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WORKSHOP REPORT
PROPOSING THE EXPANSION OF FISH-RICE JOINT-PRODUCTION AND THE PRESENTATION OF RESULTS OF A SURVEY ON FISH-RICE PRODUCTION IN BAGUINEDA

Bamako, Mali

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Prepared by:

ABCD LLC staff

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I. Introduction

A workshop was held May 27 2015 in the training room of Agriculture Business Credit and Development (ABCD LLC) at its headquarters in the Immeuble Dissa, ACI 2000 Hamdallaye, Bamako.

Reminder context

The workshop on the prospects for the expansion of fish-rice culture is an outgrowth of a research program funded in the amount of U$500,000 by USAID. The research was carried on for three years (2008-2010) in collaboration with the Oregon State University and the University of Shanghai Ocean in China in collaboration with the National Directorate of Fisheries (DNP) in Mali. This research was carried out in Baguineda (less than an hour's drive from Bamako) and showed highly positive results; these were confirmed in additional on-farm trials which ABCD encouraged Peace Corps volunteers to carry out in the area around Niono. Based on these results, FAO has funded additional research in the regions of Sikasso, Segou and Mopti in order to further test the production system and to adapt it to other parts of the country. The Office du Niger has also collaborated with these trials. ABCD has continued its efforts in favor of expand the fish-rice production by carrying out a survey of fish-rice production.

Objectives

The objectives of the workshop was to act as a forum for the dissemination of results of ABCD's survey of Baguineda producers and to promote the expansion of the fish-rice production system to other parts of the country and to thereby increase producer incomes and the availability of high-quality protein to improve the local diet.

II. Proceedings

After participants (the list of attendees is found below) settled in, Dr. Jeff Dorsey, the Director of ABCD welcomed them to its headquarters.

Opening of the Workshop

Dr. Héry Coulibaly officially opened the workshop. Dr. Coulibaly is a former National Director of Fisheries and coordinated the research effort funded by USAID over a period of three years. In his opening remarks, Dr. Coulibaly recalled the process whereby the fish-rice production system was brought to Mali and the fruitful partnership with USAID which made its introduction possible. He expressed his faith and cautious optimism in the support for the expansion of this technology as an important tool in the fight against poverty malnutrition.

He stressed the importance of evaluating projects to make certain that they manage funds efficiently and transparently and to make certain that they achieved the recognition that they deserve when they demonstrate positive results. Good evaluations provide the arguments which USAID needs to justify much-needed additional funding. The purpose of such funding is to support the move from research to the massive extension to other parts of Mali where farmers grow rice under irrigation. Farmers will benefit from the additional revenues provided by production of fish as a result of adopting the system of fish-rice farming system. Finally, Dr. Coulibaly invited donors to continue financing fish-rice production given its importance to food security, to improving living conditions for farmers and for the socioeconomic development of irrigated areas to which the system is well suited.

Historical Appreciation

After the opening remarks by Dr. Coulibaly, Alassane ("Sandy") Touré, an expert on fish-rice production and also a former National Director of Fisheries (DNP) was the next speaker. Mr. Touré was the lead research officer for the DNP and directed the research effort in Koulikoro and thus has the best first-hand knowledge of the introduction of the fish-rice production system to Mali.

In his presentation, Mr. Touré defined fish-rice farming as a complementary production technique to irrigated rice production in areas where rice is transplanted (not broadcast seeded) and where there good water-control is available. Fish-rice farming has been practiced for 2,000 years in Asia, as a variant of fish-farming is one oldest activity. The Asian continent was the pioneer of the practice as evidenced by the first fish-farming treatise written by Fan LEE in 475 B. To this day, the Asian continent has maintained its leadership position in fish-rice farming and has demonstrated reductions in the need for fertilizers and herbicides while maintaining rice yields.

After its introduction through the research carried out by DNP-Oregon State and Shanghai Ocean Universities, the fish-rice production system was taken to Niono through the intervention of two Peace Corps volunteers encouraged to do so by ABCD after its review of the initial findings of the research sponsored by USAID. The system was also tested in other regions of Mali by USAID's Farmer-to-Farmer program.

