

Research and innovation

The Global Forum on Agricultural Research (GFAR) brings together all those working to strengthen and transform agricultural research for development around the world. As part of this role, GFAR is working with New Agriculturist to showcase and raise awareness of important initiatives and their outcomes, to update and inspire others.



Smallholder enterprise development

Smallholder farmers can significantly contribute to a country's economic growth and food security. In this edition, GFAR draws attention to the role of smallholder enterprise development and show how smallholders use knowledge and innovation to increase income, create business and new opportunities in Nepal, Ghana and Cameroon.

Improving livelihoods through community-based beekeeping in Nepal

In a mountain community in Nepal's far west, traditional beekeeping methods are being replaced by modern hives and better marketing. With a clean, high quality, branded honey, production, income and job opportunities have all increased.

A hard nut to crack

To enable smallholder farmers to increase production of *njansang* - a highly prized paste made from ground kernels of a forest nut, used widely in Cameroonian cooking - the World Agroforestry Centre developed alternative techniques that dramatically cut the processing time from six to eight weeks to a mere eight hours. Around 100 *njansang* producers in Cameroon have adopted this new technology, allowing them to increase their involvement in processing and trade.

Rising rice: an enterprise in Ghana

Having set up an agri-business enterprise, involving buying and processing of paddy, the Single Mothers Association (SMA) in Ghana's Upper East region successfully bid for a contract to supply schools with parboiled rice. With the help of TradeAid, and finance from the International Fertilizer Development Center, an agri-business cluster was established, uniting SMA, the Rice Farmers Coalition, TradeAid, input suppliers and a bank.

Improving livelihoods through community-based beekeeping in Nepal

The Hindu Kush Himalayan region contains a great diversity of honeybee species. Five species are indigenous to the region, with the European honeybee also introduced and promoted for beekeeping. While many communities have been using traditional apicultural practices to collect honey, recent years have seen the introduction of modern beekeeping techniques for rearing one indigenous honeybee species - *Apis cerana*. This has created new income and employment opportunities for men and women in this marginalised, mountainous region, as well as promoting a rich biodiversity by increasing the pollination services of these native bees.



Challenges to involving *dalits* have been overcome
©Deependra Tandukar

Beekeeping is a common practice among the villagers of Alital, in western Nepal's Dadeldhura District. The abundance of bee flora in the area, particularly the Indian butter tree (*chiuri*) - a source of high quality honey - is an advantage for local beekeepers. However, traditional use of fixed-comb log or wall-hives and harvesting honey by squeezing combs, have resulted in low yield and poor quality. Traditional harvesting methods also kill some brood and adult bees, leading to a decline in colony strength. The small quantities of honey harvested in Alital by individual beekeepers using these traditional techniques have never been able to enter the mainstream market and have instead been sold at low prices or bartered locally within the villages.

Modernhives and methods

In 2000, the International Centre for Integrated Mountain Development (ICIMOD) began to work towards a community-based beekeeping enterprise in Alital, addressing key challenges related to honey production, quality, marketing, and income. ICIMOD organised beekeepers into two groups, before merging them into one group of 87 members, and provided training in bee and hive management, harvesting and processing, selection and multiplication of productive, disease resistant colonies, and queen rearing. ICIMOD also introduced movable-frame hives, from which cleaner, higher-quality honey can be harvested without damaging the combs or killing the bees.



Beekeepers with good carpentry skills were trained in hive-making
©Min B Gurung

To develop market linkages, beekeepers were supported to participate in exhibitions and honey festivals. ICIMOD also helped to brand and label the honey as Alital Chiuri Honey and promote it in Kathmandu. The project also promoted the conservation and planting of *chiuri* trees and other bee flora and facilitated savings and credit provisions.

When training in modern apiculture techniques was initially provided to individual beekeepers, many did not transfer bees to the movable-frame hives and continued with traditional beekeeping practices. Reasons for this included a lack of confidence and insufficient follow-up support, as well as the high cost and unavailability of the modern beehives which had to be bought from Kathmandu, a process which could take three to four days.

