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Delta Agricultural Development Project (DAD)
Harvest indicators for the 2003-2004 rice production campaign

1. Introduction

This report completes the final Delta Agricultural Development project report by providing data that were not yet available at the time of reporting.

Following the exceptionally poor rice campaign during 2002-2003, the campaign of 2003-2004 was very good. All four project plains were fully flooded and cultivated. In fact, areas never before cultivated were put into production. This resulted from a combination of good rainfall and high flood levels during the growing season[1].

The rainfall from May to October 2003 reached 839 mm -- compared to only 369 mm in 2002 -- in Djenné, which is more rainfall than any of the last ten years. The rains began in May and were well distributed throughout the season with the exception of ten days in the end of July.

The water began inundating the plains on July 21st – compared to August 5th in 2002 – and the flood reached its maximum level in the plain of Pondori (3.61 meters at the Niala dike and 2.10 meters in Djiguinè). As a result, the area under rice production exceeded by far the 50,000 hectare target area.

[1] Although somewhat counterintuitive, these two factors are not fully interdependent—some years there is good rainfall with low river levels and some years the opposite. The combination of the two provides for maximum production results.

It is important to mention that the project came to an end on June 30, 2003, which means that the results of this last rice campaign were not directly influenced by the project team. This testifies that the farmers' associations have been able to properly manage the flood using the water retention infrastructures to maximize their production and represents a strongly promising indicator of sustainability of project impact.

2. Rice production

2.1. Overall comments

Although the good rainfall and high flood levels had a clearly positive impact on the rice production, other factors mitigated the increase in production:

- Seed availability:

  During the campaign 2002-2003, given the lack of rains, most farmers had to re-sow their fields several times. So many seeds were wasted and some of the farmers had only poor seeds remaining for the campaign 2003-2004. The project solved part of this problem by supplying the farmers' associations with 56 tons of improved seeds, which met 38% of the needs expressed by the farmers' associations and allowed the farmers to sow improved seeds on 13,732 hectares. The government helped the farmers to set up seed banks but the seeds were of poor quality and not adapted to local cropping conditions.

- Equipment availability:

  As a consequence of the poor campaign 2002-2003, some farmers were forced to sell part of their production equipment and/or oxen, which reduced their ability to plow their fields for this campaign.

- Labor availability:

  Given the anticipated poor results of the campaign 2002-2003, several farmers migrated in search of other sources of income. So fewer farmers plowed their fields for the campaign 2003-2004 than in previous high-production years.

2.2. Estimated production

The members of the measurement committees, with technical assistance from the project agronomist, placed yield squares [2] in 127 plots, distributed as follows: Pondori (22), casier Syn (28), hors-casier Syn (27), Djiguiné (15) et Djonké (35). In total, 508 yield squares – four squares per plot – were placed, each of them covering 25 square meters.

The yield estimates [3] are presented below:

[2] Yield squares are a standard tool of rice production measurement–randomly placed frames are used to estimate total production in a given area.
[3] The yield data of each plot are available at CARE Bamako office.

Pondori	2.70	44,527	120,223
Syn [5]	2.44	3,285	8,015
Djiguiné	1.95	584	1,139
Djonké	2.38	1,398	3,327
Average		49,794	

The yields of the campaign 2003-2004 as well as the productions are the highest since project inception, as shown below :

1997-1998	0.539	15,216
1998-1999	no data (year of studies)	no data (year of studies)
1999-2000	0.836	16,310
2000-2001	2.272	113,056
2001-2002	1.922	84,894
2002-2003	1.252	9,150
2003-2004	2.665	132,704

2.3. Project impact on rice production over the life of the project

If we consider the average yields reported by the SLACAER in free submersion systems around Djenné from 1997 to 2004, as our control [6], the impact of the DAD project on overall rice production is as follows:

1998-1999	No data	no data	900	-	-
1999-2000	19,510	16,310	900	17,559	-1,249
2000-2001	49,795	113,056	892	44,417	+68,639
2001-2002	44,170	84,894	910	40,195	+44,699
2002-2003	7,308	9,150	600	4,384	+4,766
2003-2004 [7]	49,795	132,704	975	48,550	+84,154
		356,114		155,105	

[4] We used the estimated areas of the campaign 2000-2001 as we did not take GPS measurements of the flooded areas this year. It is obvious that the area under cultivation during this last campaign exceeded the areas estimated in 2001.