DNP had an important role following up on initial research. It carried out two technical training presentations for Peace Corps as well as providing additional training for Baguineda fish-rice farmers. ABCD for its part can take credit for helping those interested to focus narrowly on profitability and on replication based on farmer self-interest and proven earnings potential. ABCD took this approach so that farmers can adopt the system with a minimum of outside technical help without expecting or needing subsidies (except perhaps for some assistance in digging the ponds). The main programmatic lesson learned which ABCD is in bringing to donors

is that they should make common cause on a model involving the absolutely lowest possible costs, including minimizing cash outlays for fingerlings, feed and pumping.

For Mr. Touré, fish-rice production has a double benefit: in addition to their rice harvest, producers have a second harvest of fish. The same resources (land, water) are used for both activities, but most of the costs are the same as for rice production alone, meaning that fish production is basically costless, that is, most costs being already covered by rice production. Thus efficient management of resources allows a second product (fish) at almost no cost to the farmer. Mr. Touré concluded that fish-rice production has the following impacts:

- Diversification of agricultural activities;
- Strengthening food security and reducing nutritional shortfalls by providing a cheap source of protein;
- Contribution to the fight against poverty;
- Job creation;
- Encouragement for additional growth; and
- Improvement in environmental protection.

These impacts are consistent with Feed-the-Future strategies guiding USAID investment in agriculture.

Results of the survey:

After Director Touré's intervention, Dr. Jeff Dorsey addressed the participants on the results of the its producer-level survey into Baguineda fish-farming. He began by thanking USAID for its support to research that introduced this system. He then highlighted the different people who participated in the implementation of this survey including Chris Harmer, Kevin Cummiskey (former US Peace Corps volunteers) and Bréhima Koné (IT Analyst); the three researchers all currently reside in the United States but keep Mali in the forefront of their thoughts. The universe for the survey are thirteen fish-rice farmers. Of these, ten respondents engaged in production during the study year and were able to fully respond to the questions put to them based on the survey questionnaire.

Analysis of the results shows that average production from the fields of dedicated fish-rice production is about 3 tons per hectare. This yield is about average for Bagineda and represents a good yield given the nature of the soils. Thus production and the income derived from rice is not affected by the addition of fish to the production system. The average price of paddy is 288 FCFA among participating farmers.

The infrastructure used for fish production consists of the pond and trenches which together occupy 5% to 10% of the area of the field. Field size on farmer plots averages 1000 m² (1/10 of a hectare). Ponds generally are one meter in depth. The ditches carrying water in and out of the pond and providing access for fish to the rice fields are 50 cm deep. This depth is sufficient to

allow fish to feed in the rice fields without sacrificing their ability to flee to the ditches and into the pond to protect themselves when threatened by bird attacks. The different pond sizes and shapes observed among Baguineda farmers conform to established standards.

Good practice calls for a density of one fish per square meter. Sexing is not practiced. Clarias are predators in the production system and are not introduced for purposes of production *per* se but rather to reduce breeding in ponds and to increase the average size of tilapia. The fingerlings (tilapia and clarias) were introduced late, apparently in August and at the same time, which is not recommended because the delay in introduction and excess ratio of clarias to tilapia reduces total production and hence profitability. At stocking, fingerlings had an average weight of 20 g / fry. The cost amounts to FCFA 100-125 per fingerling (up to FCFA 200 per clarias), equivalent to FCFA 5000-6000 per kg; this cost is far beyond what fish-rice farmers can afford to pay and still make a profit on their fish.

Producers report harvesting 4,026 fish. The percentage of tilapia is 54% and of clarias 46%. The harvest weight is between 46-76 g / fish, far below a desired average weight which should be above 100 grams per fish to command a good price in the market. The amount of fish harvested by fish-rice producers is between 5 kg to 88 kg (on field sizes averaging 704 square meters); the amount of fish harvested by most producers is not up to the levels needed to achieve profitability. That being said, some producers did achieve a yield of one ton of fish per hectare; such performance is consistent with good profitability and is an indication that with modest, well-conceived technical assistance, producers can achieve commercially viable production. However, the focus needs to be clearly on profitability and rather than on some other criteria.

Finally, many producers reported having problems with water availability following the rice harvest; after water is drained from the rice fields prior to harvest, water flow in the main canal is reduced to the amount necessary to water livestock. The lack of enough water in the canal to maintain water-level in the ponds by gravity flow forces farmers to engage in pumping which is prohibitively expensive. (Fish need one or two months beyond the rice harvest to grow out to profitable weights.) Producers have had to resort to pumping to supply water which is very expensive and makes production unprofitable. The solutions proposed to address the problem of soil permeability are to line ponds with soil from termite mounds or with clay to minimize water loss due to seepage from the ponds.

