Photo: Chris Reij

Innovator Samuel Toh explaining the night paddocking technic to a radio agent during a study tour in Babanki. The paddock has just been tilled. A visiting farmer listens attentively and makes notes.

Chains of innovation by farmers in Cameroon

Paul Tchawa

Samuel Toh's farm in Upper Babanki is almost 2000 m above sea level and receives about 1500 mm of rain each year between May and September. Population density is about 150 persons/km^2. The "grassfields", where Bororo Fulani pastoralists keep their cattle, lie above the farming areas. In the early 1980s, Toh saw that his soils were becoming poorer and that, with population growth, there was less space for traditional long fallow to restore soil fertility. Bororo cattle grazed in the surrounding hills and he began to collect manure and transport it in jute sacks to his field. As this was strenuous work, he decided to build a fence around his field and to ask a Bororo herder to bring his cattle there each night for about a month. Afterwards he cultivated the fertilised area and the bumper crop he was able to harvest showed him that his new system worked. Over time, Toh improved his system. For example, he noticed that the animals tend to concentrate in one corner of the field and the manure was not well distributed. He subdivided the paddock, and the cattle were moved each night to different subdivisions.

Toh's innovation met with extraordinary success. One plant in particular is grown regularly after manuring: black nightshade or wonderberry (*Solanum nigrum*). Its leaves are eaten like spinach and are highly appreciated in Northwest Cameroon and in the cities of Yaounde (Central Province), Kumba (Southwest) and Douala (Coastal). Almost all farmers in Upper Babanki (more than 500 families) have adopted the night-paddock system, and a stream of traders in "bush taxis" weave through the villages to collect the leaves and take them to the city markets. Usually, the farmers grow nightshade for two years and then maize for another two years. The cattle then return and the fields are manured again.

New harvesting tool

Besides bringing direct benefits in terms of income, the innovation has borne other fruits as well.

With better soil fertility, farmers had five times as many nightshade leaves to harvest several times per season. It is hard work to break off the stems by hand. In the early 1990s, another local farmer, Phillip Ndong, tried to harvest with a knife but it was not sharp enough. Moreover, because the women and children were involved in harvesting several knives were needed and this was expensive.

He then tried using a razor blade held directly with the fingers. This cut the stems better, but also often cut into the fingers. He therefore took a piece of bamboo about 20 cm long and attached the razor blade to the end. After trying out several types of blade, he settled on one with three holes, which could be fixed firmly to the bamboo with thread. With this tool, which costs less than 25 FCFA (FF 0.25 or US$ 0.04), the price of a razor blade, the nightshade leaves can be cut quickly and efficiently and, because the stems are not damaged, leaf re-growth is stimulated.

Neighbours were sceptical at first, but now all nightshade growers in the area use Ndong's innovation. It spread spontaneously. Then another farmer in Babanki, Christopher Vitsuh, noticed that market demand for nightshade leaves was not being satisfied in the dry season and the price therefore increased threefold. This inspired him to develop a system of irrigation by gravity, so that he could produce nightshade leaves in the off-season.

Market demand

Since the 1960s, small canals have been dug in the Babanki area to conduct water towards brick-making yards. In 1986, Vitsuh thought of using the same technique to lead water to his farm. The night-paddock system had greatly increased nightshade leaf production in the wet season and the fertility could still be used in the dry months if there was water. Vitsuh started a small irrigation system, that expanded as additional families wanted to be connected to it. In 1999, the system was irrigating more than 10 ha to the benefit of some 40 farm families.

When Vitsuh had first thought of this idea, he contacted some advisors in water engineering. After examining the site, these experts estimated it would cost six million FCFA (60,000 FF) to set up the system. As Vitsuh could not afford this, he had the choice of giving up the idea or working out something himself. He did the latter and his initial network of 5 km of canals cost him only 110,000 FCFA (1100 FF).

To begin with, Vitsuh identified streams that could be diverted into canals. Depending on the location of the plots of the other farmers involved, the most

Participatory research on night-paddock manuring

A team composed of members of ISWC Cameroon, CIPCRE (a local non-governmental organisation), the University of Dschang, the Institute of Agricultural Research for Development (IRAD) and farmers has been formed to examine the production of nightshade (*Solanum nigrum*) in Babanki. The village lies
30km from Bamenda on the road to Nkambe. Here, market gardening is an important income-generating activity,and nightshade is the major crop.
Farmer innovators and the ISWC coordinator organised a workshop in June 1999 to identify priorities for joint experimentation. About 50 men and women farmers met at the palace of the traditional chief (Fon). During this workshop, the farmer innovators said they knew that the researchers' priorities differed from their own, but stated clearly: "Let's work first on our priorities; then we can help you with yours". They specified which aspects of the night-paddock system they wanted to address.
The farmers were paddocking 50 head of cattle overnight for one month, but suspected that these plots were being too well fertilised, while manure was needed for other plots. They wanted to know how many cattle should be kept in a paddock and for how long to ensure the best level of soil fertility, and what was the best crop succession to follow after manuring. The researchers agreed that they would address these questions first. During a second workshop in July 1999, details of the experiments were discussed and everyones task was defined. The researchers were so impressed by Samuel Toh's analysis and presentation at this workshop that they gave him the nickname "The Professor".
The experiments were carried out on the fields of four farmer innovators. They make their own recordings although this does not mean that they are the only ones involved in experimentation. They receive considerable support from the Fon and the villagers.
After they have dealt with the issue of maximising the benefits of manure, the researchers were keen to address their own priorities, such as examining the nutritional quality of the nightshade leaves, studying how increases in the cattle population was affecting the environment, and evaluating the forage species available to cattle. As long as farmers are also interested in these questions, participatory research can continue for the benefit of both local farmers and the larger world of research and development.