[5] The average yield in the "casiers" is estimated at 2.67 tons/ha and in the "hors casiers" at 2.21 tons/ha.

[6] The rainfall during the campaign 1997-1998 was below the average rainfall. Therefore using the average yield of the campaign 1997-1998 as a means of comparison would lead to overestimate the positive changes resulting from the project. That is why we prefer to use the average yields reported by the SLACAER Djenné in free submersion areas as a control.

[7] No GPS estimate has been done re the area inundated. Therefore we used the area estimate from the campaign 2000-2001, while it is obvious that the actual inundated area during the last campaign was much larger.

The DAD project thus contributed to an increase of 201,009 tons of rice production, or a 130% increase over the control production.

2.4. Project impact on rice crop value over the life of the project

If we use an average price of 100 FCFA per kilo and a CFA/$ exchange rate of 520, the increased rice production resulting from the DAD project interventions would be estimated at **$38,655,577**.

Considering USAID's financial investment ($3,171,166) and CARE's financial investment ($459,695) in DAD, that means that **for each dollar invested, the DAD project has already produced more than ten dollars worth of increased rice production**. Furthermore, as already mentioned, there is no reason to believe that the increased yields will not continue indefinitely, with a minimum level of infrastructure maintenance.

3. Lessons learned and conclusion

The campaign 2003-2004 confirms that the DAD project, as reported during previous years, has successfully contributed to increase rice production, most dramatically in good years, but also substantially in terms of average production over the relatively short term of the life of project. Perhaps most importantly, there is no reason to believe that this increase will not be sustained over the longer term by the strengthened farmers' associations.

The fluctuating nature of harvest yields, which remain largely dependent on rainfall and flood levels, means that farmers using the controlled submersion system must continue to develop stocks and other strategies in order to sustain production following low-yield years. Nevertheless, **it is indisputable that no other investment in irrigated rice production in Mali is nearly as profitable as the controlled submersion system promoted so successfully by the DAD project**.

Updated project performance against targets

Result	Performance Indicator	Baseline 1997		CY 1999		CY 2000		CY 2001		CY 2002		CY 2003	
		Initial Estimate	Survey Results	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Vol. Of sustainable rice production Increased	Total area cultivated In rice (ha)	27,270	28,231		48,376.9		49,695		49,794		49,794		49,794 (1)
	Average yield per Hectare (T/ha)	1.0	0.539		0.836		2.275		1.922		1,252		2,665
	Total Production (T)	27,270	1,186 15,216		16,309.6		113,056		84,894		9,149		132,704
	Area with Improved Seed (ha) cumulative	0	0		513		1,758		6,327		8,910		13,732
Value of rice Production Increased	Value of rice Produced (millions of CFA	3,409	179 1,902		2,039		14,132		10,612		1,281		16,588
	Revenue per hectare (FCFA)	NA	63,375		104,516		284,375		213,118		175 280		333,872
	Revenue per person (FCFA)	NA	34,033		42,130		263,456		198,611		75,120		310,462
	Revenue per household (FCFA)	NA	389,287		463,439		1,844,186		1,390,279		525,840		2,173,195
Rice marketed	Tons	NA	NA		NA		NA		NA		6,168		(2)
Infrastructure manual		NA	NA		NA		NA		NA		Approved		In use

(1) The area cultivated in rice has not been measured this year. It is obvious that the area cultivated was larger during the last campaign than in CY 2001, which is attested by the fact the flood reached the maximum in Niala, for the first time.

(2) As stated in CARE's request for extension of the project submitted to USAID on June 3, 2002, we will provide the rice marketed data in June 2004.