind, or if farmers had to buy them. If an innovation is distributed at no cost and even together with additional inputs in a very capital and input scarce environment, as often has been the case with Nericas, this is likely a major adoption incentive for first time adopters as well as “less risky”.

Adoption motives among farmers can further be related to a third theory regarding diffusion/adoption – the view that *socio-economic conditions and constraints* affect adoption decisions (see Pattanyak et al 2003). General status and assets such as capital, land, available labour and education may for instance influence whether a farmer has access to a technology in the first place and has the opportunity to enrol or even has the chance to be targeted. Several studies on adoption patterns during the green revolution in Asia seem to support this view: “while technology as such is scale neutral...the social system, including the skewness of the distribution of landholdings, generally creates a bias in favour of larger, wealthier and more influential farmers” (B.H Farmer 1981).

3.2 The complexity and diversity of local knowledge- and seed systems of Sierra Leone

Small-scale rice farming in Sierra Leone is typically organized to spread labour peaks, since both the availability of labour and the ability to pay for labour is low (Unruh et al 2006:15). Managing risks, of for instance, drought, floods, pests and diseases is another reason behind certain organizational patterns. Farmers' rice preferences reflect these conditions and in general farmers have different varieties with different attributes under production, of varied duration, and they make use of diverse ecologies; upland, swamps and buluiland¹¹ (Richards 1995:198). Data obtained from this study also show that farmers in general are making use of different varieties and ecologies; having three or more varieties under production is common as well as combining upland and lowland cultivation. Local, short duration (2-4 months)

¹¹ Buluiland is both gaining moisture from the runoff water in the uplands and from rains (Leach 1994).

upland varieties were also produced in most villages visited, in at least some of the members' private farms in bigger villages and more widely in smaller ones.

2/3 of the area under rice cultivation in SL is devoted to upland farming, which without fertilizers requires a new piece of land to be cleared every year for rice, although second season crops such as cassava and groundnut can be cultivated in the former rice plots. 1/3 is devoted to lowland/swamp production which is often continuously cultivated year by year. Traditionally, upland farms are heavily intercropped with rice, cassava, greens, sesame, millet, sorghum, chilli peppers etc, both to steer off risks and to meet important household needs, such as the need for food (sauce ingredients and hunger breakers) and the need for goods which can be traded for cash. Johnny with colleagues show that the aggregate yields from intercropped farms are sometimes as high as around 4000kg per ha. Moreover, in their study, crops other than rice accounted for 73 percent of the weight and 58 percent of the food-energy of the total harvest (Johnny et al 1981:51).

Nyerges points out that upland, slash and burn, rice farming is a highly time-bound and precise activity which is dependent on the seasonal rains: "the bush has to be brushed and left to dry sufficiently and burned as late as possible before the rain begins, and the rice must be planted so it will mature before the rain ends" (Nyerges 1997:175). In addition to unreliable rain patterns, soil management mistakes, failures to organize and direct labour, as well as late distribution of seeds may all affect the yield outcome negatively (Nyerges 1997).

Archibald with colleagues claim that low-yielding traditional upland varieties might have an advantage "despite its deficiencies" over improved varieties for risk aware, poor farmers due to the fact that the former varieties are more adapted to "weak" local soils and yields as expected (generally 800-1500kg/ha) without fertilizers or extra labour inputs, and are more "tolerant of weed competition" (Archibald et al 2002). In 1987, Richards showed that 45 percent of all rice plots were devoted to traditional varieties, and that these were generally grown in the weaker soils. These varieties were on the other hand "shouldered aside" modern Asian types, some of which were improved ones that came from research stations (Richards 2006:2).

On the other hand, improved and potentially high yielding upland and lowland varieties typically require fertilizer inputs and better soils (so called research station conditions) to achieve their maximum yield potential (2500-5000kg/ha for Nericas). But according to Monty Jones, these varieties may be more high-yielding without fertilizer application, than local varieties, because of their morphological features (Dalrymple 1986:7, Jones 2006:2).

Lowland farming is less time-bound than upland farming and therefore less risky. In general, lowland farming generates higher yields. The labour inputs in clearing and levelling a lowland swamp are regarded as more labour intensive than clearing and ploughing and upland farm. On the other hand, once a lowland swamp is cleared, it can be continuously cultivated and high-yielding without the application of fertilizers, as long as nitrogen-fixing practices are applied (Johnny et al 1981).

3.3 Gender aspects of rice farming in Sierra Leone

Family, individual and communal forms of land-tenure exist side by side in rural Sierra Leone. The first is most frequently characterized by families tracing “a common, usually patrimonial, lineage and exercising paramount title to a plot of land” the second by “the purchase (or gift) of land from an individual or family owner” and the third by the belief that “land is held on behalf of the community as a whole, with decisions on distribution and use primarily made through consultation by authoritative figures in the villages” and chiefdoms, where land-use options available include borrowing and renting (Dale 2008:18). Even if property and land is passed down patrilineally and women usually move to their husbands’ villages or houses after marriage, land-use rights are occasionally granted to women or inherited by women. Nevertheless, the different forms of land-tenure that exist in Sierra Leone, whether the land is acquired by patrimonial inheritance, purchase or communal distribution, do not tend to favour women¹². Women generally, have less cash to buy land and less opportunity to make land claims, especially more permanent claims, both in the household and on a village level. Such conditions have, among other reasons, affected the capacity of women to embark on, and manage control over perennial tree-cultivation/cash-crops such as cocoa, coffee, kola and palm-tree (Unruh et al 2006:7, Berry 1988, Leach 1994:100-129).

The agricultural division of labour tends to be affected by gender relations in rice farming households in Sierra Leone. Women are particularly active when it comes to planting, weeding, bird-scaring, harvesting and post-harvest processing (threshing, drying, winnowing, pounding, cooking) whereas men are the ones conducting land-clearing, farm-hut building, stumping and burning, though they also help out during other activities such as planting,

¹² Other vulnerable groups are young people and strangers (Unruh et al 2006).

harvesting and threshing. It is strongly believed that land-clearing is only suitable for males whereas food preparation (often including winnowing and pounding) is an exclusively female task. The gendered nature and “complementary” division of these duties is emphasized in the secret and separate societies for males and females in Sierra Leone (Leach 1997).

