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AfricaRice  
Centre du riz pour l'Afrique



Technologies for African  
Agricultural Transformation


# Production of Resilient Rice Seed Varieties and the GEM Parboiling System in Côte d'Ivoire

*An Outcome Case Study Report*

**TAAT Monitoring, Evaluation and  
Learning System**

December 2021

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## TAAT MEL Working Document No. 004

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## Executive Summary

The Technologies for African Agricultural Transformation (TAAT) is a program initiated by the African Development Bank (AfDB) aiming to increase agricultural productivity through the deployment of proven and high-performance agricultural technologies across 31 Regional Member Countries (RMCs) along selected value chains namely, rice, maize, cassava, wheat, sorghum and millet, orange-flesh sweet potato, high-iron beans, small ruminants and poultry, and aquaculture. TAAT demands a robust Monitoring, Evaluation and Learning system premised on a theory of change and processes that foster adaptive program implementation and learning. "Learning" in TAAT is done through analysis of technical reports by TAAT "Compact" agriculture experts and are subsequently validated through a sample of outcome case studies. This report presents findings from a 2021 outcome case study on results reported by the TAAT Rice Compact activities in Côte d'Ivoire.

The TAAT Rice Compact is coordinated by AfricaRice and operates in eight (8) focus countries and seven (7) spill-over countries across the continent. The focus of TAAT Rice Compact is to reduce rice imports into Africa and to promote and rice sector on the continent that rivals imports through the deployment of modern agriculture innovations (technology toolkits) that increase farmers' productivity and post-harvesting of rice products. The TAAT Rice Compact deploys modern technology packages that support the farming of three rice varietal lines: (i) New Rice for Africa (NERICA), (ii) Advanced Rice Varieties for Africa (ARICA), and (iii) ORYLUX (aromatic) varieties. To date, AfricaRice has released over 68 varieties under these varietal lines. To ensure proper farming techniques used on these modern varieties, deployment of these improved rice varieties is complimented by training on Good Agricultural Practices (GAPs), highlighting the importance of proper

farm and post-harvest techniques.

The TAAT Rice Value Chain Compact was officially launched, 6-7 September 2018, at the AfricaRice Research Station in M'bé near Bouaké, Côte d'Ivoire, with a focus on contributing to the African Development Bank's (AfDB) 'Feed Africa' initiative by accelerating the deployment of impactful rice technologies, innovations and products along rice value chains. The TAAT Rice Compact in Côte d'Ivoire used its existing regional delivery infrastructure of partnerships with key stakeholder groups at the national and grassroots level to accelerate the deployment of modern rice technologies. Partners involved in the rice Compact's delivery infrastructure include the National Agricultural Research and Extension Systems (NARES), private sector partners such as seed enterprises and millers, farmer groups, and other development partners, to name a few.

Supporting the need for accelerated deployment of modern rice varieties, the TAAT Rice Compact used established stakeholder Innovation Platforms (IPs) developed under the previous Support to Agricultural Research for Development of Strategic Crops in Africa (SARD-SC) project funded by the African Development Bank from 2012 to 2017, to enhance partnerships along with the rice sector development hubs and the Africa-wide Rice Task Forces in order to provide a conducive environment supporting further and accelerated deployment through TAAT of (i) improved climate-smart rice varieties and hybrids, (ii) post-harvest GEM Parboiling Technology; (iii) ASI thresher mechanization; and (iv) Good Agricultural Practices (GAPs). By leveraging existing partners, the TAAT Rice Compact made substantial contributions to improving the rice value chain infrastructure in Côte d'Ivoire.



Resilient rice seed variety in the field

## Background

TAAT is not a research program but is rather an initiative to promote and disseminate proven high-performance food production technologies from research to millions of farmers for commercial sustainability through a network of partners forming a Regional Technology Delivery Infrastructure (RTDI). It involves collaboration between the AfDB and other developmental partners such as the World Bank, The International Fund for Agricultural Development (IFAD), Bill and Melinda Gates Foundation (BMGF), Alliance for a Green Revolution in Africa (AGRA), United States Agency for International Development (USAID), European Union (EU), and the Department for International Development (DfID) among others.

TAAT operates as a network of interacting «Compacts» with nine devoted to specific commodity value chains and six others serving as «Enablers» that provide needed specialist services. The nine (9) value chain Compacts are rice, maize, cassava, wheat, sorghum and millet, orange-flesh sweet potato, high-iron beans, small ruminants and poultry, and aquaculture. The six (6) Enabler Compacts are soil fertility management, water management, capacity building, seed policy, fall army worm control and youth in agribusiness Compacts.

Technical coordination of the program is provided by the TAAT Clearinghouse. The Clearinghouse serves as an honest broker in the identification and assessment of «proven» technologies and products that are ready for widespread dissemination, as well as linking these technical opportunities to wider national development agendas. The Clearinghouse links proven agricultural technologies with national priorities to scale deployment of modern technologies with countries as the key partners providing sustainable support to their value chains. The Clearinghouse facilitates scaling up by examining TAAT interventions in specific agricultural value chains in various countries and assembling «technology toolkits» that could be used across similar agro-ecological zones by countries seeking to transform their agriculture sectors, thus providing an opportunity to duplicate successful demand-driven interventions in one location to other locations. Since June 2018, TAAT Compacts have launched technology deployment campaigns in 28 African countries.

Given the complexity and breadth of TAAT, it should come as no surprise that having a monitoring, evaluation and learning (MEL) system in place is critical first, to ensure timely monitoring against key indicators that show implementation progress, and second to foster a culture of "learning" that serves to improve program implementation. Learning in MEL is the process through which information generated from M&E activities is reflected upon and intentionally used to continuously improve the performance of

an intervention's ability to achieve results. It is learning from past actions to improve the planning and implementation of future actions and translating them into new initiatives that serve as the basis for Learning. Lessons learned reveal good and/or bad practices and why different programmatic strategies work and others do not work. Learning is garnered from field reports by TAAT Compacts and is validated through a sampling of field visits that results in outcome case studies in select countries. Outcome case studies are conducted against the reported outputs and outcomes through evidence-based analysis. This report presents results from an outcome case study on the TAAT Rice Compact's activities in Côte d'Ivoire. The outcome case study data was collected through a 5-day field visit undertaken by the TAAT MEL and TAAT Communications Specialist in partnership with the TAAT Rice Compact team conducted between June 21 and June 26, 2021.

## 1. About TAAT Rice Compact

The TAAT Rice Compact is coordinated by AfricaRice and operates in eight (8) focus countries (Benin, Côte d'Ivoire, Ghana, Nigeria, Senegal, Cameroun, Uganda, Madagascar) having spill-over into eight (8) countries (Burkina Faso, CAR, Ethiopia, Liberia, Mali, Mauritania, Niger, Togo) across the continent. The AfricaRice is the leading Pan-African Research Organisation on the continent with a mission to contribute towards poverty alleviation and food security in Africa through research, development, and partnerships. AfricaRice activities aim to increase productivity and profitability of the rice sector in ways that ensure the sustainability of the farming environment. AfricaRice is an autonomous intergovernmental research



The TAAT MEL team with one of the partners of the TAAT Rice Compact

organization with 28 African member countries covering West, Central, East, and North Africa, and it is also a member of the Consultative Group on International Agricultural Research (CGIAR).

AfricaRice works with National Agricultural Research and Extension Systems (NARES), nongovernmental organizations, farmer associations and other relevant bodies to help strengthen rice productivity. AfricaRice priorities in the rice sector include: conserving rice genetic resources and providing farmers with climate-resilient rice varieties better adapted to production environments and consumer preferences; improving rural livelihoods through sustainable intensification and diversification of rice-based systems; creating market opportunities for smallholder farmers and processors by improving the quality and the competitiveness of locally produced rice and rice products; facilitating the development of the rice value chain through improved technology; and strengthening the capacities of national rice research and extension agents and rice value chain actors among others (AfricaRice, 2011). Building on the



mission of AfricaRice, the focus of the TAAT Rice Compact is to work with partners to improve the rice value chain and reduce massive rice imports into Africa by producing a quality product that rivals the imports and appeals to Africans through the deployment of demand-driven, country-tailored rice technology toolkits. The Rice Compact technology toolkits are bundled solutions of modern agriculture innovations focused around three varietal lines: New Rice for Africa (NERICA), Advanced Rice Varieties for Africa (ARICA), and ORYLUX (aromatic) varieties; with over 68 varieties released to date.

The Rice Compact has set a bold objective to attain a 25% yield increase in rice production, reaching over 2.26 million beneficiaries (30% are women) by 2021 by availing modern agriculture technologies to value chain actors with the goal of improving livelihoods for farmers as well as stakeholders along the value chain sector. The Rice Compact implements activities through four program components: (i) Create an Enabling

Environment for Agricultural Transformation (ii) Develop A Regional Technology Delivery Infrastructure, (iii) Deploy Transformative Proven Technologies and (iv) Efficient Coordination and Management of the Compact. The focus of the TAAT Rice Compact is to create a sustainable seed system in Côte d'Ivoire that increases rice productivity and builds a resilient food system protected from future shocks.

During the early stages of project implementation, the Compact focussed efforts on introducing hybrid seed varieties in collaboration with national partners and obtaining accreditation and acceptance of the seed in the Economic Community of West African States (ECOWAS) region. Once accepted by ECOWAS, the varieties are promoted through commercial licensing of foundation and certified seeds. To ensure the knowledge on Good Agricultural Practices (GAPs) accompany the deployment of the varieties for maximizing on-farm productivity, TAAT Rice Compact developed an implementation plan to accelerate deployment of knowledge on (i) engineered irrigation surfacing, (ii) fertilizer interventions that include climate-smart urea deep placement for greater and more efficient nitrogen use and knowledge on the application of foliar micronutrients, (iii) water management guided by the "Smart Valley" concept, the development of site-specific irrigation kits, and water lifting technologies, (iv) weeding operations using motorized weeders that cut, uproot and bury weeds between crop rows and (v) agronomy management guided by AfricaRice's RiceAdvice decision support tool providing farmers with guidelines for specific field conditions remotely through smart devices. The Rice Compact toolkits also highlight the importance of separation of the grain from the cut plant assisted by an Axial Flow Thresher (named ASI thresher) purchased and manufactured locally. The Rice Compact also supports partners to improve post-harvest processing activities result in "import-quality" polished rice flour and production of good quality using 'Grain quality enhancer, Energy-efficient and durable Material,' (GEM) parboiled rice - producing rice of high physical and eating quality compared with traditional technologies. The demand for quality parboiled rice is high in parts of Africa. But the traditional parboiling process is laborious, time-consuming and unsafe, producing rice with impurities, broken and burnt grains and undesirable smell. It also requires lots of firewood and water. It enables the women to process large quantities of paddy rice in a relatively short time. It also includes an eco-friendly stove that is fed by a solar-powered fan and runs on rice husk, which is a free and abundant fuel in rice-producing areas. The process is carried out mainly by rural women in Africa and provides a pathway to involving women into agriculture as a business. This bundling of production, harvest and post-harvest technologies deployed by the TAAT Rice Compact stimulates rice value chain growth. The outcome case study looks at the story in Côte d'Ivoire.



## 1.1. TAAT Rice Compact achievements

The outcome case study aims to validate the reported output and outcome achievements of the TAAT Rice Compact. The results below represent aggregated data from all TAAT Rice Compact focus countries highlighting outcome achievements of 113% and outcome achievements of 55% based on the following:

- **Increase in income household (USD):** increase in income (32%) had been realized, representing 64% progress towards the target.
- **Increase in agricultural commodity productivity:** average yield on farmers' fields had increased to 3.4 t/ha (65% of target) in Sub Saharan African (SSA).
- **Number of jobs created:** post-harvest new GEM Parboiling targeting women enterprises and youth groups, showed that out of a target of 12,000 jobs to have been created, 3,458 (29%) had been realized.

- **Increased volume of food produced:** increased food production was 1.03 million MT (72% of End Target).
- **Increased number of food groups for consumption/ household-** three (3) new food groups (GEM parboil rice, Black rice (Low GI rice), and baby rice)
- **Value of additional production (MT):** USD 622,120,000 with an end target of USD 863,720,000 achieving 72%.

Côte d'Ivoire was selected for this outcome case study based on three outcomes reported: (i) increased income, (ii) enhanced productivity, and (iii) created jobs which form the development objectives of the program. However, to validate the Rice Compact Theory of Change (ToC) and refine the Result Framework (RF) or Results Chain (RC), assumptions were made to understand the program implementation processes from management, implementation, developmental and sustainability perspectives as presented in Figure 1 below. The details of the validated ToC and refined RF/RC are presented in Appendix 5 and 6, respectively.

