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Biodiversity as adaptation strategy for West African farmers towards climate variability

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Background and Motivation

In West Africa - apart from potential climate change effects - farmers suffer from unpredictable climate variability. One rainy season might be characterized by excess rainfall and flooding and the next by intra-seasonal drought. These natural conditions contribute to food insecurity and risk-averse decision making of farmers. Is it possible under these conditions to increase food production and to decrease vulnerability of farm households at the same time? In principle increased crop diversity at the farm level offers an option. At the crop level some species better resist to excess rainfall like rice, others are more resistant to drought and high temperatures like pearl millet. And diversified vegetable production can decrease dietary deficiencies. At the variety level varieties with different maturity cycle and a different degree of photoperiodic response might optimize yield potential. Finally at intra-varietal level optimized heterogeneity can contribute to phenotypic plasticity and reduce the risk of crop failure. Based on this rationale the BMZ-funded CODE-WA project (<http://codewa-icrisat.uni-hohenheim.de>) has opted for a participatory biodiversity approach, aiming at enriching farmers options to respond to climate variability and potentially also to climate change effects. However, how could new crops and varieties be successfully and sustainably introduced to villages and farms in the short time frame (3 years) of a R4D project? There is an endless number of failure stories in this respect, where all actions have been stopped after the end of project activities. This calls for new approaches involving farmers and respecting their perspectives and interests. In this short paper we will present two methodologies (Vertical Farmer Exchange Visit and Opposite Pyramid Approach) developed within the CODE-WA project, which is at the time of reporting in the final project year.

Approaches and Methodologies

General

The CODE-WA project has adopted a zonal approach. This means that in the West African intervention zones, sites in four agro-ecological environments have been chosen: i. Serkin Haoussa in the Maradi region of Niger representing the Northern Sahel, ii. Tominian in the San region of Mali as southern Sahelian site, iii. Nobere, 100 km south of Burkina Faso's capital in a southern Sudanian environment and finally iv. Wa in the Upper West Region of Ghana as Northern Guinea zone site.

Via the national research authorities co-operation is taking place exclusively with local farmer organizations. These cover a wide range, from a local very small women association (village level in Ghana), over subregional (Burkina Faso) to regional (Niger, Mali) farmer unions with thousands of members. The rationale is to strengthen farmer organizations under conditions where national extension services are weak but also to have a partner who can distribute successful innovations. In general, the CODE-WA project tries to optimize participation, including farmer organizations and their representatives at all suitable levels of planning and decision.

Vertical Farmer Exchange Visit (VFEV)

Farmer exchange visits are a well known tool in development work in order to widen the view of farmers and to learn about other cultural techniques. However, in most of the cases exchange is organized only over short distances and within one agro-ecological zone. The advantage is, that the farmers learn about crops they already know and options tested under similar agro-ecological and socio-economic conditions. The disadvantage is that the presented options are restraint and do not confront the farmer with "another world". However, the CODE-Wa team is convinced that the latter is mandatory in order to cope with the agricultural constraints farmers are facing in the West African environment like overpopulation, land shortage, rainfall variability, food shortage etc.. In the long term agriculture needs to be professionalized, step by step replacing subsistence farming with market oriented farming. In order to reach this goal, farmers need to become more open-minded, more keen to experiment with new options, and even to change some cultural habits. Therefore, the CODE-WA project has developed the Vertical Farmer Exchange Visit. Why vertical? As already mentioned conventional farmer exchange visits are intrazonal in type. Since agro-ecozones are latitudinally organized in West Africa, mapping the participants would key out on a map as a more or less horizontal line. In the CODE-WA project we have opted to exchange across agro-ecological zones, resulting in a N-S oriented vertical line.

Why exchanging across agro-ecological zones? The project wants to decrease farmers' vulnerability facing climate variability and climate change effects. Frequent weather/climate features are variable rainfall, excess rainfall, intra-seasonal droughts. Comparing farmer skills, farmers from the more humid zones know better how to deal with excess rainfall (i.e. cultivating on ridges in the Northern Guinea zone), whereas farmers from the semi-arid zones know better how to deal with intermittent droughts (i.e. crop spacing, plant genetic resources). This knowledge can better be exchanged by direct contact between farmers and by field visits, than by any other means of knowledge distribution. Secondly, CODE-WA has selected crop (bio-)diversity as general approach. Constraining the exchange to one zone limits the choice. Own ongoing investigation (ICRISAT 2010) has shown that the number of crops is increasing with the NS rainfall gradient in West Africa. On the latitudinal gradient not only rainfall is increasing but also the length of the growing season, allowing farmers i.e. for a second crop. Non-consideration of these options means depriving other farmers from potential solutions to their problem. Just to give a prominent example from the VFEV in 2008: while farmers from Nobere (Southern Sudanian zone) plant tomato crop into furrows for easier gravitational irrigation, the same crop is planted on ridges during the rainy season in Wa (Northern Guinea zone). This was a real eye-opener for farmers, viewing the extremes and the options included: using tomato in different seasons, dealing with excess or restricted rainfall, using different genetic resources and cultural techniques.