This survey covered the 2013 crop year; ABCD plans to continue data collection for 2015. Since the costs of the 2013 campaign were excessive, ABCD is advising farmers to focus on profitability to provide an incentive for them to stay in fish-rice production for the long term.

Dr. Dorsey concluded his presentation by calling on Technical and Financial Partners (TFPs) for support. For profitable production systems such as this one, it is important that financing be available to allow for the adaptation and expansion of this new technology to reach all farmers

whose rice farms enjoy soil and water conditions which would allow them to benefit from adopting the technology.

Recommendations

In conclusion the cost of purchase of fingerlings is the most significant cost for the system of fish-rice farming. Alternatives proposed are 1) for producers to buy fingerlings from fishermen or 2) to produce their own fingerlings by building and operating nursery ponds keeping fingerling cost to a minimum. Another factor is the start-date for production: production should start during the month of June when rice production starts instead of August; furthermore, clarias should be added two months later, after tilapia have had a chance to grow and thus to be less prone to become prey to the clarias. Clarias should not introduced at the same time as tilapia are. While rice is growing, fish feed on algae and insects in the rice field. Feed costs after the rice is harvested need to be kept low by using by-products, worms, and any protein-rich food available locally at low cost. It would also be advisable to carry out a market study to improve product marketing. Fish will be sold fresh and therefore post-harvest processing is not likely to be a major consideration. Some clarias are smoked.

After the coffee break, questions were posed and participants contributed their own insights.

Participant Comments

Participants posed a number of questions: Did the research being conducted during the 2013 crop year have a detrimental effect on the fish-rice production and profitability? Could different fish species other than tilapia and clarias be used in aquaculture or fish-rice production? Participants expressed concern over the lack of water in the canal after the rice harvest, the cost and problems associated with the acquisition of fingerlings and the appropriate feeding of the fish after rice is harvested. Theft and losses to predatory birds were also noted as problems, though planting sharp stakes in the bottom of the pond which extend 15 cms above water-level seems to solve both problems depriving birds of a perch to catch fish from and ripping thieves' castnets.

The proportion of tilapia must be much higher than that of the clarias. These proportions found in the survey correspond to a lack of commercially available tilapia fingerlings in market, which led researchers to provide farmers with more clarias than is recommended. This high percentage of clarias reduced numbers of tilapia through predation. This reduction in the total volume of fish appears to have been responsible for reducing the overall profitability of the system.

Participants were of the opinion that for a fish-rice farming system to succeed, attention had to be given to reducing the cost of fingerlings and to proper feeding in the months when fish no longer have access to the rice fields to forage. In general, participants were of the opinion that the system of fish-rice farming is productive and relevant to the concerns of farmers growing irrigated rice and that the next step is to expand its coverage to other irrigated rice-growing areas where water control exists.

III. Conclusion

In conclusion, Dr. Dorsey thanked the participants and most especially the members of the fish-rice cooperative of Baguineda for their availability and cooperation to the success of the survey and for their efforts in coming to the workshop to present the production system which they helped to develop. Dr, Dorsey also hoped that the activity of fish-rice culture in which everyone believes to be a tremendously cohesive factor for the growth of their organization would attract other producers based on its profitability.

After these discussions the workshop made recommendations:

- Search for technical financial partners (donors) willing to finance programs of expansion;
- Start the fish-rice farming activities earlier, preferably as early as June shortly after transplanting of the rice was done;
- Buy fingerlings from fishermen;
- Move forward with the application for land for the Baguineda Hatchery for the benefit of the fish-rice producer's cooperative provided fingerlings can be raised for the same prices as they can be bought from fishermen (FCFA 10-20 each);
- Construct ponds for fingerling production;
- Improve the operational capacity of the fish-rice cooperative of Baguineda;
- Create a framework for synergy and partnership among the various actors to make fish-rice farming a reality for the many producers in need of this system; and
- Sustain women heads of household in the irrigated regions of Mali.

Attendance at the fish-rice production workshop of 27 May 2015					
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