Due to a social construct that divides labour based on gender, land-clearing is considered a male domain, and thus women depend on male labour in order to initiate agricultural production in the upland. Conversely, gardening, continuous use of a swamp that only requires to be cleared once, and second season cultivation in the upland are regarded as “weeding” rather than “land-clearance” and can be performed by women (Leach 1994).

As Melissa Leach and others have shown, the ability to mobilize labour from both inside and outside the household crucially depends on “negotiation abilities” (Leach 1997). Often, men “have claim over women’s labour” in the general farm although “women do not have a similar claim over men’s labour” in for instance their private farms (Doss 2001:36). More influential members of the community and of the household find it easier to mobilize labour, because of their position in the household, or through established patron-client ties, or since they may have capital to hire labour. Poor village members and women (excluding women with influence, so called “Big Women”) have a disadvantage in this regard due to their generally lower status within the household and in the community (Leach 1997).

Earlier studies in the region, suggest that lucrative, labour intensive “cash crops” usually end up under the control of male members¹³ of the household since men are often given the privilege of accessing land, mobilizing labour, and handling contact with extension (Basile 2001).

Data also indicates that African women farmers are adopting new farming technologies to a lesser extent than their male counterparts (Doss 2001). Doss with colleagues show in a study on adoption patterns of an for improved maize technology in Ghana that low adoption rates of farming technologies among women derive from “gender-linked differences in access to complementary inputs”, namely “land, labour and extension services” (Doss et al 2001).

¹³ Although an increased income from these sources potentially translates into increased welfare levels for other members of the household.

Chapter 4. Adopting Nericas – what determines the process of adoption?

4.1 Diffusion of information and management

Farmers involved in the Nerica project claim that they first heard about Nerica through (a) the local ministry, or (b) extension workers paying a visit, or (c) farmers in nearby villages who had already been targeted. Consequently, being in the habit of visiting¹⁴ the local agricultural ministry by, say, having friends or contacts at the place, or enrolling in other projects, may enhance the chances of gaining knowledge or becoming targeted. Furthermore, living close to the district headquarters or in nearby chiefdoms may mean a higher likelihood of gaining knowledge since transport in and to remote areas is both costly and time-consuming as well as difficult because of poor roads and low access to vehicles (Dale 2008). One extension officer explains that “lack of fuel” sometimes acts as a constraint on their abilities to travel¹⁵ (Personal communication with an extension officer Moyamba 11/1-10). Extension workers’ decisions and network ties may also affect which villages to visit and who to talk to in the villages.

That the relative proximity of a particular village to the position of the local agricultural ministry or other stakeholders working with Nericas is a determinant for adoption and continuous management dissemination is strongly suggested by the fact that the most successful Nerica farmers in 2009 are in the Magbema chiefdom (personal communication with the head of extension, MAFFs, Freetown 2/2-10). Magbema is close to Kambia - the district headquarter, as well as to the Rokupr research institute which is testing and developing management practices to be taught to farmers. Magbema is also close to Kobia seed dissemination centre, which is the primary buyer of Nerica seeds from farmers. Kobia seed dissemination centre in turn sells Nerica seeds to NGOs working with Nericas (Personal Communication MAFFs, Freetown 2/2-10, Care SL Kabala 22/1-10).

Initially, the Nerica project has had little chance to become all-encompassing due to limited finance and a shortage of seeds to distribute. Indeed, demand for enrolling in the

¹⁴ At the local ministry of Moyamba, I encountered several big-scale Nerica farmers of the district who seemed to be friends with the extension officer (participant observation, Moyamba 11/1-10).

¹⁵ Although potentially powerful as distributors of inputs, local agricultural personnel are also suffering from the “weaknesses” of the public sector of Sierra Leone. Nonpaid salaries and lack of financial support for vehicle reparations and fuel were some of the problems described. For example, several of the SMP-personnel that I encountered had not been paid for over 9 months. Such shortfalls may potentially lead to abuse of power, so called “forced corruption” (see Nadoll 2009).

project seems to be higher than the supply. Competition between different farmers associations over whom will be granted support, and between different chiefdoms has occurred, and two associations describe how they had to “fight” to become part of the project and that the dissemination of Nerica is “politicised” in the sense that having contacts and influence may mean a better chance to become targeted (personal communication, Masungbala 16/12-09). According to the local agricultural staff in one remote chiefdom in the Kambia district, the said chiefdom “ha[s] struggled to gain support” because the “ministry is concentrating too much on the downer area” and the associations targeted are all in the chiefdom headquarter or in the very nearby villages (personal communication Tonko Limba 26/1-10).

Several of the Nerica adopters claim that they generally enrol and participate in development interventions “to not run the risk of being neglected by future projects,” and stress the importance of “showing an interest” and “being enthusiastic” (personal communication Warawara-yagala 23/1-10). Thus, adoption decisions may not only be based on the attributes of the technology but on other, no less rational reasons. In one case, a F/A was asked to help out in clearing an extension officer’s private swamp, which they did in the hope of securing future support and a chance, to enrol in development projects (personal communication Mano 14/1-10).

One of the extension officers under the MNDPSL explains that “capabilities of the group and suitability of the land” are the selection criteria he uses to determine whether to grant an association support (personal communication with an extension officer Kambia 28/1-10.). Another extension officer claims that he is looking for “potential areas” and “viable farmers¹⁶” (personal communication with an extension officer Moyamba 11/1-10). Such targets possibly benefit groups with leaders or members who have access to high-quality land and capital or groups that include members with high negotiation abilities (see discussion below). As mentioned elsewhere, MNDPSL also aims to target women farmers in particular, or associations headed by women in order to reach a minimum gender-parity of 50 percent women and 50 percent men in the associations targeted.