1. The VFEV is directed by the project co-ordination and the hosting national researcher, since organizing such an event in all its details and expenses exceeds the potential of smaller farm organizations (FOs).
2. Venue, date, duration, and content are decided by the farmer participants. Hosting of the VFEV

is changing from year to year between the sites. The local farmer organisation is in charge of organising the housing and food for the alien participants and local events like visiting village chiefs, radio stations, processing units etc.. For this purpose a restricted budget is especially allocated to the FO by the project. The date is under optimum conditions chosen for a time, when crops are still in the field, harvest did not already begin, and farmers are not overcharged. However, since end of the cropping season is differing between the sites, this choice is not always easy. While the first VFEV was only planned for two days, farmers opted to prolong it to three days for more interaction in the second year and to four days in the third year. This participatory decision alone underlines farmers' appreciation of the event and the necessity for detailed exchange. In the first year topics covered organisation of greater farmer unions as well as cash crops (tomato). In the second year content shifted towards major staple crops and in the third year towards secondary crops. This order might indicate that potential topics to be discussed might be restricted exchanging always the same FOs.

3. Each country can send about five representatives, women mandatorily included. the local FO can contribute more participants (maximum 15), in order to reach a wider public but also due to the fact that more people need to be mobilized to execute the local organization. Including inter-/national collaborators this amounts to about 35-40 participants. This limit is set due to the Babylonian problem.

4. In the context of CODE-WA 6-7 languages are spoken during the VFEV: four to five local languages and 2 international (French and English). Actually translation is the greatest problem to be overcome. Within the VFEV approach this was solved in the following way: during the meeting the language groups are seated together, a national researcher sitting in front, serving as translator from and to one international language. If necessary national or international staff is translating from French to English and vice versa. The experience shows, that this organization is very time efficient and leaves sufficient time to farmers to follow the presentations. Guaranteeing the exchange between the participants during recreational time and thus allowing to visitors to exchange about topics they are personally interested in, is so far the biggest challenge.

5. Presentation style and technique is chosen by the FO. So far it reached from sophisticated computer aided ones over locally or professionally produced films to simple sketches and drawings. FOs usually stick to the medium once chosen. On demand the FOs are supported by the project to produce the necessary media and content. During the VFEV 2009 the least advanced medium (local drawings) clearly merited being the best contribution, since it was delivered in a fashion (slowly!) that farmers could follow the content.

6. Apart from the in-door discussion, field visits and other activities like cooking events, showing to alien participants how to prepare local dishes from partly unknown crops, are of paramount importance, since they reveal the practical challenges related to potential innovations. Experience shows that about half of the program should be dedicated to such type of events.

Opposite Pyramid Approach (OPA)

While the VFEV is addressing the confrontation of farmers with new crop (cultural) options from other agro-ecological zones, OPA is focusing on the question how to sustainably introduce new crop varieties at the farm and village level within a short time frame (3-4 years). The OPA is based on an optimized participatory approach in the sense that FOs could take the decision where appropriate (i.e. where the knowledge base is given).

In CODE-WA we started with a wide range of varieties of major staple crops in the region and additional crops from ICRISAT's West African diversification program (i.e Moringa oleifera). Later on the project responded to farmer requests (i.e. fruit trees, bambara nut).

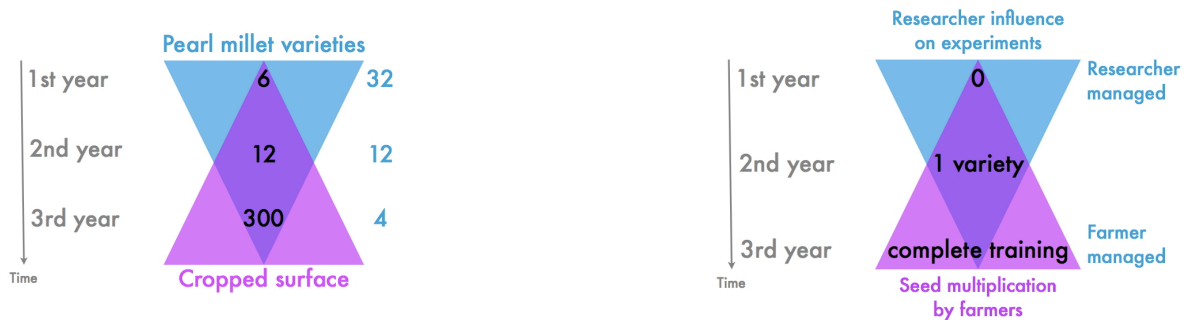


Figure 1: Generalized Opposite Pyramid Approach taking pearl millet as example (cropped surface in m²)

All options were tested on-farm, but in the first year under standardized researcher managed conditions. Owing to the fact that farmers can only conserve a limited (gender specific) number of varieties, and the limited lifetime of the project, the varieties were evaluated in a participatory manner including organoleptic tests, and consecutively reduced in the following years until a reasonable number was reached. At the same time surface cropped per variety was increased in order to allow better evaluation under real field conditions. Therefore, also the researcher influence was consecutively reduced until in the third year farmers were free in their cropping decision (i.e. sole vs. mixed cropping, fertilizer regime). Since also open pollinating crops were tackled, it was necessary to introduce training events on seed multiplication. These clearly showed that farmers - though they are usually good observers - are not aware of the different biological aspects of the crops they cultivate since hundreds of years. So continuous training is necessary. During this process some farmers decided to become professional seed producers thus creating a new income source.

In order to perpetuate crops and varieties it is intended to link the FOs with other initiatives (i.e. WASA = West African Seed Alliance) and to convene with FOs on volunteer activities in the first year after project conclusion, i.e. further variety testing. Final evaluation is planned two to three years later.

Conclusions and Outlook

It is far too early for a final evaluation of the presented methodologies. However, some indicators like extension of the VFEV duration, volunteer over proportional increase of cropped surface (OPA) and choice to become professional seed producers hint towards a success of the general project concept. VFEV and OPA as rather inexpensive methodologies might be used and further developed under different project environments as single components but certainly work better in a holistic approach with optimized farmer participation.

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