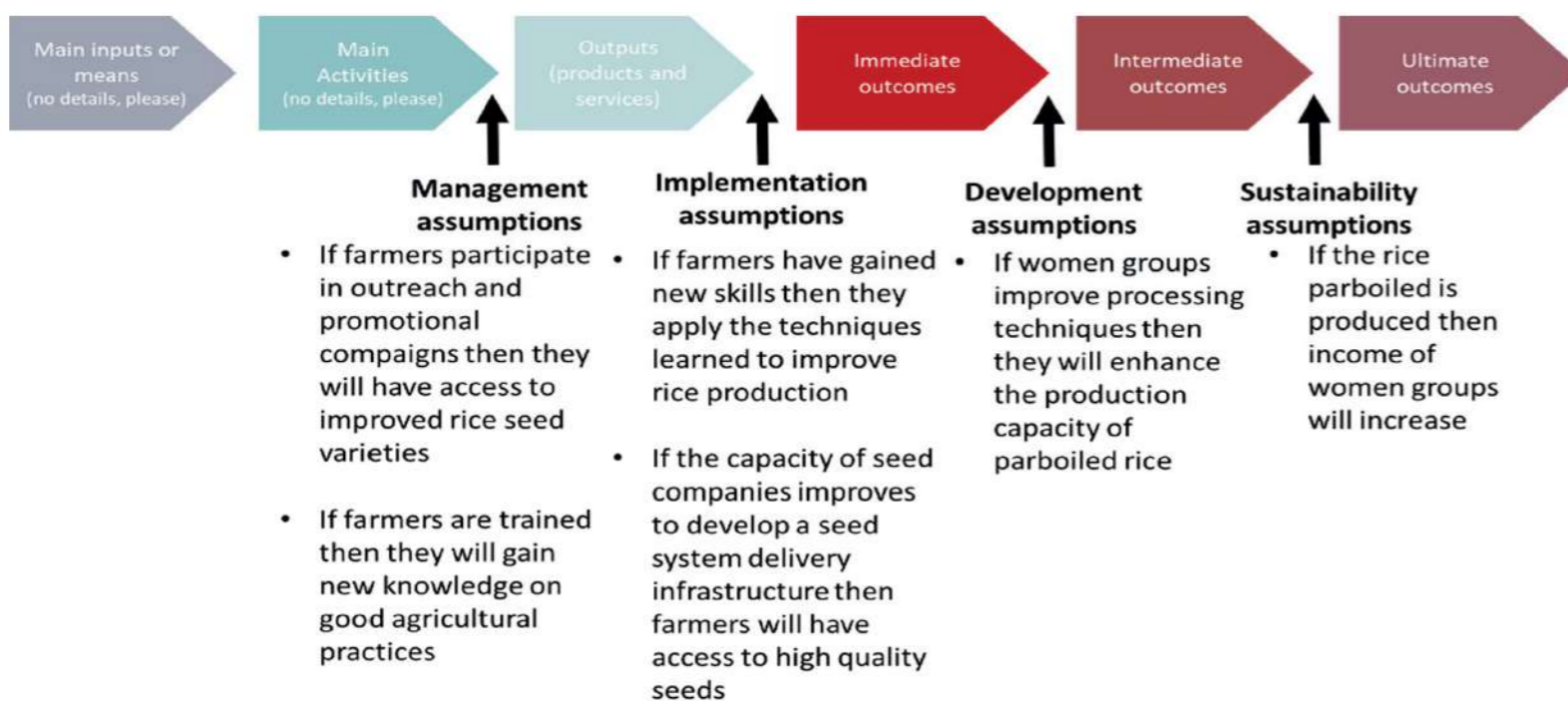


Figure 1. TAAT Rice Compact Vision of Success Assumptions

## 1.2. Operationalization of the Rice Compact in Côte d'Ivoire

Côte d'Ivoire is centrally located along the southern coast of West Africa and borders Ghana to the east, Burkina Faso and Mali to the north, Guinea and Liberia to the west, and the Gulf of Guinea to the south. The country has two principal climatic zones: the tropical rainforest to the south and the savannah to the north, in a total land area of 318,000 km<sup>2</sup>, of which arable land is 8.8%. The annual rainfall totals 1,100–1,200mm during the rainy season from April to October, and agriculture supports 38% of the population and contributed 24% of GDP. Rice is the principal food crop grown by most smallholder farmers and is one of the most important staple foods for the country's population (Riquet et al., 2017), with per capita consumption averaging at 67.3Kg milled rice per person per year (Maclean et al., 2013). Rice production in Côte d'Ivoire can be segmented into three production systems: Rainfed upland system that is used across the country but more predominant in the North, West-Central, and the West; Rainfed lowland system that is mostly used in the expansive Northern and North-Wester plains; and Irrigated systems that are more common in the developed lowlands and dam-based schemes in the West, Centre-West, and North of the country (Ministry of Agriculture 2012). Table 1 highlights rice production seasons in Côte d'Ivoire.

Table 1. Rice cropping season in Côte d'Ivoire

	Planting	Harvesting
Main, North	May – June	October - December
Main, South	April – May	September - November
Off	December – February	April - June

Total paddy rice production in 2020 is estimated at 1.6 million tons compared to 1.884 million tons in 2019. FAO attributes the -15.1% reduction in rice production to movement restrictions occasioned by COVID-19 that resulted in limited availability of certified seeds of improved varieties and delayed planting activities (FAO, 2021). Overall, Côte d'Ivoire's rice demand is yet to be fulfilled through local production and the deficit is met through imports that account for about 50% of the country's rice consumption (Saito, et al., 2019). The planting areas in each production system are illustrated in Table 2.

Table 2. Characteristics of the rice production system in Côte d'Ivoire

Indicator	Rainfed upland System	Rainfed lowland System	Irrigated System
Area Planted	About 600,000 Ha	About 15,000 Ha	About 35,000 Ha
Average Yield	0.8 MT/Ha	2.5 MT/Ha	3.5MT/Ha
Number of Cycles per year	1	1	2
Producer Organizations	44 Cooperatives, two Unions of Cooperatives, one National Association (ANARIZCI), one Development Management Council (CGA) for each developed scheme		
Development Service	ANADER, Agricultural Professional Organisations (OPA) such as AfricaRice, NGOs		
Use of Certified Seed	7%	20%	60%
Fertiliser and Herbicides Usage	Low usage of herbicides and fertilisers		60% of total area
Mechanisation	Hardly any tractors	Use of tractors, rotary tillers and threshers	

### 1.3. Strengthening the rice delivery infrastructure through public-private partnerships

TAAT Rice Compact in Côte d'Ivoire was launched by incorporating key stakeholder groups into Compact activities with representation at the national and grassroots level within the rice value chain. These included NARES, private sector partners such as seed enterprises and millers, farmer groups, and other development partners working together to enhance the rice value chain and scale delivery of modern rice technologies across the country (Appendix 1).

During the early stages of implementation, the Rice Compact educated partners on its mission to support them to (i) improve rice productivity in Côte d'Ivoire, (ii) reduce post-harvest losses, improve the quality of milled rice for better market access, and (iii) reduce overreliance on traditional rice milling and processing practices and introduce more efficient and reliable practices. With partners and stakeholders mobilized around a common goal and working

as an ecosystem of partners, the Rice Compact began the implementation of accelerating the deployment of productivity-enhancing technologies across the country.

The TAAT Rice Compact provides oversight of activities of its partners by leveraging on the established rice Regional Technology Delivery Infrastructure (RTDI) in partnership with the NARES Focal Persons, Facilitators and Champions of Change of the Innovation Platforms (IPs) in the rice hubs. These partnerships have been mainstreamed in TAAT technology deployment and scaling.



Donor projects some funded by AfDB, IsDB, GiZ, and 53 seed enterprises benefit from seeds supplied by TAAT which are multiplied into foundation and certified seeds. The further multiplication and marketing to reach out to farmers are done through the investment made by these partners. With regards



to the GEM parboiling technology beyond the training, installation of facility and monitoring, the women groups provide the remaining resources to acquire quality paddy, contract seed producers, and off-takers come from the women themselves. In a similar vein, beyond the training that benefited the equipment fabricators, the resources for fabrication and sales of equipment come from the fabricators themselves. In the eight focus countries, the engagement of 116 key rice value chain stakeholders in 8 focus countries, comprising farmer organizations (8), women rice parboiling groups (8), paddy aggregators, traders, seed enterprises (53) and millers/aggregators (4), equipment manufacturers/suppliers (8), micro-finance (3), policy institutions (8), Research Institutions and universities (10), Extension (8), NGOs/Development Projects (8) and media (8) facilitated awareness and demand creation and access and use of the technologies.

### 1.4. TAAT Rice Outcome Case Study Areas

The Rice Compact outcome case study purposively focused on Côte d'Ivoire being one of the eight primary focus countries. This was backed by several conveniences such as location of AfricaRice headquarters in Abidjan, AfDB's AHA1 offices also in Abidjan, and seed multiplication station in M'be. Côte d'Ivoire was therefore best suited for the study team to meet the leadership of AfricaRice including the Rice Compact Coordinator, the Rice Breeder, the Impact Assessment leader and other experts and technicians supporting the Compact, as well as seed breeders and the innovators and fabricators of the GEM parboiling technology. The areas visited during the study are graphically shown in Figure 3.

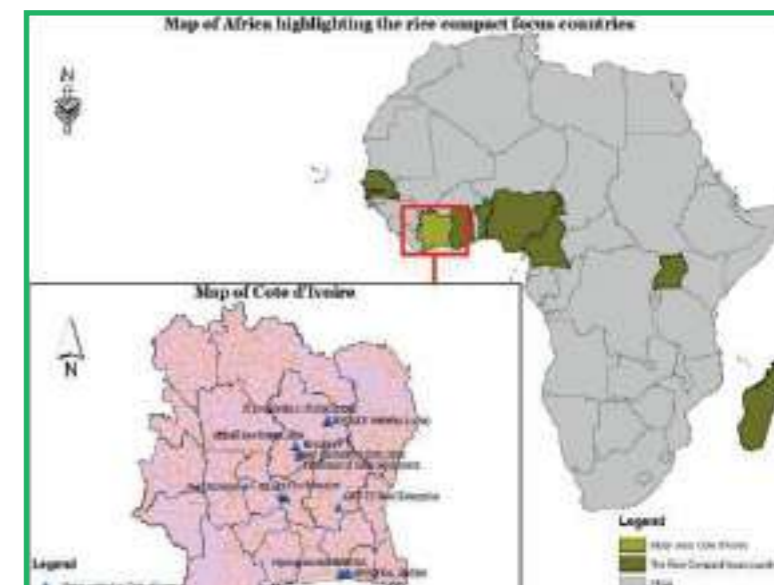


Figure 2. Map of the study sites and TAAT Rice Compact focus countries. Source: Own data plotted using ArcGIS

### 1.5. TAAT Rice Compact Technologies

The five technologies and approaches being deployed to improve rice productivity and competitiveness in Côte d'Ivoire include: (i) Climate-smart rice varieties and hybrids, (iii) improved rice threshing using ASI threshers, (iv) post-harvest GEM rice parboiling system, (ii) RiceAdvice Decision support tool highlighting Good Agricultural Practices (GAP), and (v) stakeholder participation in Innovation Platforms networks in rice hubs.

## 2. Objectives of the Outcome Case Study

The objective of the outcome case study was to determine the effects of the TAAT Rice Compact interventions and the degree to which the rice Compact deployed proven rice technologies to increase productivity, create jobs for women and youth and increase income of value chain actors in Côte d'Ivoire. Specifically, the case study focused on evaluating the effect of reported public and

private partnerships mobilized to deploy TAAT technologies and sought to:

- Document evidence-based results on the deployment of Rice technology toolkit in Côte d'Ivoire;
- Understand the role of public and private partners in the scaling of rice technologies;
- Gather lessons learned on what works/does not work and examine the challenges encountered for purposes of adaptive learning to improve future programming (subsequent TAAT phases).

## 3. Methodology used for Outcome Case Study

Kusek and Rist (2004) argued that a case study is the most appropriate evaluation approach to collect and decipher data to help understand the breadth and depth of implementation progress against program targets. This case study used both



explanatory and exploratory approaches to evaluate the Rice Compact's reported accomplishments and how they align with the Compact's ToC (Figure 4). A clarificatory evaluation was used to clarify the underlying rationale of the Rice Compact deployment approach and make explicit the logic that supports the program including its goals, objectives and activities conducted to achieve the intended outcomes and refined the ToC. To gain insight into the extent to which the outcomes were generated, questions on income, job creation and productivity were explored with the aim of documenting clearly the contribution of partners and lessons learned on what works/does not work for corrective action to be taken (Stein & Valters, 2012).