As far as I could see, strategic targeting of poor farmers and in particular poor women farmers, through such methods as making sure that the F/A in question is headed by and/or to a large extent includes people from lower wealth groups, do not form part of the targeting

¹⁶ Viable understood as “hard-working” surely relate to farmers from all wealth groups. Not undermining agency and dedication as a key to be successful as a farmer, resource constraints as lack of high-quality land, ability to mobilize labour and to purchase inputs probably influence a farmers potential.

strategies of MNDPSL. Targeting women farmers does not automatically mean that you are reaching out to farmers who are poor relatively, since powerful and influential women exist in Sierra Leone just as their male counterparts. Explanations behind extensions' approaches locally may be insufficient training and low awareness of how to handle/work with power dimensions and gender issues in the field.

Special targeting of “viable” farmers, could on the other hand, be seen as a strategy to make the initial multiplication phase of the MNDPSL efficient and “successful”, that is to allow the dissemination to be “self-spreading” (personal communication with the head of extension MAFFs Freetown 2/2-10). Still, concentrating on Nerica seed-sufficiency by investing in/targeting “the best” or the most viable farmers may initially have little effect on food security issues since poor farmers outside of the project may lack access to Nerica seeds or food grains because of low buying power and lack of trickle-down effects. MNDPSL's strategies can be related to the fact that MAFFs has put forward the goal to reach national rice-self sufficiency by Nericas “in the short term” and food security “in the medium to long term” (PRSP SL Progress Report 2006:6).

Concern SL and Care SL are using other target mechanisms in their programmes with Nerica, the former aims at reaching the “extreme poor” through a vulnerability matrix (female headed households or households including orphans, widows or elders), whereas Care SL/SADev is collaborating with farmers who have graduated from their Farmer Field Schools¹⁷ (personal communication Kabala 22/1-10, Freetown 2/2-10). The recommended farming practices also differ, MNDPSL normally provides¹⁸ their participating F/A with chemical fertilizers whereas Care SL only recommends and trains farmers to develop and use organic fertilizers and to intensify their lowland farms (personal communication, Moyamba 11/1-10 and Kabala 22/1-10). These different target mechanisms and strategies suggests that the agencies in question, are initially concentrating on different goals in their work with Nerica; *effectiveness, women farmers* and potentially *Nerica seed sufficiency* in the case of MNDPSL *food security for the poor* in the case of Concern SL and *ecological sustainability* together with *food security* in the case of Care SL.

¹⁷ Participants in Care SLs' farmer field schools are initially drafted by “local stakeholders” into associations. The aim of the SADev project is to reach out to “60 F/A in 5 chiefdoms of which 45% are women and 70% are young people” with help from a local implementing NGO by the name Madame (Care 2010).

¹⁸ Chemical fertilizers are provided in kind by MNDPSL, which mean that the F/A has to give a certain amount of Nerica seeds in return, often the double – 2 bags of fertilizers equivalent 4 bags of Nerica (personal communication with an extension officer 11/1 Moyamba).

4.2 How do farmers perceive the attributes of Nericas?

The Nericas' attributes that are initially most appreciated and recognized by the associations which have enrolled in the project are characteristics such as being of short duration and potentially high-yielding, as well as the exceptionally high price Nericas have in the domestic market vis-à-vis local rice (50-80 000 Le per bushel in comparison with 20-25 000 Le per local bushel and 30-45000 Le for ROKs). These characteristics make Nericas appear as the potential solutions to problems experienced by small-scale farmers in Sierra Leone such as “the hunger season,” low yields, and lack of finance (NRDS 2009).

The perceptions above and actual performance of Nericas are also measured against the attributes of the local varieties with respect to for instance labour requirements, yield, price, and duration. Farmers interviewed claim that Nerica requires higher labour inputs than other varieties throughout the production process. Additional practices include: stumping (in the upland), seed priming, crop transplanting and water controlled plots (the latter three in the case of lowland Nericas), line sowing, scheduled weeding, fertilizer application and higher labour inputs when it comes to bird scaring and pest management in both ecologies. Local varieties and widely diffused, improved, high-yielding dual varieties such as the ROK-varieties and Pa Kiamp¹⁹ do not require stumping or line-sowing and the latter two can be high-yielding without fertilizers: “no matter if you apply fertilizer it will come up beaucoup²⁰” (Personal communication Bagruwa, 9/1-10).

Nericas might be regarded as more labour intensive because (a) the varieties are diffused in tandem with explicit management practices²¹ such as the importance of stumping and line-sowing for increased yield rates which both educates and motivates farmers to increase their labour efforts, (b) labour allocation for bird scaring and other pest management increases for early varieties since pests cluster on what there is to eat and since pests according to the participants seem to appreciate the taste of Nericas, and (c) the participants seem to be more attentive to Nericas than to other rice varieties since they are very valuable in the market. Data from the ongoing diffusion of Nericas in Uganda show that many farmers perceive the high

¹⁹ Pa Kiamp is a dual variety and was given as a present to the former agricultural minister of SL, Harry N. Will from the President of Ghana (personal communication 8/12-09, Rokupr, Magbema). The variety was later multiplied and distributed around in Sierra Leone, though the author only came across the variety in the south and central part of the country during her interviews.

²⁰ In plenty (my translation).

²¹ In general so have at least a few of the members per association been sent away for management trainings and the local extension officer have paid visits demonstrating and commenting on management practices.

rewards from sales as motivation for further Nerica production, despite the fact that Nerica is more labour intensive than for instance maize and beans (Kijima et al 2007:35).

As table 4.2.1 (below) of one participant's farming system indicates, there are often no rewards in term of sales and/or food from Nerica (in this case L19), during the multiplication phase, although it is regarded as one of the most input demanding (together with palm tree production) and difficult (i.e. labour intensive) crops to cultivate. L19 gets as few points as yam and maize which are of minor importance and production size in this participant's farming system. The difference between Nerica and these two crops is that Nerica is potentially very profitable and is regarded as very easy to sell²². An unanswered question remains regarding the role Nerica will play for food consumption and sales. Will it be used for a dual purpose, and both consumed in the household and sold profitably such as ROKs and palm-oil or will it rather be used as a cash-crop such as cocoa and coffee?