This resistance was overcome by organising village-based training and building the capacity of local beekeepers as trainers to provide follow-up support. Beekeepers with good carpentry skills were trained in hive-making, and two participants have subsequently established workshops, selling their hives for around US\$20 each. Challenges to involving *dalits* (traditionally low status castes), women, and economically disadvantaged groups were overcome by providing free village-based training, beehives, and other equipment.

Cooperativemarketing

Originally organised as an informal community group, beekeepers formed the Alital Multipurpose Cooperative Limited in 2005. Since then the cooperative has grown to 117 shareholders from 12 villages, and has also been strengthened to provide services like training and marketing support to beekeepers.

These efforts have had a positive impact on the lives of local honey farmers. The number of apiarists that have adopted movable-frame hives has increased from one in 2001 to 117 in 2012. With each household keeping between five and 40 bee colonies, the number of colonies in movable-frame hives has jumped from six to over 1,000. Annual honey production in the project area has increased from less than 100kg to over 2,500kg and multiplying and selling bee colonies has also emerged as an additional income option for some beekeepers.



The number of apiarists that have adopted movable-frame hives has increased significantly
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With the increase in production, beekeeping has become an important source of income for each household, representing 35-50 per cent of annual earnings. Increased honey quality has contributed to better market access. This, combined with branding and promotion of their product as Alital Chiuri Honey, has enabled the beekeepers to earn up to US\$4.5 per kilo of honey, more than double the 2001 average of US\$2 per kilo. Even higher prices are thought to be achievable if the larger market in Kathmandu can be accessed.

At this time, Alital has the only beekeeping resource centre in Far-Western Nepal providing bees, beehives, and training services to local farmers. The initial success of the project, which attracted support from UNDP Microenterprise Development Programme and the Department of Agriculture, shows that rural livelihoods can be improved by mobilising the community and strengthening the capacity of local institutions to upgrade the value chains of high value products. Improving the quality of local honey and branding it as organic mountain honey to improve access to national and international markets could be further explored with increased private sector engagement.

Links

- ICIMOD (<http://www.icimod.org/>)

Written by Uma Partap and Min B Gurung, ICIMOD

A hard nut to crack

Great cooks in Cameroon have a secret ingredient: a fine, pale-brown paste made by grinding the roasted kernels of the forest tree species *Ricinodendrom heudelotti*. A small amount of the paste, known locally as *njansang*, livens up the flavour of food and thickens soups, making it a valued commodity. Extracted and dried, *njansang* stores well and fetches good prices on the market. In 2006 a study found that four self-help groups in central Cameroon earned 2.8 million CFA (US\$5,500) from the sale of 3,000kg of *njansang*.

Njansang's high price is related to the long, tedious and labour-intensive artisanal processes used to obtain the commodity from *R. heudelotti* fruits. This difficult processing procedure represents a major constraint in the value chain, creating a bottleneck to wider production and commercialisation of this valuable commodity.



Extracted and dried, *njansang* stores well and fetches good prices on the market
©Amos Gyau and Aneh Mundi

Alternativetechniques

To enable smallholder farmers to increase production of *njansang*, the World Agroforestry Centre (ICRAF), in partnership with Berinyuy Women's Development Cooperative (BERWODEVCOOP), developed alternative techniques that dramatically cut the processing time from six to eight weeks to a mere eight hours.



With the new process, the fruit is boiled for an hour, soon after picking
©Amos Gyau and Aneh Mundi

Artisanal processing traditionally involves collecting the fruit, piling it up and leaving it to decompose in the shade for four to eight weeks. Rotten fruit pulp is washed off to obtain the hard seeds, which are then put through a series of boiling processes that can take anything from eight to 48 hours. Finally, the cooked seeds are cracked open to obtain the *njansang* kernel, which can be dried and stored.

With the new process, the fruit is boiled for an hour, soon after picking. Boiling removes the fruit pulp, as well as the thick leathery lining around the seed coat. Then the nuts are dry-roasted until they fracture, to release the edible kernels. This entire process takes just eight hours, and at the same time reduces the health hazards associated with traditional processing. For instance, the decaying fruit produces a dark liquid that stains the hands of handlers. The decaying fruit is also frequently infested with maggots, which can get under the skin of processors.