The study took place in four regions of the country, including Abidjan, Yamoussoukro, Bouaké, and Bongouanou. The target groups were different stakeholder groups engaged in the implementation of the TAAT Rice Compact activities were interviewed. They are also found along the rice chain value as TAAT operates in a value chain model to provide temporal employment for women and youth and enhance value addition through rice processing. The stakeholders who took part in this study were:

- AfricaRice administrative personnel in Abidjan and Bouaké: to understand partnership and implementation arrangement from the program management standpoint
- AfricaRice technical personnel in Abidjan and Bouaké: to understand the delivery infrastructure of the rice hub. Stakeholders included the Compact Coordinator, the Rice Breeder, GEM Technology Innovator and M&E Specialist
- Seed multiplication technicians overseeing farms in Bouaké and Dabakala
- Private Seed Companies
- Members of a rice Innovation Platform in Bouaké
- Rice processors in Abidjan, Bouaké, and Bongouanou,
- GEM Parboiler Fabricators
- Rice Traders in various market centres

The study applied a non-probability sampling approach targeting purposively rice Compact partners who participated in the Rice Compact implementation in the four regions of the country. The study used primarily qualitative data



The MEL team with seed farmers at one of the MANY Group's rice fields in Dabakala

collection methods supplemented with quantitative data methods to explore, describe, and interpret perceptions of what stakeholders and partners involved in project implementation. Secondary data collection was also used through desk reviews and analyses from documentary and statistical sources to understand the partnership arrangements and records in place to gain insight on the roles of stakeholders in achieving the Compact results. The information gathered helped to measure the effectiveness of TAAT Rice Compact activities and whether resource utilization is fit for purpose to support the Compact activities (Acevedo et al., 2010). Mixed methods helped to corroborate findings to lessen bias in our conclusions and provide recommendations to the Compact moving forward.

Qualitative data collection methods included:

- a. Focus Group Discussions (FGD):** 3 FGDs were carried out with different stakeholders engaged in the deployment of TAAT Rice Compact technologies. These discussions provided first-hand stories from beneficiaries detailing how the outcomes of TAAT Rice technology interventions had impacted their businesses. The focus group discussions conducted are presented in Appendix 3.
- b. Observation through ground-truthing field visit:** The mission team was able to verify results through field visits to various sites of the TAAT Rice Compact activities. Some of the visited sites included M'be, AfricaRice station where breeder rice is produced and stored, GRACI seed production farms, used to produce foundation and certified seeds, the "MANY" out-grower schemes managed by contracted farmers to produce foundation and certified seeds, as well as various rice processing plants in Abidjan, Bouaké, and Bongouanou.
- c. Secondary desk review:** A thorough review of documents was conducted prior to the field visit.

The documents reviewed included but were not limited to: Quarterly Technical Progress Reports, Implementation Progress Reports, Key Performance Indicator Audit reports, Outcome Reports, and Performance Monitoring Reports. Quantitative data collection methods included:

**d. Individual Interviews:** 18 individual interviews were conducted with actors along the rice value chain in Côte d'Ivoire to collect in-depth data on their operations, learn how they had benefited from TAAT Rice Compact through AfricaRice, and how TAAT could further compliment the support provided to help exceed targeted TAAT outcomes and impacts and bring more value for money to rice value chain stakeholders. Unlike FGD interviews, these interviews have a feedback loop and look at the learning aspect of TAAT interventions to see what more can be done to help rice value chains stakeholders build their business in a sustainable manner. Feedback in these interviews come directly from stakeholders. The profiles of individual interviews conducted are summarised in Appendix 2, 3, and 4.

**e. Key Informant Interviews:** The key informants interviewed were AfricaRice staff who are deemed to have the necessary understanding and knowledge about the TAAT project and components as well as the existing delivery infrastructure, including the role of farmers, processors, millers, marketers, breeders, equipment fabricators, investors play along the rice value chain. They played a crucial role in leading the Rice Compact operations in Côte d'Ivoire. The Key Informants interviewed are presented in Appendix 2. The study was limited to clarifying implementation processes and assessing the delivery of outputs and outcomes without establishing any causal inference.

## 4. Findings from the Outcome Case Study

This section presents the findings and validation of the results reported as outputs and outcomes of the Rice Compact activities. The findings intend to demonstrate and validate the implementation processes used to deploy TAAT Rice technologies and the partnerships and delivery infrastructure used to supply breeder and foundation seeds to infield partners who produce and deliver certified seed to farmers for production. The findings intend to capture and understand the deployment of TAAT Rice Compact

activities through TAAT Rice Compact technology toolkits, outputs and outcomes realised, and lessons learned intended to inform the Compact where corrective measures are needed. A RC is the causal sequence for a development intervention that stipulates the necessary sequence to achieve desired outcomes beginning with inputs, moving through activities and outputs and outcomes. Each level represents a distinct step in the logical framework of project implementation. The ToC goes a step further and provides an explanatory of how the program works, with whom, and under what circumstances (Astbury & Leeuw, 2010, p.365). The validated ToC and refined RC are presented in Appendix 5 and 6, respectively.

The TAAT Rice Compact, led by AfricaRice, received funds from the AfDB to implement Compact activities, as depicted in the results chain. The Compact recruited staff and mobilized partners (Appendix 1 and 2) to support Compact activities intended to deploy modern rice technologies through the rice value chain to reach farmers and help the country improve overall rice productivity. While AfricaRice recruited a team of staff under the Rice Compact (Compact Coordinator, Technology Transfer Officer and Accountant), the institution has devised a strategy to ensure that the available resources can be utilized to leverage on in-house scientists and rice experts to support the Compacts' efforts to strengthen the rice delivery infrastructure. These included an AfricaRice Seed Unit Coordinator, GEM Technology Innovator and a Monitoring and



One of the TAAT Rice Compact's beneficiaries selling rice at the Yopougon market in Abidjan

## 4.1. Inputs supporting Compact interventions

Inputs are resources made available to complete tasks and activities. These are usually in the form of staff, money, and time. Inputs are made available and mobilized to deploy project activities. The project team is then able to carry out the activities and produce the outputs. The direct project beneficiaries use the outputs, which then contribute to the immediate outcomes. The achievement of the immediate outcomes contributes to intermediate outcomes; and the achievement of the project intermediate outcomes will drive the achievement of the ultimate outcomes or impact at scale of the rice innovation and technologies deployed in the TAAT program.

Evaluation Specialist.

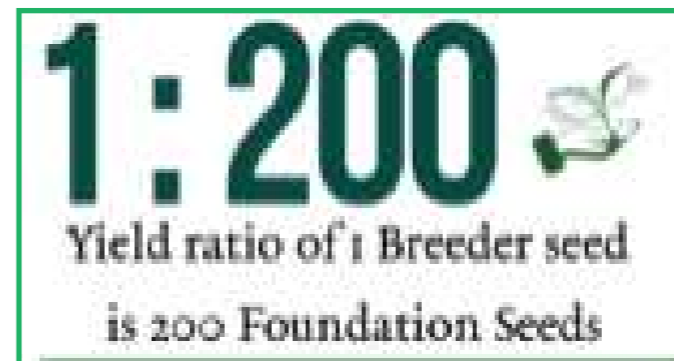
For partnerships outside the Compact, agreements were signed with strategic value chain partners in ed.

Côte d'Ivoire to accelerate the implementation of field activities. Through these partnerships, approximately 100.3 MT of breeder seed and 356 MT of foundation seed were supplied to over 40 seed companies subscribed to Cossem-Riz (at no cost) to stimulate seed production to provide more farmers with seed for planting across the country across larger land areas. To support the TAAT Rice Compact's effort at providing basic seed at no cost, partners helped with the distribution of the seed by overseeing the shipping or airlifting of seed to identified destinations. The provision of seed through TAAT, while one of many outputs needed to stimulate production, serves to improve the seed system and delivery infrastructure by getting improved varieties out into the market at an accelerated pace. From there, it is expected that partners will continue to ensure productivity continues and that farmers are given access to adequate amounts of se

## 4.2. Outputs of TAAT Rice Compact interventions

### 4.2.1. Output 1: Production of climate-smart rice variety seed

With support of the AfricaRice breeding program, The TAAT Rice Compact focused efforts on the production of breeder seed of improved climate-smart and hybrid rice varieties. The breeder and foundation seed produced are non-cash



contributions made by the Compact to the private sector who play a critical role in the deployment of seeds and ensure that farmers, across the country, have access to foundation seed for certified seed production. This responsibility of seed companies was monitored through agreements to ensure adequate distribution of seed across the country. In parallel, the Compact worked with national partners to develop a

seed roadmap for Côte d'Ivoire, identifying the volume of seed needed over the next few years underscoring the importance of self-sufficiency of seed production as a means to enhance national food and nutrition security, but also reduce rice imports in the long run. The Compact has produced 12.4 MT of breeder seed, 623 MT of foundation seed, 31,150 MT of certified seeds covered on 623,000ha. The Compact is estimated to have reached 1,246,000 beneficiaries as at the end of June 2021. Breeder seed has the highest varietal purity and is produced for further multiplication. Intense care must be observed during breeder stage and seed multiplication processes, often involving constant inspections by seed technicians to detect any off-types or varietal mixture. This is, therefore, only possible in highly controlled research stations with adequate expertise. In this case study, the production of breeder seed was done by the AfricaRice Mbé Research station in Bouaké.

The breeder seed is multiplied through a series of three re-planting seasons before being rated as Foundation seed in the fourth cropping cycle harvest and certified seed by the fifth harvest cycle. The conversion ratio of breeder seed to foundation is 1:200, meaning that each plant from 1 breeder rice seed yields 200 seeds of foundation seed. Over a decade, AfricaRice has continued to develop new high-quality hybrid rice varieties (AR032H, AR051H, AR606H, and AR708H), providing

farmers with higher yields with an appealing aroma, early maturing (110-120 days), comparative yield advantage compared to non-hybrids (inbred) varieties grown under the same conditions, and high milling recovery and characteristics of long grains that have a higher market value to farmers (AfricaRice, 2019).

These varieties are also water-efficient, allowing farmers to grow rice twice a year for increased yields. The list of Improved climate-smart varieties & hybrids deployed through the Rice Compact is in Appendix 10. The TAAT Rice Compact focused on promoting the deployment of these hybrid varieties by raising awareness and creating demand at the forefront of its interventions in Côte d'Ivoire. To ensure the uptake and required support by national partners, the Rice Compact organised a field visit at the AfricaRice research station in M'bé, Côte d'Ivoire, to demonstrate to different stakeholder groups how the seed system begins

and what support is needed to ensure the continuation of proper farming of these new varieties. Stakeholders in this engagement included representatives from eleven seed companies, two milling companies, two farmers' organizations, national seed system partners and research and development organizations from Benin, Burkina Faso, Côte d'Ivoire, Mali, Nigeria and Senegal. Part of the requirement of deploying new varieties in countries is to ensure ECOWAS seed regulation supports the release of varieties. This is something the Rice Compact worked extensively with the Côte d'Ivoire Ministry of Agriculture which was able to place an order of 10MT of approved hybrid varieties, while Mauritania has sought for the establishment of a 20 ha breeder seed for hybrid varieties revealing that the positive impacts of seed delivery in a country, can have a ripple effect into other countries. The effort on seed supply was further accelerated due to the African Development Bank's 2020 emergency Covid-19 repaid response initiative.

The TAAT Rice Compact and other TAAT value chains were tasked with providing accelerated support to countries in seed system development. This repurposing required that the Compact react fast and respond to the needs of three identified new countries Sierra Leone, The Gambia and Guinea Bissau to stimulate rice production for the 2021-2022 planting seasons. Ensuring the correct linkages and right partners to deliver rapid response required an all-hands-on-deck approach and expertise from the TAAT Clearinghouse and Program Management Unit (PMU) to assist the TAAT Rice Compact with the new activities. This is an example of what a TAAT partnership entails and how it works to help countries achieve results in food security. In addition to focusing on its primary focus countries such as Côte d'Ivoire, the Rice Compact was able to respond to the needs of the countries and made accelerated efforts to provide Sierra Leone, The Gambia and Guinea Bissau with breeder and foundation seed at no cost that was then sent to private companies and farmers for production of certified seed. Table 3 indicates the volume of seed produced between 2020 and 2022, showing how the Rice Compact, through its ecosystem of partners and experts, showed how it is an agile operation ready to respond to the needs of farmers and countries.