Table 4.2.1 Pattern of rewards for different crops
(Personal communication Masungbala 20/12-09)

1-5. 5= totally positive, easy, a lot 1= negative/problematic, difficult, a little

	Impr oved cassa va	R oc 3	R oc 5	Ya'Gb assay (local rice)	Ya m	Maize	Beans	Sorg hum	Benn eh (sesa me)	Ora nge	Ma ngo	Pal m tre e (pa lm oil)	Nerica, L19
Food	2	4	4	1	2	1	2	5	2	2	5	5	-
Sales	5	3	2	-	2	-	-	3	2	4	2	4	-
Income	5	4	2	4 (potent ially)	2	2(potent ially)	3 (potent ially)	2	2	4	1	5	4 (potent ially)
Pest/dis ease	1	1	1	1	2	2	1	2	3	1	1	1	1
Marketa bility	5	4	4	3	2	2	3	3	4	4	3	5	5
Storage	2	3	3	3	1	1	1	5	3	1	1	5	3
Input	2	2	2	2	2	2	2	2	2	2	2	1	1
Ease of	1	1	1	1	4	4	4	3	1	1	1	1	1

²² Initially SMP, and the extension officers have bought the Nerica output from the farmers interviewed directly in the village, enabling farmers participating to avoid the costs usually involved in selling produce to middlemen or for their own transportation to a bigger market.

cultivation													
Total:	23	22	19	15	17	14	16	25	19	19	16	27	15

Interviews with farmers revealed that they generally show patience in their Nerica production although they may experience crop failures due to factors such as late distribution of seeds, floods, bad site allocations and poor management. 6 out of 12 associations interviewed say that they have experienced complete yield failures where they harvested as many seeds in output as in input (in general farmers sow 1 bushel/27 kg per acre) or just a little above that in their upland Nerica farms, primarily due to late distribution of seeds (see Appendix 1.1). The farmers associations in question received their upland Nerica seeds as late as August and September, at the end of the raining season, when they would usually harvest their upland farms and not sow them. Farmers associations under Care SL/SAD also experienced such distribution bottlenecks, which accounts for why a few of them had not begun harvesting by January.

Data from Kijima’s study on Nerica in Uganda show that 60% of all Nerica farmers are self-sufficient in their seed production in their second as Nerica growers (Kijima 2008:7). From this, one can deduce that farmers are most vulnerable for late distribution of seed inputs when they first enrol in the Nerica project.

Clearly, poor harvests can also depend on other factors. F/A 1, one of the three F/A that have been growing upland Nericas since 2004, also experienced complete yield failures in their upland Nerica farms in 2009 due to the fact that it was “sown in unfertile soil” (Personal communication Masungbala 19/12-09). The woman paramount chief in Mano: Haja, a big-scale, mechanized Nerica farmer, lost 25 acres of upland Nerica in 2009 due to flooding (personal communication Mano 13/1-10). Such episodes emphasize the vulnerable nature of upland rice farming, as mentioned before.

Several of the associations stopped growing upland Nericas after poor yields during the first cropping season (see appendix 1.1 below), but later embarked on lowland Nerica production after being granted L19 seeds. Lack of successful yields in relation to what upland Nerica requires in labour efforts may be one explanation for the drop-outs. Moreover, farmers associations in general neither consume nor sell the Nerica output initially. Rewards are therefore low as are incentives to further embark on multiplication on that particular variety, due to the meagre output.

Abandoning the project has not been an alternative for any of the groups involved, since the belief in Nerica is still strong in the groups: the many benefits of the project and the high price that the variety brings in the market are appreciated.

Nerica farmers stress the high-risk nature of the variety and claim that the crop requires more timely procedures than local varieties to yield successfully. Extension workers under the government's Nerica project claim that the yields in upland Nerica production "totally depend on chemical fertilizers"²³ which are normally given in kind for a certain amount of Nerica seeds in return²⁴ (personal communication, Moyamba 11/1-10). Whether Nerica can be high yielding without fertilizers can not be determined from my study since all F/A under MNDPSL recording high yields in the upland as well as in the lowland have been using chemical fertilizers.

The data obtained from this study point in the direction of a wider and more continuous adoption of L19, despite the fact that it matures after 4 months (local lowland varieties in general mature between 4-9 months) rather than 3 months as with the upland Nericas. The fact that Irish Aid and NGOs such as Care SL, Trust SL, and Concern SL have only embarked on diffusing L19 contributes to its wider dissemination together with initial distribution bottlenecks for Nerica since late distribution of seeds has a greater effect on upland farms (see Johnny et al 1981). Observations showing how many farmers already have access to short-duration varieties may also indicate that it may well be the high-yielding potential of upland varieties that are on demand rather than the duration.

Embarking on lowland rice is motivated by sustainability concerns since such production does not require as much capital intensive chemical fertilizers, the yields are higher and the paddies can be farmed with rice for up to three times a year if fertilizers are applied, or with other crops if nitrogen fixing crops are planted in the intervening seasons. NRDS recognizes the potential to increase the areas for lowland rice cultivation but not for upland areas in Sierra Leone, although both ecologies are recognized as potential intensification areas (NRDS 2009:16).

In general the yield levels are very low for local varieties, especially when it comes to upland farming (if only the harvest of rice is included). Johnny with colleagues have shown in numerous studies that yields in general are between 800-1500 kg/ha in SL in upland farms and in the lowlands managed by traditional methods (Johnny et al 1981). Data obtained from this study prove that it can often be lower.

²³ The recommended fertilizer is NPK 15-15-15, which is a mix of nitrogen, potassium, and Kadium

²⁴ Often, farmers have to give back the double - 2 bags of fertilizers equivalents 4 bags of Nerica.