Paul Tchawa, Chris Reij and Ann Waters-Bayer, ISWC Programme

appropriate routes were chosen. As the land is prone to erosion and the canal sides could cave in, the farmers planted live hedges to stabilise them. When they had to cross a deep gorge or major watercourse, they used hollowed-out logs as pipes to link the two steep banks.

Community control

The new technology also led to social innovation. A management committee was set up in the community to arrange the distribution of the water to the different plots and to solve possible conflicts. Water is distributed on the basis of strict rules set by the farmers themselves. If the rules are not respected fines are levied. Farmers who have not contributed to digging the canals must give the management committee 20 litres of palm wine, a basket of maize flour and a cock if they want to irrigate their plot.

This innovation is characterised by people coming together because of a certain problem, the simplicity of the means used and a great potential for improving income. There was no outside intervention in building and managing this new irrigation system. Farmers in other parts of the village still seek the innovator's support to be linked to the network. Vitsuh conveyed this request to the Indigenous Soil and Water Conservation (ISWC) programme. As a result, a geometrician joined Vitsuh, helped survey the entire system and helped him improve and extend it.

Mutual inspiration

This case shows that, as isolated as some farmers' innovations may seem at first glance, there may be close and logical connections between them. In Babanki, one innovation triggered a series of innovations. The explosion in nightshade production led to a high demand for cattle manure and a more than two-fold increase in the number of cattle kept in the area. To reduce the cost (in terms of materials and time) of enclosing the animals overnight, some farmers have begun to experiment with live fencing. Under the in contract with the herders, the farmers have to feed the cattle for one month and some have started to plant fodder grasses.

Chain of innovations

Babanki farmers developed a chain of innovations:

- Night-paddock system
- Contracts between farmers and herders
- New harvesting tool
- Irrigation system
- Live fences for paddocks
- Growing fodder grasses

The relationships between the sedentary farmers and the mobile Bororo herders used to be tense, because the cattle sometimes damaged the crops and farmers expanded their fields into grazing areas. The contracts between the Babanki farmers and the Bororo for enclosing the cattle overnight on farmers' fields for a month each year has improved the relationships between the two groups.

It is also interesting to note that the links between innovations also link innovators, and they admire and respect each other. The development and mastery of an innovation by one person stimulates others. As a farmer in Babanki said: "After fertilising a patch of ground, you lose a lot if water cannot reach it". The farmers obviously do not regard these innovations as isolated developments. It is therefore not surprising that Samuel Toh, Phillip Ndong and Christopher Vitsuh support each other actively in developing their innovations. ■

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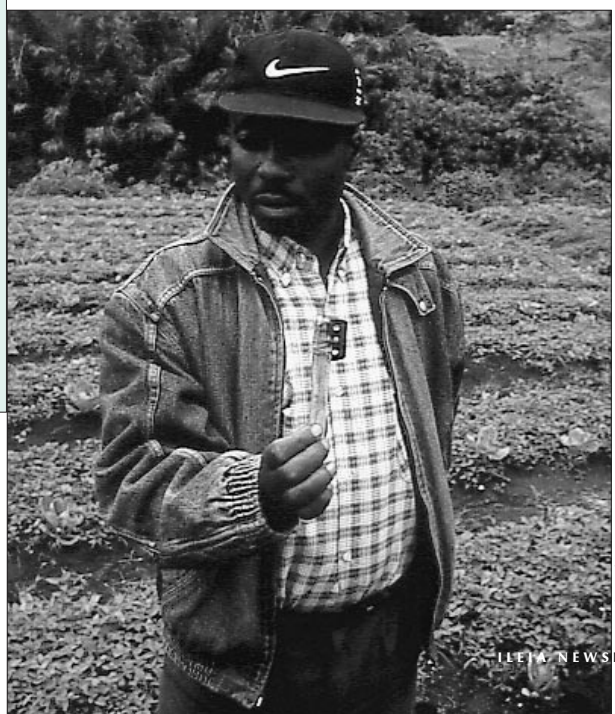

Photo: Chris Reij

Phillip Ndong showing his innovation, a razor-blade knife to cut nightshade leaves quickly and efficiently.