**Table 3. The TAAT Rice Compact Covid-19 emergency response seed initiative**

Country	Breeder	Foundation	Certified
Guinea Bissau	0.74 MT	10MT	215MT
Sierra Leone	16 MT	30MT	2,000MT
The Gambia	1.5MT	28MT	900MT

#### 4.2.2. Output 2: Increased participation of women in outreach and promotional campaigns

##### promotional campaigns

To address the gap of participation in the rice value chain in Côte d'Ivoire between men and women, the Rice Compact emphasizes gender inclusion across the rice value chain. Women producers, who are often excluded or have their participation restrained, face a continuous additional challenge when joining their male counterparts in post-harvest rice production. Establishing their organizations or becoming more active in integrated organizations can help them overcome these constraints and help families collectively increase income when both fathers and mothers are active in the value chain. Promoting inclusive roles for women across the rice value chain in the Rice Compact activities has conventionally focused on the processing of traditional parboiling methods and retail trading of milled rice.

To address the inequalities faced by women and to strengthen and enhance their participation in post-harvest processing, the Rice Compact deployed

activities focused on organizing different stakeholders into multi-stakeholder Innovation Platforms (IPs) with high female membership rates (accounting for about 57%) actively occupying leadership roles in the platforms. Through these selected IPs and using the leadership of the women as a mechanism to interest other women, the Rice Compact conducted activities that: highlighted the value addition of harvesting new rice varieties, created awareness, and promoted modern rice technologies, provided knowledge on seed multiplication, provided knowledge on rice processors, and focussed on skill development of youth in the rice value chain. An E-registration of farmers and other rice value chain actors using an android-based application was developed to track the deployment of technologies in the rice hubs. Over 7,977 rice value chain actors were registered in two rice hubs in Bandama Valley and Gagnoa regions, with female value chain players accounting for 11.27%. However, high proportion of women (57%) was included in the IP activities of the rice Compact in Côte d'Ivoire.

#### 4.2.3. Output 3: Improved knowledge of farmers on GAP and crop management

The TAAT Rice Compact has deployed Good Agricultural Practices (GAPs) proven to improve rice productivity and help farmers use proper farming techniques with accompanying inputs. The GAPs comprise the crop, soil, water, and weed management good practices deployed in the Compacts' focus countries, including Côte d'Ivoire. The GAPs entail land preparation methods (bundling, puddling, and levelling), variety selection, crop planting, fertilizer application, harvesting, weed and nutrient management. These are disseminated through field demonstrations, training, and media (radio/TV) coverage. In 2019, 320 farmers benefited from GAP training in Côte d'Ivoire, and more than 5,000 were sensitized through Radio RTI, Bouake. New varieties and fertilizers were provided to farmers resulting in a yield increase of >1MT/ha. Radio messaging on GAP (in French by Radio RTI) that have created increased awareness among rice farming communities in Côte d'Ivoire.

In partnership with private seed company Grace Agricole De Côte d'Ivoire (GRACI) based in Yamoussoukro, the TAAT Rice Compact trained members from Société Coopérative des Producteurs de Riz de Yamoussoukro (COPRORIZ), The Conseil de l'Entente (ENTENTE), and L'Agence pour le Developpement de la filière RIZ en Côte d'Ivoire (ADERIZ) farmer cooperatives on

the application of Good Agricultural Practices (GAPs) when farming hybrid rice. As part of the business approach in hybrid rice scaling through TAAT, GRACI is providing financial support for the hybrid demonstrations in 12 farmers' fields in the Yamoussoukro area while AfricaRice provides technical support to GRACI during the training. The uptake of GAP has mainly been dependent on partner willingness to adopt three practices that serve to sustain and ideally improve agricultural production. In the visited foundation seed and certified seed multiplication fields, GAP practices and spacing distance requirement of 5 meters between rows for seed production to prevent cross-pollination and lower seed rate to reduce nutrient competition by plants, unlike in paddy production, were observed as essential farming practices deployed to farmers

#### 4.2.4. Output 4: Improved knowledge of IP members on the new GEM parboiling system

To reduce women's drudgery and attract more youth into the rice value chain in Côte d'Ivoire, the Rice Compact introduced gender-friendly equipment that women and youth could easily operate. The Compact organised a series of capacity building to target these specific audiences that training on:

*Entreprise Ivoirienne de Ferronnerie, tuyauterie et de Chaudronnerie Industrielle Machines Agricoles (EIFTCI) based in Bouaké, represented Côte d'Ivoire.*



- Fabrication, installation and use of the GEM soaking tank, GEM steamer, hoist and rail system, rice husk gasifier cooking stove for parboiling and rice husk gasifier cooking stove for household cooking.

- Improved rice parboiling and sun-drying methods. All trainees received technical drawings of all fabricated equipment and training materials on parboiling and sun drying of paddy rice.

- Fabrication of one GEM soaking tank (300 kg capacity), two GEM steamers (40 kg capacity), one hoist and rail system, two high output rice husk gasifier cooking stoves for parboiling and two low output rice husk gasifier cooking stoves for household cooking with solar system (100- watt panel, 12/24-volt charge controller, 65 Ah solar battery and 20-meter cable) and 12-volt fan plus speed controller.

- The ASI thresher and the new GEM parboiling system introduced by AfricaRice are easy to move, reduce drudgery and are affordable. The new GEM rice parboiler uses rice husk completely in replacement of fuel wood for rice parboiling. The new GEM parboiler is smokeless and therefore harmless to women health, reduces drudgery, has high turnover, results in high quality milled rice with high come and is easy to market.

The Rice Compact trained over 3,500 rice processors, imparted with knowledge and skills to use new GEM Parboiled System across the rice hubs (Benin, Côte d'Ivoire, Niger, Nigeria, and Togo) supported by AfricaRice. The Rice Compact also worked to provide knowledge and training that empowers local fabricators to enable users to source out for locally produced and high-quality GEM parboiling machinery. The Compact organized a regional workshop on post-harvesting, processing and value addition equipment standardization and fabrication in Benin. Participants were from Benin, Cameroun, Côte d'Ivoire, Ghana, Mali, Nigeria, and Senegal were trained to locally fabricate improved GEM parboilers and other rice processing technologies.



### 4.3. Immediate Outcomes of TAAT Rice Compact interventions

Immediate (short-term) outcomes represent the short-term changes that result from using the products and services delivered by a project or program. These products and services, also called outputs, are defined as the goods, equipment or services that result in outcomes from the development action. The changes at this level are expressed in skills, ability, partnership, knowledge, etc. In this regard, the Rice Compact ToC validated four immediate outcomes of the Compact's activities:

- Enhanced the capacity of seed companies
- Improved rice production and post-harvest technologies access
- Improved investment opportunities along the value chain nodes
- Enhanced good post-harvest using the GEM parboiling technologies

#### 4.3.1. Enhanced the capacity of seed

##### companies

Leveraging on its ecosystem of partners to enhance the capacity of seed enterprises and other seed multipliers, during the 2019/2020 rice cropping seasons, the Compact supplied at zero cost 7.04 MT of breeder seed of major varieties namely; NERICA 4, ORYLUX 6, AKADI and NERICA L19 to GRACI and Agricultural and Management Company - Food and Commerce (AMC-FC) seed enterprises as well as Bouake Women Rice IP. A production of 237.391 MT and 300 MT certified seed was recorded in 2020 and 2021 across the 3 intermediate beneficiary groups. The Compact also gave out 50 kg of the four hybrid seed varieties AR032H, AR051H, AR606H, and AR708H for evaluation purposes. A total of 583.5 Kgs of certified seed for the four hybrids was produced by GRACI, and high yields were recorded, varying

between 5.8 to 10.0 MT/ha. To deep dive into partnership arrangement, observations were made on ongoing field activities coordinated by the TAAT Rice Compact leadership.

#### 4.3.1.1. Seed certification

Through this process of building the capacity of seed companies, the Rice Compact also facilitates activities that support the seed certification processes for the seed companies in Côte d'Ivoire through its long-standing partnerships with various government agencies. The process of seed certification in Côte d'Ivoire involves the collection of samples from harvested rice by the National Rural Development Agency (ANADER), a public agricultural extension organization with a nationwide network comprising of 8 bureaus and over 60 branches. The



Breeder and Foundation seed that is produced by AfricaRice is routinely subjected to genetic purity and germination tests before it is distributed to COSEM-Riz members for further multiplication. Similarly, once the COSEM-Riz members multiply the seed, ANADER collects samples from the multiplication fields and conducts a quality analysis of the seed on aspects such as germination rate, genetic purity, variety, and origin. Each bag of certified seed is tagged with a serialised card displaying the quality analysis results ready for dispatch. It is then made available to farmers through the seed supply chain to produce paddy rice. The certification process assures farmers of better productivity and increased incomes compared to the use of recycled

seed. Overall, the seed that has been produced in Côte d'Ivoire by the Compact has so far been distributed across 15 countries. Distribution of the seed is especially considerate to the varying agro-ecological zones, and demonstration farms are usually established to assess seed suitability. This is done in collaboration with the national seed certification agencies in the respective countries and the private sector and is based on their need for uptake and introduction of newer modern varieties into their country's rice value chain.

#### 4.3.1.2. Establishing a Consortium of Seed Enterprises and Millers (COSEM-Riz)

To enhance equitable access to breeder seed availability, TAAT Rice Compact facilitated the establishment of the COSEM-Riz consortium in Abidjan. The consortium so far has 40 subscribed best seed enterprises from different countries through the establishment of a strong delivery seed infrastructure, thereby accelerating efforts for multiplication and delivery of certified seeds



to farmers. This platform constitutes a capital for delivering quality breeder seeds for further multiplication into foundation and breeder seeds. G3 breeder seed is currently distributed through the COSEM-Riz network, whose members undertook multiplication of the breeder seed into foundation seed and certified seed. The COSEM-Riz seed enterprises visited during the study were: GRACI, AMC-FC, and MANY. Through their subscription, the COSEM-Riz members can access seed quotas from AfricaRice without relying on donor funder projects or government-led country programs. Through COSEM-Riz, the Compact was able to go beyond the eight focus countries to reach ten other countries (Burkina Faso, CAR, Gambia, Guinea, Guinea Bissau, Mauritania, Mali, Niger, Sierra Leone and Togo) by supplying them with quality breeder seeds and/or hybrids.

### 4.3.1.3. Partnerships fit for purpose for seed production

**a.** Mother Africa Need You (MANY). In 2020, the Compact signed a sub-contract agreement with a MANY. MANY is an organization that assembles the expertise and experience of the diaspora to return to Africa to become key in the continent's growth and

receiving breeder seed from AfricaRice. The seed company owns a huge infrastructure with a 6,500 MT storage capacity for paddy rice and a 10,000 MT warehouse for seed conditioning. MANY's partnership with the Rice Compact is to produce foundation seed that is then distributed to 8 seed enterprises and 174 out-grower farmers to produce certified seed and production of paddy



development. MANY responds to Africa's rising need for education, health, infrastructure, industry, and development in agricultural agriculture to support continued economic growth, build capacity, and enable Africa to continue its development as a leading trading partner in the global market. Production of certified rice seed in Côte d'Ivoire is expected to rise significantly in 2021 as the MANY seed enterprise expands its business and scales its seed production scheme. MANY established a 100ha land to produce an estimated 350-400 MT of foundation seed after

rice, respectively. During the multiplication of foundation seed, the yields averaged at 5 MT/Ha, while certified seed yields averaged between 7-8 MT/Ha due to plant spacing. MANY SA is an Agro-industrial company that is working thoroughly to help trigger a positive economic transformation and the development of agribusiness in Côte d'Ivoire. MANY has been invited by the Government of Côte d'Ivoire to become a Rice Pole Leader of the Region of Hambol with substantial investment in rice production and processing to contribute to rice self-sufficiency by 2025. The strategy devised targets mainly smallholder rice farmers by granting them

access to the working capital on a commercial basis and by investing in innovative models of sustainable agricultural intensification of new technologies and techniques and the development of market opportunities. MANY provides farmers, on a contractual basis, with inputs - fertilizers (NPK, Urea) and machinery - land preparation, herbicides' applications, and paddy harvesting. MANY's success is mainly attributed to its high-level Board members: (i) The Board Chair, Mr. Tiahmo Rauf, is a Business Expert with a high profile and professional reputation career. He has created and managed diverse initiatives worldwide, mainly on sports, music and tourism., and (2) The Director-General, Dr. Beye Amadou is a well-known Senior Scientist and Business Development Manager, understands business operations of various public and private institutions including ECOWAS, Investment Center/FAO, World Bank, USAID, UNDP, WFP, Michigan State University, Bioversity, ICRISAT, CFC, FIDA, Winrock International, etc.

**b.** The partnership with Grâce Agricole de la Côte d'Ivoire (GRACI) is arguably a successful model. GRACI's partnership with Rice Compact is mainly to sustain the seed system to ensure that farmers have access to quality certified seeds to produce paddy rice and have a market for their produce by linking farmers to markets, mainly

ability for GRACI to provide financial support for the hybridization of rice. GRACI has organised massive demonstrations in 12 farmers' fields in the Yamoussoukro area (Middle belt – Yamoussoukro – Bouake and North). To date, GRACI has over 300 (cooperative members to produce certified seed and paddy).