The maximum yield per acre for Nericas that I recorded was 30-40 bushels (1500-2200 kg/ha), achieved by Marie “Nerica” Kamara previous seasons. Such high-yields were also mentioned by a few big-scale farmers at the local ministry of Moyamba though I never got the chance to verify these claims. Generally, 10-20 bushels per acre (500-1000kg/ha) was normal for successful farmers, as indicated in Appendix 1.1. The yields for Nerica for F/A that recently joined the MNDPSL show that their local upland rice varieties are “very close in yield” to Nericas, (5-10 bushels/acres bearing in mind distribution bottlenecks and management failures for Nerica) excluding other intercrops. These numbers do not support Monty Jones’ claim that Nerica can potentially produce 2500 kg/ha without fertilizer application and as much as 5000 kg/ha with fertilizers applied (Jones 2006:2).

Evaluations of Nerica in Guinea show that only a “very small part” of the upland rice production, (including Nericas) is on the market since the production is “designated to satisfy self-sufficiency needs” both because it is harvested during the hungry season and due to general palatability preferences (Bezelga et al 2006:47, Richards 2002). These observations must also be kept in mind when looking at the potential for short-duration upland Nericas since the cultivation of upland rice in farmers’ seed systems may be designed more for food purposes than sales due to the time of harvest; the hungry season.

When it comes to palatability, local upland varieties are often more preferred than lowland rice and even Nericas. According to some of the farmers participating, these local upland varieties “are more bulky and make you stay full for long” (Personal communication Tonko Limba 27/1-10). Nerica 1, on the other hand, is appreciated for being very sweet, and nor is L19 disliked (personal observation at a palatability test on Nerica in Rofeika 23/12-09). Conversely, Adesina and Zinnah propose that palatability has little influence on farmers’ adoption decisions for highly productive technologies, i.e. “cash crops”, since they are more valued for their output and as cash generators (Adesina et al 1993). One of the farmers associations that has been growing Nerica since 2004, claim that they sure have had a taste and appreciate the taste, but it seems like they’ve generally have sold most parts of the harvest (personal communication Masungbala 9/12-09). The high-price initially has probably motivated the approach.

Richards and others have shown that rice farmers of Sierra Leone prefer a portfolio of varieties, for different ecological niches primarily to avoid risks, meet different needs and due to other preferences, and that farmers in general are willing to try new varieties. New farming technology will therefore interact/merge with the “complexity, diversity and rationality” already existing in the farming systems and social context in question (Chambers 1997). The

integration of ROKs into many small-scale farmers' local seed systems support this thesis since it was readily adopted and since farmers are still practising multiple cropping and making use of local varieties.

4.3 Farmers Associations under the MNDPSL

Farmers associations, in the form of work groups, have long existed in Sierra Leone to manage labour peaks on local level. However, the benefits of such arrangements have not always been of an equitable nature (see Leach 1994, 1997).

MNDPSL primarily supports farmers associations that collectively grow, multiply and sell²⁵ Nerica seeds. The associations under MNDPSL were formed in connection to (a) earlier development interventions prior to and post-war, and (b) in response to this project. There are potentially a lot of benefits to be derived from farmers associations especially for members from lower wealth groups since such associations enable them to overcome labour shortfalls collectively, channel development inputs and strengthen land claims (See Unruh et al 2006).

Still, conditions for entering a local F/A vary, and sometimes it depends on the leaders' personal preferences since they often decide who will be made a member. Less influential village members may thus have difficulties accessing F/A in the first place. Gaining access to Nerica without being part of the project requires capital to be able to buy seeds. The few Nerica growers outside of MNDPSL or any NGO involvement that I came across or heard about during this study were either mechanized big-scale farmers such as the paramount chief of Mano, or SMP workers (personal communication Bo 15/1-10 and Moyamba 11/1-10).

In attempting to determine what actually influences farmers' adoption decisions and perceptions of the technology, the fact that F/A are the primary beneficiaries for Nerica inputs should be taken into account. Adoption decisions taken by a F/A collectively, may not reflect the decisions and cost and benefit analysis members would take/do privately on an intra household level with regard to adoption since the conditions and constraints may differ. Increased availability of Nerica seeds will probably lead to a broad diffusion of seeds to farmers' private farms, just as has occurred in several of the villages visited during this study (participant observation Rofeika, Nerica show 23/12-09). Earlier diffusion-processes of the

²⁵ Consumption of the Nerica grain certainly occurs, though most of the farmers interviewed claim that they are either multiplying (many of these are recent adopters) or selling the large bulk of it after parts of the harvest have been stored for the next cropping season.

improved ROK-varieties show, in some of the villages visited, that the production went from monocropping under the farmers associations to intercropping when the variety later diffused to private farms. Observations during this study also point in the direction of that improved varieties seem to be grown more in the general farm of the household rather than in women's private farms (personal communication, Masungbala 20/12-09).

Wealth rankings demonstrate that the leaders of the associations under MNDPSL typically belong to the wealthiest and/or most influential groups of the community, although members come from the whole spectrum of wealth groups. This is also replicated in the case of women headed associations – one is councillor, another is heading the women's cooperative, two are wives of village chiefs or the wives of prominent men and/or regarded as “Big Women” locally etc. The leaders seem in most cases to have had an influential position before enrolling in MNDPSL. This further supports Leach's claims of “negotiation abilities” as a determinant to organize working groups, since status potentially means that the person in question has network ties with extension workers and the local ministry and that they can convince people to join the association (Leach 1994). Examples exist of that some of the leaders under Nerica decided to “return to farming” and the village after hearing about the promising and potentially profitable technology at the district headquarter (participant observations 9/1 Moyamba).

Evaluations of earlier seed and tools projects in Sierra Leone have revealed inputs channelled through local development committees sometimes becoming “manipulated by elite groups in the communities” since they dominated the boards which excluded “intended beneficiaries” (Archibald et al 2002). Data obtained in this study show that some of the leaders of the older associations have also been in charge of the dissemination of ROK-varieties in the 90s as well as the “Food for work programmes” in the World Food Programme (WFP) in the post-war period.

The accountability levels within the associations seem to be quite varied and being the head of an association potentially means power to exercise control; over information (after handling contacts with extension), of inputs and outputs (in several cases the leader is the one who stores the output and manages the sales) of what benefits to distribute, over who to take onboard as a member, and as coordinators of the work. It seems like it is the leaders (including women leaders) of the farmer associations under MNDPSL who mostly have been the initial receivers of knowledge and sometimes the continuing knowledge disseminators to other F/A members. The people who meet up with extension officers when they arrive to the villages might come from the same category as the ones who first welcomed me and my

interpreter when we arrived to the villages: normally males such as the village chief and the more influential members of the community.

Some of the most successful associations under MNDPSL seem to be highly democratic – with a fair distribution of incomes from sales and grains for consumption and a rotational system over whom to send away for training and meetings and decisions taken in tandem. Other associations resemble the old patron-client labour groups where a leader directs the work and controls benefits (Leach 1995). In a few, the setup seems to be directed in order for some of the members to extract benefits, in the name of an association. In a remote chiefdom in Kambia, several of the members of one of the associations in the project claim that they have never received any benefits from their work although they have been contributing labour for years, and large sales of Nerica seeds have taken place, confirmed by SMP staff. Several of the active members are unaware of that L19 seeds have been distributed to the group for the past two years and are under the impression that the association is “dying out” due to “lack of support”. Although, the “top layer” of the association are cultivating L19 in the name of the group in a private farm and have divided the earlier benefits between them (Personal communication Tonko Limba 25-27/1-10). Hence, the organizational patterns and accountability levels of the associations under the project are acting as determinants of both what possibilities and incentives there are to embark on Nerica production for the members.

Nerica will possibly become as widely disseminated as the ROK-varieties in Sierra Leone once the availability of seeds increases. The observations above regarding some of the F/A members’ difficulties to gain control on the rewards of Nerica may potentially be replicated on a household level, where less powerful household members may face similar constraints regarding access to both the technology in the first place and to the benefits derived from it.

4.4 How pro-poor women are Nericas?

Firstly, there’s no sense in victimizing women farmers overall in Sierra Leone. Powerful and influential so called Big Women surely exist, just as proved by the positions of the average women leader of the F/A growing Nericas in this study. For instance, some of the women Nerica growers and especially the women leaders hold a status laden position as wives of

local chiefs, being paramount chiefs²⁶ themselves or councillors, which potentially bring a greater power to exercise control over land²⁷ as well as other assets.

What I am interested of is on the other hand, less influential and poor women members' abilities to exercise control and benefit from Nericas both during collective cultivation and later on a household level. Most frequently, these women members are cultivating "private crops" in plots allocated in the cleared, general farm of the household, under their husbands' or male elders' control.

Women's private crop production of for instance peppers, groundnut or cassava processed into gari is a way of obtaining some private income through petty trading to be able to care for their kids since the incomes and rice for consumption from the general farm usually is under the control of their husbands: "In polygamy, lucky wives get some cash, otherwise the only output you will get is through food" (Personal communication Masungbala 20/12-09).

A number of the women interviewed claim that a husband's expenditure responsibilities are to cater for food for the household, i.e. provide the household with rice, buy clothes for the family, handle reparations of the house, health care and secondary school fees. Wives are responsible for especially primary school allocations such as tips for the teachers, school books and a uniform and also to provide sauce ingredients if the husband doesn't (stock cubes, salt, tomato paste, greens, dried fish, onion etc). Other women claim that they have to cover all the expenses apart from the rice (personal communication Masungbala 20/12-09, Bagruwa 10/1-10).

Since Nerica is labour intensive variety, several of the women interviewed doubt that they will grow Nerica in their private farms. Some of them even answer in a way as that would be unthinkable: "Nerica is a very tedious activity and will therefore be grown in the general farm", and "it is not possible to grow Nerica without hiring people" (personal communication Masungbala 20/12-09). Although difficult to tell, reasons behind this may be the difficulty for less influential women to mobilize labour to their private farms, as well as to find room to increase their own labour provision²⁸ which act as a constraint on their opportunities to allow for the labour increases that seem to follow with Nericas. One male Nerica grower

²⁶ It is not possible for women to become paramount chiefs or local chiefs in the northern province of Sierra Leone. The first female counsellor in the north came into power in 2000s and is a Nerica grower.

²⁷ The power to "protect and distribute land" falls under the "custodianship" of chiefs according to the Provinces Land Act of 1960, and several interviewees refers to land as "belonging to the chief", although "use rights" to land normally are granted to members of the community after consultation (Dale 2008:18, personal communication Bagruwa 9/1-10).

²⁸ Women are typically responsible for most of the housework such as fetching water and firewood, cleaning, washing, cooking and childcare whilst they also work in the general farm and in their private plots, go fishing and conduct petty trading activities etc.

participating claims that Nerica production is not so suitable for women since you have to “participate fully”, possibly implying that women are not able to allow for the labour increases (personal communication Tonko Limba 25/1-10). Observations from this study also indicate that most of the less influential women participating are growing local rice and cassava varieties rather than the improved types in their private farms.

Another reason may be women’s difficulties to gain or maintain income control over certain spheres of production such as profitable crops (palm trees etc) and varieties grown in the general farm. The diversified small-scale nature of women’s private crop production (usually a mix of groundnut, peppers, local rice and cassava etc) and income generating activities may be designed so that they can maintain control of the benefits and meet their spread expenditure responsibilities of for instance sauce ingredients.

Poor women may also have difficulties to make claims on a household level – and they are probably not the ones in charge of the decisions about what to cultivate and adopt.

Chambers and others have with respect to less influential community members’ difficulties in maintaining control over resources, emphasized the necessity to introduce development inputs which powerful groups are less likely to capture, to the benefit of the welfare of the less powerful (Chambers 1984).