**c.** The partnership with Agricultural and Management Company - Food and Commerce (AMC-FC). AMC-FC is located in Bongouanou and operates in two different segments in the rice sector (i) processing of paddy rice to white rice and (ii) production and seed conditioning on order. AMC-FC is a strategic partner of the Rice Compact, working in seed conditioning and treatment. In addition to the production for its own account of large quantities of paddy rice from lowlands developed and exploited in full ownership, the seed enterprise has a storage capacity of 60,000 MT of paddy rice and 10,000 MT of rice certified seed. However, due to economic challenges, its current capacity is 8,000 MT/year for paddy rice and 4,000 MT/year of certified seed. For processing into white rice for resale on the local market, it deploys at least an annual recovery capacity of 100,000 MT of paddy rice. The Rice Compact has supplied 7 MT of foundation seed (ACADY, ORYLUX-6, GT-11 and C-26) to the AMC-FC for multiplication into certified seed.



The Agricultural and Management Company - Food and Commerce (AMC-FC). AMC-FC in BongouanouAd spio urorit. Satri sulicau dernih caturit, Castiam in tum quam. Aperdiusa num Paliis? Aperiaelius, us in tia



Bags of paddy rice

### 4.3.2. Improved rice production and post-

#### harvest technologies

The Rice Compact technology toolkits deployed in Côte d'Ivoire comprises various technologies targeted at improving rice production and enhancing post-harvest management and production. The technologies include deep urea fertilizer placement, Axial Flow (ASI) Thresher, and GEM parboiling. Deep urea fertilizer placement greatly enhances rice grain production because of increased nutrient use efficiency, thereby assuring high-profit margins and reduced emission of greenhouse gases. The fertiliser application method reduces the application rates of Urea, improves Nitrogen Use efficiency (NUE).

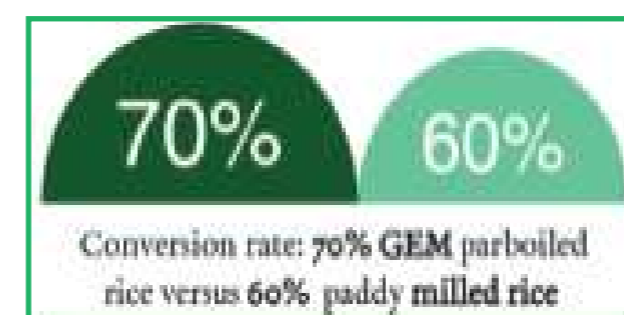
The Axial flow thresher (ASI Thresher) and cleaner has been actively promoted by the Rice Compact. ASI thresher has a high threshing capacity, low fuel costs and is relatively easy to fabricate locally by private artisans. The technology greatly reduces the labour costs and effort required to thresh and clean rice has low wastage, and a capacity to thresh 6-7 MT of paddy rice per day with a 99% rate of grain-straw separation, resulting in grain that needs no winnowing and can be bagged directly from the machine. When ASI-threshing is combined with optimum harvesting time, grain loss can be reduced by 23%. 14 artisans spread in the country were trained on how to fabricate the ASI thresher.



### 4.3.3. Enhanced good post-harvest using the new GEM parboiling system

The new Grain quality-enhancer, Energy-efficient and durable Material (GEM) parboiling system was developed by AfricaRice as an innovative solution to improve the rudimentary parboiling methods that were inefficient, heavy and difficult to manipulate or lift up by women unless aided by young people. These resulted in poor quality of parboiled rice that included stones, no taste, full of smell, broken and burnt grains, and ununiform finished product difficult to market. As a way to correct the traditional parboiling system, the new GEM parboiling system comprises a parboiler and improved stove that protects users from heat and smoke exposure with water pipes. It is a labor-saving device with a rotational hoist and improved drying surfaces. This new GEM parboiling technology recycles rice husks as the primary fuel, has low smoke exposure compared to traditional parboiling methods and is energy-efficient and safer to operate by women with steamers fired by clean cooking stoves. In terms of rice utilization, the parboiling system substitute's firewood with rice husk briquettes (by-products of rice milling residue); cooking fuel results in substantial energy savings (Woomer et al., 2021). Further, the rice product has a uniformed color, no heat-damaged grains, no impurities, and has low levels of broken fractions and is comparable to premium quality imported rice, making it competitive to the market. The Bouake Rice Innovation Platform (RIP) is one of the groups using

the improved GEM parboiling technology promoted by TAAT. The parboiling activity is manned primarily by women using GEM parboilers freely granted by AfricaRice. The GEM parboiler was installed close to rice milling facilities that are producing rice husk as a rice milling by-product to ensure an unlimited supply of parboiling briquettes, thus saving 100% cost on fuel wood, reducing time for wood collection by women and transportation cost. To show its commitment to the groups that the Compact supports to drive the rice sector in Côte d'Ivoire, Appendix 6 shows the donation done by



the Compacts to its beneficiaries to improve the rice processing quality.

The system enables the processing of larger rice quantities, usually with a recovery rate of 70%, after processing due to impurity level with a capacity of processing 1ton/hour. Using the new GEM to process 1 ton of paddy rice, women produce 700Kgs



parboiled rice against 600Kgs milled white rice. With a parboiled rice price of FCFA 600/kg (USD 1.07) against FCFA 500/kg (USD 0.88) for milled white rice, women reported that they can make \$215 more compared to those using conventional milling methods. The observations made by the team identified that through the GEM parboiling technology, the following were achieved to date:

- Bouake Rice IP processed 251.56 MT of parboiled rice and marketed it through the women's rice parboiling association Société Coopérative Simplifiée Agricole des Femmes du Gbeke (SCOOP-FG) and RINA SARL
- SCOOP-FG processed 133.56 MT of parboiled rice and supplied rice to markets in Bouaké and Abidjan
- RINA SARL in Youpougon processed 118 MT and supplied to UNAVRICI (Union des Vendeurs de Riz Local in Côte d'Ivoire section Yopougon) and SODACIS-RINA partner in the supermarket network in Abidjan

To understand the cost-benefit analysis of parboiling technology, both RINA and SCOOP-FG were asked to detail the cost of their business operations. Table 4 shows the results of the Cost-Benefit Analysis to determine the profitability of the new GEM parboiling technologies used by both groups. Details of processing cost of parboiling rice for both groups are available in Appendix 7.

**Table 4. GEM Parboil System Cost-Benefit Analysis**

Cost-Benefit Analysis	Measurement unit	AROMATIC		NON-AROMATIC	
		RINA SARL	SCOOP- FG	RINA SARL	SCOOP- FG
Operation Cost	FCFA	284,875	266,300	244,875	246,300
Quantity of purchased rice (weekly)	MT	10	1	10	1
Total investment cost	FCFA	<b>2,848,750</b>	<b>266,300</b>	<b>2,448,750</b>	<b>246,300</b>
Sale price of milled rice	FCFA	525,000	-	425,000	-
Gross revenue of milled rice	FCFA	3,150,000	-	2,550,000	-
Net profit of milled rice	FCFA	<b>301,250</b>		<b>101,250</b>	
CBR		<b>0.11</b>		<b>0.4</b>	
Sale price of parboiled rice	FCFA	800,000	750,000	600,000	600,000
Gross revenue of parboiled rice	FCFA	5,600,000	525,000	4,200,000	420,000
Net profit of parboiled rice	FCFA	<b>2,751,250</b>	<b>258,700</b>	<b>1,751,250</b>	<b>173,700</b>
CBR		0.97	0.97	0.72	0.71

The results show that GEM parboiling is the most efficient means of processing rice and most especially for aromatic rice varieties due to its increasing demand for hypermarket and consumption of the middle class in Abidjan. Note that women do not process white milled rice like RINA with CBR of 0.11 and 0.4 for aromatic and non-aromatic rice, respectively. Restrictively, both RINA and SCOOP-FG have a BCR of 0.97 for aromatic rice and 0.72 and 0.71 for RINA and SCOOP-FG. The demand for both aromatic and non-aromatic is categorized by wealth classes; usually aromatic is produced and sold to the middle class while non-aromatic is produced for mass consumption and is affordable by the lower class. With regard

to the demand for new GEM parboiling equipment, EIFTCI supplies the GEM parboilers on a demand basis at the cost of 6,000,000 FCFA (USD 10,772). So far, 4 GEM parboiler sets have been supplied to women groups in Côte d'Ivoire, and two more are ready for delivery. The fabricator has a target of selling 20 parboilers each year and plans to do promotions on radio and TV to raise awareness on the availability of the new GEM parboiling technology to achieve the target. At the time of the visit, the fabricator has established a well-organised and well-equipped small-scale enterprise. The fabricator employs 12 young people who work in the workshops as part-time and also employs 4 full-time administrative staff.

## 4.4 Intermediate Outcomes validated in Côte d'Ivoire

Intermediate outcomes are what the project or program is expected to achieve or has achieved in the medium term in terms of positive changes having an impact on direct beneficiaries of the intervention. These changes take the form of improved performance, new behavior, or practice, etc. As depicted from the Rice Compact's Theory of Change, three intermediate outcomes were identified as follows:

- Increased rice productivity from 2.78 t/ha to 3.4 t/ha
- Increased income of women from 0% to 32% (USD 459 to USD 604)
- Created jobs of 3,450 people

These three intermediate outcomes are derived from the overall postulated TAAT Results-Based Logical Framework (RBLF) (TAAT, 2018) and are described as (i) Increase in income household by 50%, (ii) Increase in agricultural commodity productivity by at least 30% to 50% and (iii) Jobs creation for women and youth. Through the deployment of rice improved varieties, the TAAT Rice Compact interventions have been designed to have a positive impact on input supply, production, and processing, creating a positive ripple effect on productivity, jobs, and incomes for farmers and rural households.

### 4.4.1 Increased rice productivity

Regarding rice productivity, the Compact has focused efforts on deploying appropriately improved and climate-smart rice varieties bundled together with good agricultural practices and knowledge advice. The specific improved varieties recorded during the study include NERICA-4, NERICA-L19/FARO-67, ORYLUX-6, WAB638-1/AKADI, IR-841, CY-2 and Bouake-AM. In addition to these six improved varieties, Hybrids varieties (Aromatic (AR051H) and varieties under evaluation (AR032H, AR051H, AR606H, and AR708H)) have shown incredible yield performance. The productivity levels recorded across the country for the different rice varieties are summarised in Figure 5 and details of variety specifications are available in Appendix 11.

#### Productivity of improved climate-smart and hybrids varieties (MT/ha) :

Hybrids are ranked first on productivity performance

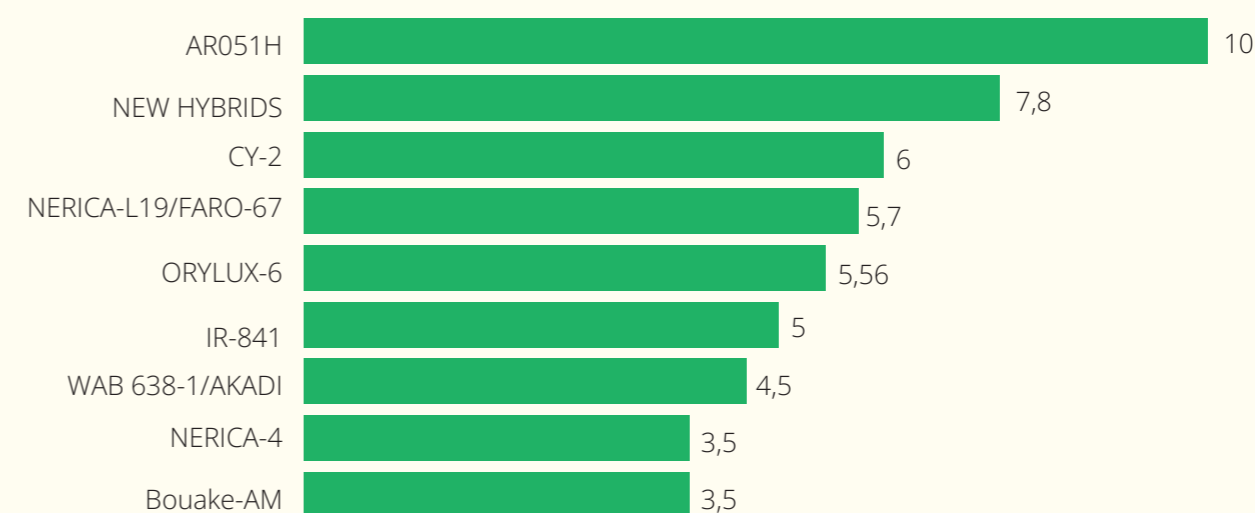


Figure 3. The potentiality trend of productivity levels of rice varieties deployed Source: The Rice Compact seed road map, 2020

Also observed were the preferences in varieties by the different stakeholder groups: seed enterprises, producer/farmers, marketers (wholesalers and retailers), processors (parboilers), and millers, these varieties were ranked by stakeholders from very important to least important. Value chain actors' variety preference are summarised in Table 5. Additionally, the characterisation of the rice value chain actors is demonstrated in a schematic representation available in Appendix 9.

**Table 5. Value chain actors' variety preference**

	Seed enterprises	Out-growers/ producers	Farmers	Processors (parboilers)	Millers	Marketers
Varieties	NERICA-4&L19, Orylux-6, CY-2, Hybrids (all varieties)	NERICA-4&L19, Orylux-6, WITA-9, AKADI and JT-11	Orylux-6, AKADI, JT- 11 and WITA-9	All varieties	AKADI, JT- 11 and WITA-9	AKADI, JT- 11 WITA-9
Reasons	Yield gain with the capacity to yield 5-6 MT/ha for NERICA-4&L19, CY-	Yield gain enables producers and farmers to recover the production cost,	(i). Orylux-6 is aromatic and tasty (ii) AKADI, JT-11 and WITA-9 are affordable	Varieties are classified by wealthy classes (i) NERICA-4&L19, CY-2, Orylux-6 for middle class	High demand for mass consumption	Affordable, demand is high for mass consumption, is accessible by poor people, the
	2 and Orylux-6) and 10- 13MT/ha for hybrids  Orylux-6 is in high demand for its slender, longer grains	availability of seeds, demand by marketers	and accessible by poor people	once parboiled and aroma (ii) AKADI, JT-11 and WITA-9 for lower class and mass consumption (iii) CB-1 dietetic values demanded by supermarkets		texture is good for porridge

Compared to the inbred varieties, which have the capacity of producing 5-6MT/ha, hybrid varieties (AR032H, AR051H, AR606H, and AR708H) as observed at the GRACI fields are expected to produce 6-10MT/ Ha against a potential of 13MT/ha, landraces (WITA-9 and JT-11) have proven to have low productivity but are mainly preferred by farmers for consumption varieties such as were assessed to have poor productivity but preferred by farmers. Though not originally designed to be included in the study, yield gains before and after TAAT were assessed though without trying to establish any causality inference, given that this study was not intended to perform any impact analysis but rather to understand how TAAT is on a pathway to improve farmers' livelihoods.

It was found out that since the Compact started its accelerated deployment process of improved varieties towards end 2018, the yield gains have substantially

improved. In terms of data review and analysis, productivity recorded from producers ranged between 4MT/ha to 7MT/ha for these varieties against 2 MT/ Ha to 3MT/ha before TAAT interventions showing that TAAT has contributed positively towards Côte d'Ivoire's rice value chain development. Deployment of these new rice varieties helped stimulate an increase in productivity and production, reduction in the importation, rice self-sufficiency and enhanced food security in countries where rice is a staple food but has continued to be imported. Additionally, through the deployment of climate-smart rice varieties, models, and practices to overcome the direct effects of climate change, such as increased temperatures, droughts, and floods to boost rice productivity and ensure sustainable rice production in Africa, the deployment of modern rice varieties has put the country on a pathway to building a rice value chain resilient to resilience to climate shocks and pest invasion.

#### 4.4.2 Increased Income

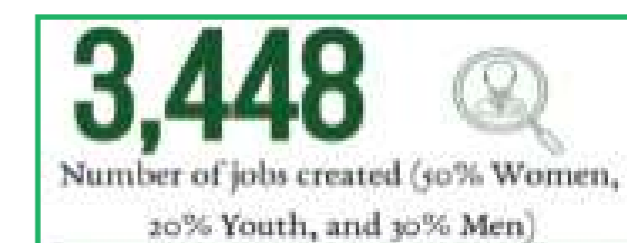
Different factors were recorded as contributing to increased incomes. These include increased rice productivity, improved post-harvest management technologies such as ASI thresher and GEM parboiling that all contributed to the final product matching premium import quality rice and fetched higher prices in the market. Specifically,

GEM parboiling technology assured higher returns given that paddy conversion ratio to parboiled rice is 1:0.7 compared to 1:0.6 for paddy to milled white rice, meaning processors using GEM get additional 100Kgs of rice per ton of paddy, and are also able to sell parboiled rice at a higher price (600 FCFA) than milled white rice (500 FCFA). Overall, farmers are now earning an average of \$688/ha.



#### 4.4.3. Created jobs

Job creation through commercialization and industrialization of the agriculture sector is listed as the second priority intervention area of TAAT. In the overall program context, TAAT targets to create 12,000 new jobs, with 50% of them benefitting women and youth. So far, 3,448 (1,037 men, 1,729 women, and 682 youth) jobs have been created by the Rice Compact. It was observed that job opportunities through accelerated crop technology deployment are created across the value chain, both on-farm and off-farm, and range from casual to more permanent opportunities.





## 5. Conclusion and Recommendations

This report has documented findings from the outcome case study conducted in Côte d'Ivoire for the TAAT Rice Compact between 20th June 2021 and 29th June 2021. The study intended to identify results that would help validate the activities and operations of the Rice Compact in Côte d'Ivoire are aligned with the Compact's targets and outcomes. Specifically, the case study intended to: (a) illustrate the operations of the Compact, (b) conduct exploratory assessments of reported outputs and outcomes, (c) focus on critical instances (high success) of a program); (e) understand program effects that emerge from the Rice Compact activities and lastly (f) garners an understanding of the impact trajectory of the Compact.

The study was spread across different regions, including Abidjan, Yamoussoukro, Bouake, and Bongouanou where the study team interacted with different stakeholders engaged in the implementation of the TAAT Rice Compact activities and saw firsthand the outputs of the activities. The stakeholders included but were not limited to AfricaRice Administrative and Technical Personnel, Seed Enterprises, Rice Processors, Fabricator, Women Group Innovation Platform, farmers organizations and other downstream rice value chain actors, such as rice wholesalers.

Overall, the team was able to verify that the TAAT Rice Compact has supported the accelerated deployment of high-quality rice seed of modern and mega rice varieties by working closely with COSEM-Riz members collectively involved in sustaining the national seed system. The Rice Compact framework is a model with clear pathway to impact at scale, leveraging partnerships along the regional technology delivery infrastructure. This



monitoring and validating case study analysed the outcomes reported by the Compact without attributing changes observed to any specific activities but instead looking at the reach of the outcomes. In this regard, the Rice Compact has been very strategic in leveraging the right partners for accelerated seed delivery initiated by providing breeder seed from AfricaRice.

From its Headquarters in Bouaké, AfricaRice through the TAAT Rice Compact has been able to expand its operations by deploying high-quality foundation seed not only in Côte d'Ivoire but also in response to the urgent country needs in Sierra Leone, The Gambia and Guinea Bissau, all in preparation for the 2021/2022 planting seasons.

Women and youth are actively engaged in Innovation Platforms in the visited areas, which are considered the mechanism for increasing their inclusive involvement in post-harvesting. Women are seen as the trailblazers of the new GEM parboiling system that is safe and easy to manipulate, not only by men. The post-harvest GEM parboiling system is energy-efficient and time-saving innovation for women who are confronted with other odds of agriculture. The new GEM parboiling system through the Rice Compact enables women to operate efficiently with a recovery rate of 70% of rice after processing while collecting an extra income of \$215 per MT. The GEM parboiling system is an important source of job creation for women and youth. Youth are the middlemen value chain actors as they play an important outsourcing paddy from producer and transporting the commodity using motorised rickshaws and motorbikes, as well as in rice trading.

The trajectory of an outcome case study showing "the pattern of interactions and causal links between actors, technologies and institutions that maintain and scale a coherent set of outcomes over time" serves as the basis for understanding how the work on the ground is aligned to program outcomes. Through the Rice Compact and TAAT's overall Theory of Change, the M&E team, Compact team and partners, understand how the TAAT Rice Compact activities and outputs are paving a clear trajectory towards achieving the desired change. It is evident that efforts to build a technology delivery infrastructure in Côte d'Ivoire have been successful and serve as a powerful mechanism that brings together key crucial partners at different segments of the value chain to ensure

final beneficiaries have better returns from their investments. The outputs of the Rice Compact activities have shown a pathway forward to transforming rice farming in Côte d'Ivoire from being mainly for subsistence living to more commercial farming by increasing yields and post-harvest activities, putting more money into the hands of farmers.



The Rice Compact's partnerships with the private sector provide strong pillars supporting a trajectory for sustainable development of the rice sector in the country. The high-quality modern seeds released by AfricaRice Centre and deployed through the TAAT Rice Compact are in the hands of next users who are working in close collaboration with field partners, seed multipliers, farmer associations and other players to sustain the seed supply chain while preparing for shocks to the food system. This ecosystem of partners helps ensure farmers are positioned to improve their yield with supporting knowledge advice and the right sustainable resources available to them. It should be noted that the partnership of the government of Côte d'Ivoire has been instrumental in ensuring a certification process in place to get only good quality seeds produced by seed companies before they are displayed on the shelves where farmers can access

them. Given that the purchase price of the seeds has not increased for over ten years, farmers are able to recycle good quality seeds at any moment to keep the productivity of rice increases.

Throughout the case study, different stakeholders interviewed also made varied recommendations to help improve the implementation of Rice Compact interventions. The suggestions that were made are both logistical and strategic in nature, as provided below, and were subsequently communicated to the Rice Compact coordinator and team.

From logistics standpoint, below key recommendations that need attention from Management:

1. Procurement of goods and services is very lengthy and denies the Compacts quick turn-around when season-based goods or services are required.
2. Compacts operate without M&E personnel despite the frequent data and reporting demands that require continuous collation of data and information from implementing partners. From programmatic and strategic point of view, the below need urgent attention to improvement program management in a more efficient way:
3. There needs to be more collaboration with Enabler Compacts in Côte d'Ivoire where the expertise of the Water Management, Soil Fertility Management, Capacity Development, Policy support and Enable-TAAT are more deliberate and embedded into program activities. This expertise is needed in rice farming specifically as they relate to rice irrigation scheme, soil management, capacity development of partners and their ecosystem, policy support to release the hybrid varieties and youth and women empowerment through tailor-made entrepreneurship programs.
4. The momentum should not be stalled, and the Compact needs to continue championing the rice sector RTDI across the country by taking advantage of the policy window such as high-level dialogue to showcase the models of PPP that work and how they support the TAAT delivery mechanism/strategy to reach self-sufficiency.
5. The Compact collaboration with Centre National de Recherche Agronomique (CNRA) should be enhanced towards strengthening the seed conditioning segment to ensure the rollout of the proper conservation practices, pest management, and storage of seeds to keep the humidity rate of the seeds as recommended by ANADA of 12% to maintain the quality and genetic purity of the seed while in storage.

6. The improved GEM parboiling system is currently being used by a limited number of cooperatives/IPs supported by the Compact. It is a powerful technology that needs to be deployed more widely across the country.
7. Seed processing and storage need to be upgraded because the existing government processing facility did not have an adequate complimentary storage system to keep the processing rice before sales.
8. Marketing of the CB-1 rice variety (black rice) targeted at niche markets to more health-conscious, and diabetic consumers needs to be enhanced to raise more awareness on the dietary benefit of this rice variety and promote its production and consumption in the populace.

## 6. A success story of sustainable Public-Private Partnership

In April 2021, MANY received 4MT of breeder seed that yielded 160MT of foundation seed which was distributed to 174 youth out-growers in the Dabakala area to produce certified seed and paddy rice. Each out-grower was required to show that they could cover 1 ha to be eligible to apply for funding through the MANY businesses model. Following a review of applicants, MANY signed



The President of the MANY Group

performance contracts with the 174 out-growers each of whom had to provide a business plan highlighting clear deliverable, profit margins and projections for growth. MANY then trained these out-growers on entrepreneurship and business development, enabling these young farmers to develop their business plans to identify, describe, identify and analyse business opportunities and to understand the financial feasibility of their business ventures. These skills were deemed necessary to ensure the youth out-growers entered sustainable farming

As part of the program, the young out-grower farmers did not only receive technical and . MANY has scheduled staggered planting periods of rice seed in irrigated farms to allow for staggered seed harvesting and processing, ensuring a sustainable and continuous seed supply in the targeted ECOWAS market. Through this arrangement, farmers have increased their incomes from 150 Fcfa (USD 0.27) obtained from landrace varieties to 300 Fcfa per Kg when they engage in improved seed production. Additionally, farmers are also able to produce seed twice a year through an irrigation scheme. During the team's visit to MANY's premises in early 2021, 1,200MT of seed was being processed. 160MT foundation seed was in the fields to be distributed to seed enterprises for anticipated production of 4,800MT of certified seed by November 2021. The certified seed is now expected to yield 1.3 million MT of paddy rice for 2020 year. MANY out-grower farmers who were interviewed during the visit indicated that they had

extension support, but they also received credit financing through MANY to support seed, application of fertilizers and land preparation. MANY provided further support to the out-growers by ensuring farmers' fields were routinely monitored by company field technicians to scout for pests and diseases and ensure minimum distancing between fields for the preservation of genetic purity. These are support services MANY provided to the out-growers. Plans are currently underway to procure a combined harvester to support the farmers during the harvesting period extended their land coverage through their partnership with MANY, and their yields had increased up to 6MT/Ha from 4MT/Ha. This first-hand feedback was a testament to the private sector partners engaged by the Rice Compact intent on working to support farmers to increase their yields.