The fact that most of the women interviewed in Koinadugu and Tonko Limba rather talked about embarking on vegetable production than Nerica privately can have something to do with the cultural connotations of rice production (a crop grown by almost all farming households in the country) and in the case of Koinadugu that there exists a women cooperative for vegetable growers²⁹ enabling the members to maintain control of the incomes and in the name of the group ask for land for cultivation in the chiefdom. Vegetable production is also regarded as women’s domains since they traditionally have been responsible for the households’ garden production and the petty trading with vegetables in the villages and markets. The crop transplanting activities involved from lowland to upland in such production are normally managed by women and the small scale nature of the production also act in women’s favour. Other advantages are that vegetables can be grown on a small scale but sold very profitably³⁰ and that women in particular have been the targets for vegetable development inputs.

²⁹ Women’s vegetable farmers cooperative of Koinadugu, involving sub-groups in eleven chiefdoms.

³⁰ You get around two cups of rice á 500 Le, or several big bundles of potato leaves or cassava leaves for the same price as for a few carrots or a small cabbage. Carrots, cabbage, cucumber, tomato etc are therefore not widely consumed in the countryside of Sierra Leone, but transported to hotels and larger towns.

Judging by the lists of associations targeted with stumping support in the season of 2009, only 26 women or ~ 20 percent of the 127 groups targeted were headed by women. Though 1286 out of 2676 participants in the organizations are women; 48 percent (126 members' sex was not filled in) (GOVSL 2009). Clearly, the gender parity of 80 percent women and 20 percent men has not been realised neither when it comes to women leaders, nor in the representation of women members. The less optimistic aim to at least target 50 percent women has almost been achieved in the case of members, but hardly in the case of women leaders³¹. One of the extension officers interviewed claims that “traditional practices” limit the number of women enrolling and thus the women friendly outcome of the project. He also describes how the women present, often “just sit there, without saying a word” when he’s out in the villages informing about Nerica (Personal communication Moyamba 11/1-10).

In conclusion, the labour intensiveness of Nericas together with its bulk profitability make it to a technology which less powerful women may have a hard time to control and embark on. Data from this study highlight that the dissemination process is skewed in favour of the more influential and socio-economic powerful - knowledge and info dissemination, targeting aims, and reliance on local F/As which often are headed by the influential people etc. This in general proves that men rather than women and powerful people rather than less powerful will have more access. Hence, poor, young, women farmers are among the ones less likely to have access. This has implications for such poor groups' abilities to take advantage of initial adoption incitements for Nerica. The favourable conditions include a high market price, inputs at no cost, labour compensation in the form of cash and the fact that the ministry is buying up all the seeds. On the other hand, functioning, democratic F/As together with women-friendly targeting strategies may be able to overcome poor women's difficulties to gain access.

4.5 Positive effects of women-friendly targeting

Advantageous price levels for Nericas have meant a good prospect for successful early adopters to enrich themselves and greatly benefit from the production. As the famous case of the mother of eight, Marie “Nerica” Kamara³² illustrates such push factors mean that women association members can build up capital savings from sales which both enable them to

³¹ Potentially the most influential post in F/A judged by previous argumentations.

³² Marie “Nerica” Kamara heads the F/A Tomemsu Women in Rofeika and has been growing Nericas since 2004.

embark on the production collectively through for instance the ability to lease labour, and increase their contributions to the welfare of the household. Increased status and negotiation/decision abilities seem to be some of the outcomes, both in the community and within the household with opening possibilities to diffuse Nerica production into private farms. Observations point to the fact that Marie Nerica now dresses in lace material rather than cotton, which is a local indicator for wealth, has financed a new house for her family by her own means, and she was also dominant at a village discussion on Nerica in the presence of the local chief and other influential members of the community (Personal communication and observations Rofeika 9/12-09).

This illustrates the potential new technology has to renegotiate and even overcome previous gendered relationships, and the non-fixed nature of such social patterns. It also illustrates the benefits that potentially can come out of women friendly targeting/campaigning – where targets are set for including women both in the executive boards and in the associations.

Although influential and wealthy, several of the women leaders claim that they are prone to bring other women onboard in their F/A. Unruh with colleagues also show that women groups generally “allow strangers and refugees³³” to join in (Unruh et al 2006). The most functioning F/A with regard to accountability and democracy I came across were run by women, as well as the most successful ones in terms of production³⁴ (personal communication MAFFs Freetown 2/2-10). Access for poor women to such successful associations is thus crucial if one is to turn MNDPSL towards being pro-poor. Since this will bring the potential for poor women to greatly benefit from initial incitements for adopting Nericas as well as other possible benefits: increased agricultural productivity, increased incomes and women empowerment.

Successful women Nerica growers also claim that they view Nericas as very women-friendly³⁵ in the sense, as I understand it, that the cultivation generates large profits they can control. Several seem to think that profits under their control will serve a woman’s interest and concerns – such as the health and education of their children and the fact that they can allow the family “to eat better” and invest in their private income generating activities (personal communication Kambia 28/1-10). Moreover, increased incomes for women may

³³ Groups that generally have a harder time to access land (Unruh et al 2006).

³⁴ A point demonstrating the eagerness and dedication of women to successfully adopt new technologies when they get the chance. Although, these F/A are also situated near Rokupr and SMP.

³⁵ These women have also been the subjects of women-friendly targeting, probably adding to the notion of Nericas as women-friendly.

mean that they can hire male labourers for the farming activities they judge necessary, overcoming gendered shortfalls such as their difficulties to mobilize male labour for farming activities.

ARC's claim that Nericas are more suitable for women in terms of production attributes, such as its upland location, has not been verified in this study. Empirically, men and women are both involved in first season upland production performing different tasks, and outputs from upland farming are rarely, solely under the control of women according to my material. Women are potentially even more dependent on male labour to be able to initiate upland farming than lowland farming (in an already cleared swamp). The added labour activities with upland Nericas seem also to have been divided along gendered lines and men are more active when it comes to stumping and fertilizer application, and women when it comes to weeding, bird-scaring and post-harvest processing. Line-sowing and harvesting seem to be performed jointly. Although, observations suggest that men might be more prone to perform "female tasks" such as threshing and pounding when the production or the rice bundles in question, are designated for sales (personal communication Tonko Limba 27/1-10).