As AfricaRice continues to spearhead Public-Private Partnership (PPP) in the seed sector in Côte d'Ivoire a linkage has also been formed by the TAAT Rice Compact between MANY and the Ivorian government to rebuild, revitalise and accelerate the development of the rice seed system by availing improved modern varieties of seed-to-seed companies. In turn, and seeing the benefits to the overall country, the government has supported the partnership by providing MANY with two seed processing units each holding a capacity of 5MT/Hour and 2MT/Hour alongside a tractor a field vehicle, two trucks, and 2 pickups. Through this effort, ANADER closely works with MANY to certify all seed produced and continue to invest in out-grower schemes intended to bring in youth into farming for prosperity.



The leadership of MANY Group with the TAAT MEL team

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# List of Appendices

Appendix 1. The TAAT Rice Compact partnership mapping

Partner Organisation name	Actor type	Role of the partner	Geographical reach of Partnership Geographical reach of Partnership	List of technologies advanced by the partner (if applicable)	Number of beneficiaries reached by the partner (if applicable)	Segment of value chain (if applicable)	Assessment of partners' effectiveness
GRACI - CI	Seed Enterprise	Seed and paddy production and marketing; hybrid demonstration	Côte d'Ivoire (Middle belt – Yamoussoukro – Bouake and north)	Foundation and certified seeds/ Hybrid Demonstration	300 (members of the cooperatives – seed and paddy)	Seed supply and paddy production	Highly effective
AMC-FC	Seed Enterprise / Rice miller	Seed and paddy production and marketing	Côte d'Ivoire (entire country)	Foundation and certified seeds	1,000 (seed producers and farmers)	Seed supply	Highly effective
MANY	Seed Enterprise	Seed and paddy production and marketing	Côte d'Ivoire (entire country)	Foundation and certified seeds	1,200 (seed producers and farmers)	Seed supply and paddy production	Highly effective
IP - Bouaké	Women Processor Groups/ Value Chain Actors	Rice production and processing	Côte d'Ivoire (around Bouake and neighbouring towns- middle belt)	Paddy and processed rice	85 key clients (and uncountable small retailers)	Food processing and marketing	Highly effective
IP – Bouake Mill	Rice Miller	Rice Processing	Côte d'Ivoire Bouake and neighbouring towns)	Milled rice	11 Clients (with 20 tons/week for six months per year)	Food processing	Highly effective
RINA SARL	Rice Miller	Final rice processing	Côte d'Ivoire (Abidjan municipality and other towns)	Milled rice	2,000 (50 wholesalers x 32 retailers) + (4 farmer cooperatives x 100 members)	Food Processing and marketing	Highly effective
EIFTC, Bouchard	Equipment Fabricator	Supply of equipment to farmers and processors	Côte d'Ivoire	Threshing and GEM parboiling equipment	180 (6 groups x 30 members)	Mechanization (Threshing/ Processing)	Highly effective
ANADER	Seed certification, Ag. Extension Services	Training and technology transfer	Côte d'Ivoire	Climate smart varieties, GAP	National reach	Technology transfer	Highly effective
ADERIZ	Ag. Extension Services	Training and technology transfer	Côte d'Ivoire	Climate smart varieties, GAP	National reach	Technology transfer	Highly effective
GIZ-CORIS	NGOs/Development Projects	Financial and technical support for upscale	Côte d'Ivoire, Benin, Burkina Faso, Nigeria	Climate smart varieties and seeds	Regional reach	Seed supply & Technology upscale	Highly effective
33 ProCIV	NGOs/Development Projects	Financial and technical support for upscale	Côte d'Ivoire, Benin, Burkina Faso, Nigeria	Climate smart varieties and seeds	Regional reach	Seed supply & Technology upscale	Highly effective
COPRORIZ	Farmer Organization	Technology use	Côte d'Ivoire	Climate smart varieties, Seed, GAP	National reach	Technology adoption	Highly effective
ENTENTE	Farmer Organization	Technology use	Côte d'Ivoire	Climate smart varieties Seed, GAP	National reach	Technology adoption	Highly effective
COOPEC	Microfinance	Credit support to value chain actors	Côte d'Ivoire	Climate smart varieties, Seed, GAP	National reach	Agricultural financing	Highly effective

## Appendix 2. TAAT Rice Compact Profiles of the Compact Team

Name	Profile
1 Ernest Asiedu	TAAT Rice Compact Coordinator - Facilitate the coordination of the AfricaRice Team in the delivery of technological packages for deployment. Serves as a link person between AfricaRice and TAAT PMU/CH, AfDB and its national projects; provides administrative support to the TAAT Rice Compact. Responsible for the development of annual work plans and budget and reporting.
2 Aminou Arouna	Leader - Policy, Innovation Systems and Impact Assessment Program - Economist in charge of E-Registration, Monitoring, Evaluation, Learning and Impact. Responsible for data analysis and quality control for output and outcome indicators and reporting.
3 Sidi Sanyang	Leader - Rice Sector Development Program - Former Coordinator of the TAAT Rice Compact. Has responsibility for the regional and national donor-funded initiatives. Provides an oversight role to the TAAT Rice Compact and other projects and initiatives in the RSD Program
4 Saidu Bah	Seed Specialist – Head/Coordinator of the Seed Unit - In charge of seed production and deployment, provides linkage between AfricaRice and the NARS and the Private Sector in the deployment of breeder seeds and training.
5 Sali Atanga	Post-Harvest & Processing and Value Addition Technology Leader -The Rice Compact Focal Person on post-harvest technology – In charge of training, deployment and supervision of installation of the post-harvest technologies - ASI thresher, GEM parboiling and rice processing to improve nutrition and access to market.
6 Ernst Zipel	GIZ funded project - CORiS Coordinator - Coordinates regional initiative in rice seed production and supply to mitigate the effect of COVID-19. In charge of seed up-scale in four countries (Benin, Burkina Faso, Côte d'Ivoire and Mali). The project benefits from breeder seeds supplied by the TAAT Rice Compact for further multiplication.

## Appendix 3. Profile of the TAAT Partners for the FGDs

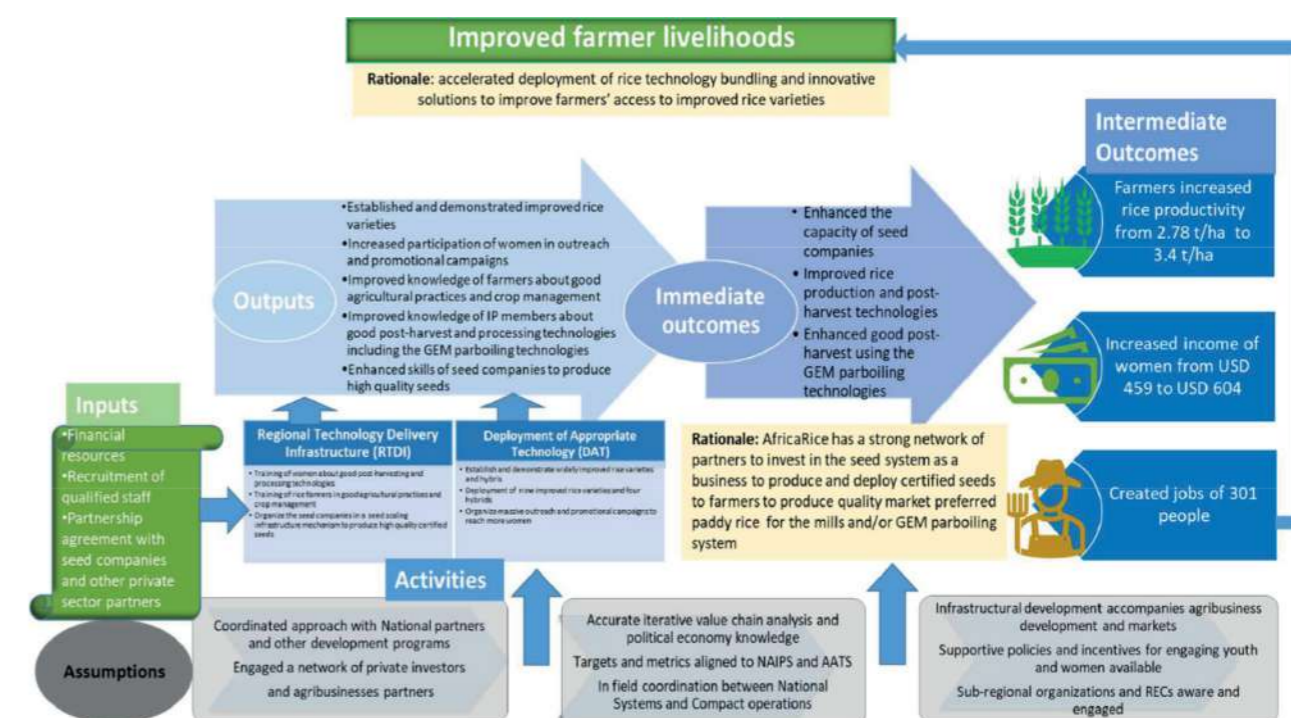
Name	Profile
1 Jerome Addou (Rice processing)	RINA – Commercial rice processor and marketer – Was supported by TAAT to use GEM (rice husk fuelled) parboiling technology and improved milling operations to produce quality rice. Producer and distributor of GEM parboiled rice, low glycemic rice, and polish rice in Abidjan-supermarkets and local marketers. Supports rice farmers with inputs for paddy production through contract farming.
2 Camara Assétou (Rice processing)	Bouake IP Women Processing Group – Leader of the women and youth rice processing group in the Bouake IP composed of two main groups SCOOP-FG and ITC milling facility. SCOOP-FG produces and markets GEM (rice husk fuelled) parboiled rice and polished rice to wholesales in Abidjan and Bouake. The group has recently acquired a destoner for self-use and for service provision to other actors in Bouake. ITC is a milling facility whose equipment was upgraded by TAAT. ITC provides milling services to the Women in Bouake IP and other markets. Due to this support, ITC was able to work and acquire a new and more efficient mill.
3 Brou Yves Lauret (Seed Enterprise)	GRACI – Seed Enterprise benefits from breeder seeds supplied by the TAAT Rice Compact and multiplies into foundation and certified seeds. The enterprise is also actively involved in awareness and demand creation of hybrid rice varieties that are being out scaled by TAAT

4	Tiahmo Rauf – MANY (Seed Enterprise)	MANY – A seed enterprise that produces both foundation and certified seeds. It is involved in promoting mechanized contract agriculture and in strengthening leadership in farmers' groups and cooperatives.
5	Yeo Kadokan Inza – AMC-FC (Seed Enterprise)	Post-Harvest & Processing and Value Addition Technology Leader -The Rice Compact Focal Person on post-harvest technology – In charge of training, deployment and supervision of installation of the post-harvest technologies - ASI thresher, GEM parboiling and rice processing to improve nutrition and access to market.
6	Ernst Zipel	AMC-FC – A seed enterprise that produces both foundation and certified seeds. It holds the biggest seed and rice processing plants in Côte d'Ivoire and has played a leadership role in the development of the rice sector.