Chapter 5. The issue of access to development inputs for vulnerable groups

5.1 Synthesis

According to the participants of this study, there seem to be compelling incentives for F/A to adopt Nericas. These include: (a) Nerica is distributed at almost no financial cost for the beneficiaries and includes seeds, fertilizers, farming tools, and money as labour compensation (b) the high price Nerica generates in the local market³⁶(c) they are short duration and potentially high-yielding varieties. Thus, Nericas potentially alleviate the constraints experienced by small-scale farmers such as low-level of inputs, lack of finance, struggles to obtain food during the hungry season and low yields.

On the other hand, harvesting Nericas generally entails higher labour costs and more timely practices than local varieties or improved types such as ROKs and Pa Kiamp. Nericas do not

³⁶ Almost all seeds are bought up by visiting SMP officers, overriding transaction costs.

seem to live up to their yield potentials even though they are higher-yielding than monocropped local varieties if you are successful with your production (10-40 bsh per acre) and can be sold very profitably. All successful and less successful Nerica growers taken into account in this study applied chemical fertilizers and it is therefore difficult to say how Nerica would fare without fertilizer application. Data also show that farmers have been more prone to embark on the lowland varieties of Nerica rather than the upland varieties primarily because production failures during their first season with upland Nericas.

Adesina's and Moses' attempt to only look at how farmers perceive the attributes of the technology, or Rogers focus on knowledge dissemination, do not say much about what actually determines farmers' initial access to new technology since they do not sufficiently take into account farmers' access to other resources such as influence, contacts, land, labour and extension. Since insight into the technology's attributes may be there, as well as knowledge of the technology but not always the conditions necessary for an adoption.

Data derived from this study reveal that virtually all parts of the dissemination process is skewed in favour of more influential farmers – knowledge and info dissemination, targeting aims, reliance on local F/As which often are headed by the influential people. Thus, the Nerica dissemination process is hardly pro-poor women, since this group probably has the hardest time accessing Nericas as they often lack the means necessary.

According to ARC, “the main goal of agricultural research in Sub-Saharan Africa”, is to develop and disseminate agricultural technologies for “poor people”, such as Nericas, to alleviate poverty and increase the levels of food security by increasing productivity and raising incomes (WARDA 1998). The Ministry of Agriculture in Sierra Leone has emphasized the dual necessity of both alleviating food insecurity and becoming rice self-sufficient nationally, but the latter is regarded as the first step (see NRDS 2008). Their Nerica campaign suggests that they are paying more attention to viable farmers than poor farmers, contrary to the NGO Care Sierra Leone's work on Nerica. As demonstrated, targeting and including women farmers or associations headed by women does not necessarily mean that poor women farmers will benefit, despite existing positive examples of how the introduction of Nericas has become the catalyst in changing access to influence and resources such as in the case of Marie Nerica.

All this emphasize the necessity to evaluate development interventions in-depth, both in order to improve future practices and to seriously appraise the actual effects that development inputs have, independently from beliefs and claims by the funding agencies.

Nerica may have the potential to reach out to poor women farmers in particular – if serious target attempts are made to make sure that they are the beneficiaries and among the ones involved in the farmers associations targeted. Other conditions that need to be met in order to ensure that poor women will benefit from Nericas include a fair and democratic distribution of outputs and knowledge dissemination within the F/A itself as well as on a household level.

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Appendices

Appendix 1.1 Map over farmer associations interviewed

	Starting year	Nerica (N, L19) varieties under production	Nerica (N) varieties abandoned Why?	Yield (bushels, bsh. per acre) last cropping season	Consume, multiply or sale?	Acreage (ac.) under Nerica production	Local rice varieties. Output?	Other improved rice varieties
Kambia District								
Masungbala								
F/A 1	2004	N4, L19		1.5 bsh. of Nerica 4	Multiplication	4 ac. N4 (2009)		ROK 5, ROK 3
F/A 2	2007	L19	N4 Crop failure, late deliverance	3 bsh.	Multiplication	4 ac. of L19 (2009)	Mageni, Ya' gbassay	ROK 3, ROK 5
F/A 3	2009	L19		No harvest	Multiplication	2 ac.		ROK 10, ROK 3
Magbema								
F/A 4	2004			15-20 bsh.	Sale	5 ac.		
F/A 5	2004-2005	L19, N1		10 bsh. of N1	Sale	4 ac.	Buttacup	ROK 3
Tonko Limba								
F/A 6	2004	L19 (from 2008).	N1. Difficult to thresh.	21 bsh. of L19, 1.5 bsh. Of N1	Sale	2 ac. of L19, 2 ac. of N1.	Bateki 4 month swamp, Samandu upland 3month 10bsh	
F/A 7		L19		10 bsh.			Kamakwie Banwerika	
F/A 8	2004	N1(2009),	N1. Not	1 bsh.	Sale,	4 ac. of	Kawulaka,	

		L19	suitable.	of N1, 5 bsh. of L19	consumption	L19, 2 ac. of N1	Bundiaka	
Moyamba district								
Bagruwa								
F/A 9	2009	N4		1 bsh.	Multiplication	2 ac.		
F/A 10	2008	N4, L19		6 bsh. of L19, 1.5 bsh. Of N4	Multiplication	4 ac. of N4, 4 ac. Of L19	Dunja, Cote D' Ivoire	Pa Kiamp
Kamajei								
F/A 11	2009	L19		1 bsh.		1 ac.	Bo Kondri, Getti	
F/A 12	2006	L19		5 bsh.	Consumption	4 ac.		
Koinadugu District								
Wara-Wara Yagala								
F/A 13	2009	L19		No harvest yet	Multiplication			
F/A 14		L19			Multiplication			
F/A 15	2009	L19		4 bsh.	Multiplication	2 ac.		ROK 5 (Nerica yields higher), ROK 3
Sangbe								
F/A 16	2009	L19			Multiplication	2 ac.	Senewa (6 bsh.)	
F/A 17	2009	L19		5-6 bsh.	Multiplication	4 ac.		