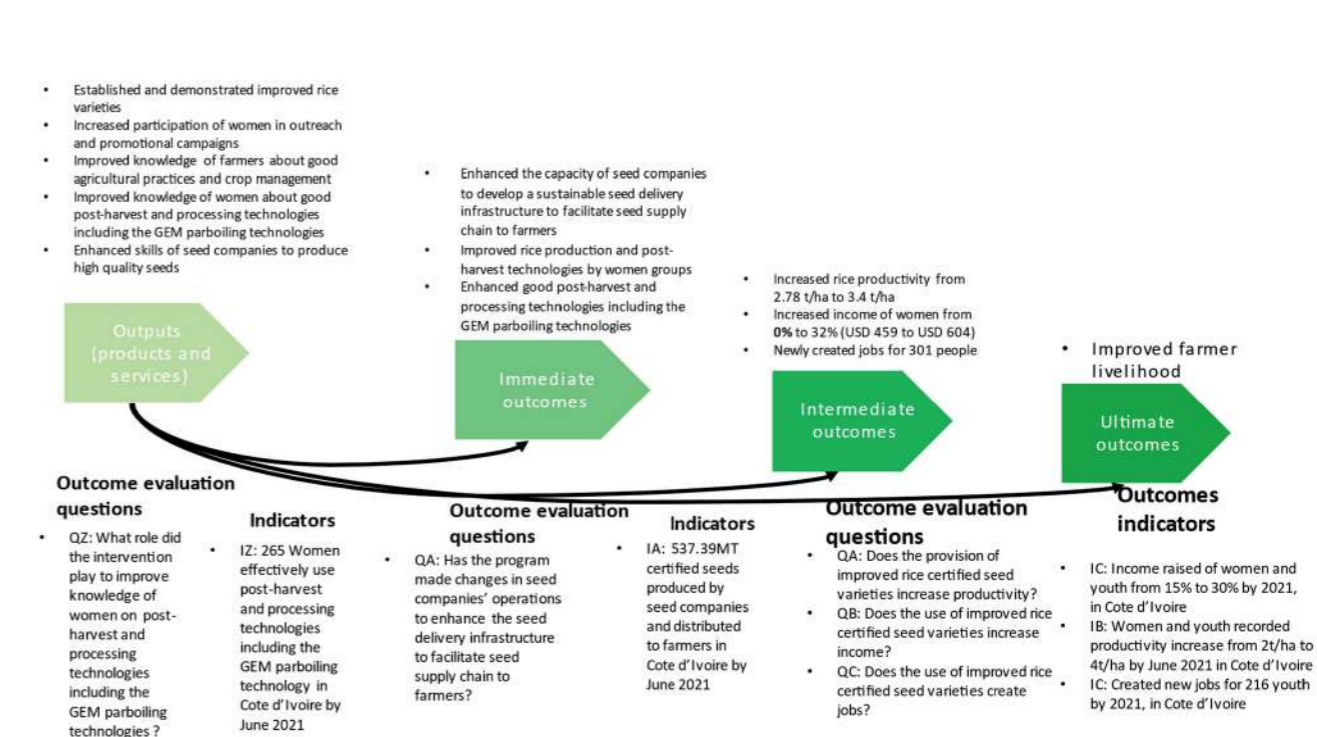
#### Appendix 4. Individual Interviews

Name	Value chain Node	Location	
1	RINA SARL	Rice Processor (Milling and GEM parboiling)	Abidjan - Youpogon
2	Matta Goma	Wholesaler	Abidjan –Mami Fete Market
3	Coulibaly	Wholesaler	Abidjan – Wassakara Market
4	Mother Africa Needs You (MANY)	Seed producer	Bouake - Dabakala
5	AMC-FC	Seed Producer / processor	Bongouanou
6	EIFTCI	GEM Parboiler Fabricator	Bouake
7	Kone Issiaka	Paddy Rice producer	Bouake

#### Appendix 5. The TAAT Rice Compact validated Theory of Change



#### Appendix 6. The TAAT Rice Compact refined Results Chain



## Appendix 7. Inputs distribution for beneficiaries

Items	Value (FCFA)	Quantity	SCOOP WG IP	RINA SARL
Warehouse construction	5,000,000	1	-	x
GEM system	200,000	1	x	x
Vehicle repair	500,000	1	-	x
Sterilizer		1	-	x
Parboiler		1	x	x
Husker		1	x	x
Laundress		1	x	x
Steaming tank (600kg)		2	x	-
Cooking pots (80kg)		1	x	-
Cooking pots (60kg)		2	x	-
Furnace		3	x	-
Ventilator		3	x	-
Solar panel		1	x	-
Tarpaulin		2	x	-
Labor saving devices			x	-
Big size basin		4	x	-
Medium size basin		4	x	-
Small size basin		4	x	-
Calabash		5	x	-
Bucket		4	x	-
Costume		10	x	-
Boots		10	x	-
Gloves		10	x	-
Rake		4	x	-
Tricycle		1	x	-

## Appendix 8. Cost of processing of parboiling rice

PRODUCTION COSTS	Measurement unit	AROMATIC		NON-AROMATIC	
		RINA SARL	SCOOP WG IP	RINA SARL	SCOOP WG IP
Transport	FCFA/MT	3,000	1,500	3,000	1,500
Bags	FCFA/MT	2,000	2,500	2,000	2,500
Rice collectors	FCFA/MT	2,000	500	2,000	500
Loading	FCFA/MT	1,500	1,000	1,500	1,000
Unloading	FCFA/MT	1,500	1,000	1,500	1,000
Storage	FCFA/MT	4,875	4,000	4,875	4,000
Parboiling	FCFA/MT	27,500	15,000	27,500	15,000
Package	FCFA/MT	2,000	4,300	2,000	4,300
Repackaging	FCFA/MT	-	3,000	-	3,000
Commission	FCFA/MT	5,000	3,500	5,000	3,500
Electricity	FCFA/MT	3,500	2,500	3,500	2,500
Cleaning	FCFA/MT	10,000	-	10,000	-
Labor	FCFA/MT	-	2,000	-	2,000
Fuel	FCFA/MT	-	500	-	500
Water	FCFA/MT	-	5,000	-	5,000
Purchase price of paddy	FCFA/MT	222,000	220,000	182,000	200,000
<b>Sub-total cost</b>	<b>FCFA/MT</b>	<b>284,875</b>	<b>266,300</b>	<b>244,875</b>	<b>246,300</b>
Quantity of rice					
purchased and processed (weekly)	MT	10	1	10	1
<b>Total investment cost</b>	<b>FCFA/MT</b>	<b>2,848,750</b>	<b>266,300</b>	<b>2,448,750</b>	<b>492,600</b>

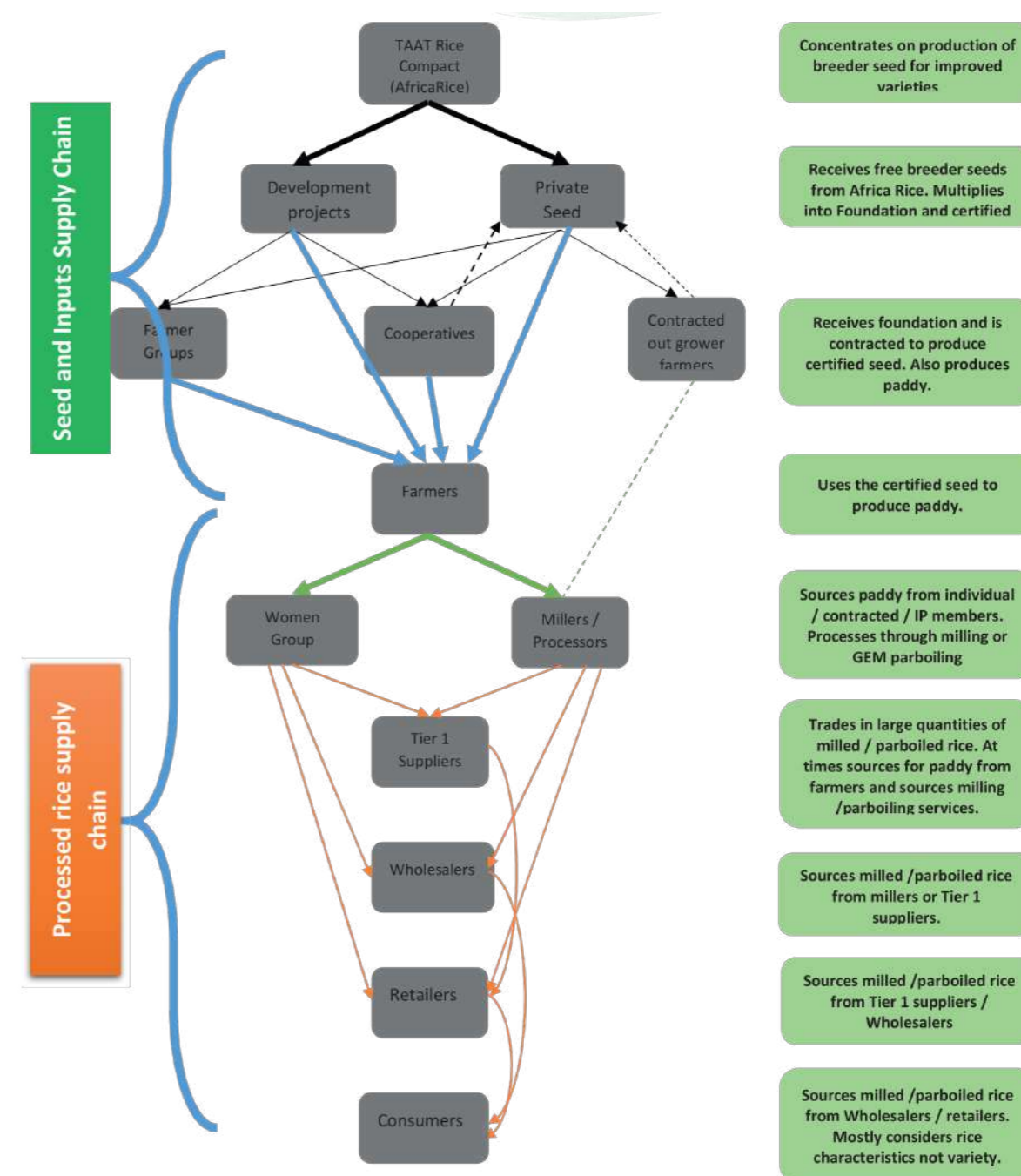
**1USD=557 FCFA at the time of the study**

### Appendix 9. Investment cost of selling rice (Wholesale)

INVESTMENT COSTS	Measurement unit	Matta Goma	Mme Coulibaly	Kouadju Natacha
Transport cost	FCFA	13,000	10,000	15,000
Bags costs	FCFA	1,000	1,000	1,600
Loading cost	FCFA	1,000	1,000	-
Unloading cost	FCFA	1,000	1,000	-
Storage cost	FCFA	15,000	30,000	25,000
Repackaging cost	FCFA	-	-	-
Package cost	FCFA	-	-	-
Tax	FCFA	6,000	9,000	-
Electricity	FCFA	-	6,000	4,000
Personnel	FCFA	-	-	40,000
Communications	FCFA	-	-	15,000
Marketing	FCFA	1,500	1,500	6,000
Fuel	FCFA	-	-	-
Purchase price of milled rice	FCFA	287,500	300,000	325,000
Sub-total	FCFA	326,000	359,500	431,600
Quantity of rice bought	MT	4	28	10.5
Total Investment cost	FCFA	1,304,000	10,066,000	4,531,800
Selling of milled rice	FCFA	420,000	450,000	525,000
Gross revenue	FCFA	1,680,000	12,600,000	5,512,500
Net profit	FCFA	376,000	2,534,000	980,700
CBR		0.29	0.25	0.22

**1USD=557 FCFA at the time of the study**

### Appendix 10. Value Chain Actors Characterization in Côte d'Ivoire



## Appendix 11. Improved climate-smart and hybrid rice seed specifications

Improved climate smart varieties & hybrids	
1. NERICA L19	5.7 MT/Ha; Flood and Fe toxicity tolerant, Resistant / stem borers, bacterial leaf blight and blast. Good grain quality. Saidu,
2. ORYLUX 6	4.5-6.5 MT/Ha Aromatic long grain and good grain quality. Short duration with maturity in about 100 days.
3. NERICA 4	3-4 MT/Ha; Early maturity, drought and Striga tolerant.
4. Sahel 134, Sahel 210, Sahel 177, Sahel 108,	Adapted to the Sahel conditions and tolerant to salinity
5. WAB 638-1	4-5 MT/Ha; Aromatic variety and known as AKADI in Côte d'Ivoire,
6. IR841	4-6 MT/Ha; long grain, aromatic known as AGRA rice in Ghana Saidu,
7. FARO 44;	3-4 MT/Ha; FARO 44 is long grain (most preferred) and produced in Nigeria
8. Bouake AM	3-4 MT/Ha Specifically grown in Côte d'Ivoire
9. AR051H	10 MT/Ha – Hybrid variety with aromatic long grain with good grain quality. (Over 40% yield increase over existing varieties)
10. AR032H; AR051H; AR708H; AR606H (Four other new Hybrids)	5.8-10 MT/Ha – Hybrid (Over 40% yield increase over existing varieties)

**Source: The Rice Compact seed road map, 2020**





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