Groundbreaking

Around 100 *njansang* producers in Cameroon have adopted this new technology, allowing them to increase their involvement in processing and trade, and ICRAF has already helped them form into groups, linked them to markets and provided training on vegetative propagation techniques. ICRAF is also working on developing mechanical and manual cracking machines to further reduce the processing time in addition to exploring post-cracking processing methods including oil extraction. "The project has taken a value chain approach by incorporating production, processing and marketing activities," Dr Amos Gyau, a marketing Specialist at ICRAF explains.

With less time and energy spent processing, families are able to spend more time gathering nuts and participating in other agricultural activities, such as the cocoa harvest which coincides with the *njansang* harvest. "This results in an increase in income and also gives the farmers more of an opportunity to diversify their sources of income, which is a good risk management strategy," says Aneh Mundi, a researcher at ICRAF.

Processors and farmers who have adopted the new technology are hailing it as ground breaking. "I can now collect and process my *njansang* on the same day, instead of waiting eight weeks to get the nuts ready for cracking," says Christina Nypie, a producer. "We should have known this long ago." Another producer, Victorine Ebamo, says that she will now "process a huge quantity of *njansang* for the market, and earlier in the season, when it will yield more income." On average, farmers have said that they have doubled the quantity of *njansang* they process.



Around 100 *njansang* producers in Cameroon have adopted this new technology
©Amos Gyau and Aneh Mundi

A key challenge currently being faced, however, is to gain widespread adoption of the new innovation: communities have different methods for processing the fruit to extract the kernel, and need tailored approaches to foster the adoption of the new technology. Secondly, *njansang* has traditional and cultural significance, and for this reason many farmers have been reluctant to give up the traditional methods of processing, complaining that the new processing techniques have no cultural depth. Some farmers, meanwhile, are willing to embrace one part of the technology but not another; for instance, boiling the fruit to de-pulp it is far more culturally acceptable than dry-roasting the nuts.

Scaling up

"Whatever the advantages a new innovation brings, efforts aimed at scaling up adoption need to take such important social factors into account," says Gyau, and group leaders have welcomed the new technique, promoting it among their peers.



In recent years ICRAF has encouraged farmers to plant *R. heudelottii* trees in their farms
©Amos Gyau and Aneh Mundi

Traditionally, *njansang* is collected from the wild but in recent years ICRAF has encouraged farmers to plant the trees in their farms. "There is an abundant supply of *njansang* on farms and from the wild," Mundi explains, "and more people are planting *R. heudelottii* trees with advice and guidance from ICRAF so there is no problem with farmers increasing production." ICRAF is providing training on propagation techniques, including grafting and rooting, which provides early fruiting trees, compared to those grown with seedlings. *Njansang* producers are also trained in marketing, including how to negotiate for better prices.

"Time-consuming, tedious or complex processing requirements for agroforestry tree products such as *njansang* can serve as a major barrier to their exploitation by smallholder producers," explains Dr Steven Franzel, leader of ICRAF's marketing and extension global research project. "It's therefore important for researchers and development practitioners to take a value chain approach when looking at potential economic benefits of non-tree forest products. Involving local communities in all stages of the experimental design and scaling-up efforts can enhance adoption."

Written by Aneh Mundi, Amos Gyau and Maryben Chiatoh, ICRAF

Rising rice: an enterprise in Ghana



SMA successfully bid for a contract to supply schools with parboiled rice
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To avoid buying imports, Ghanaian national policy aims to stimulate the consumption of locally produced foods. For example, government institutions - such as schools - are encouraged to buy local, good quality parboiled rice. Having set up an agri-business enterprise, involving buying and processing of paddy, the Single Mothers Association (SMA) in the Upper East region successfully bid for a contract to supply schools with parboiled rice.

The association was formed in 1995 with five single mothers joining together to help each other improve their lives. Having expanded to 600 members, SMA continues to provide rural women with economic empowerment, through a range of income generating activities. However, in bidding for the contract to supply parboiled rice for schools, a key challenge for SMA was to source enough paddy.

With the help of TradeAid, and finance from the International Fertilizer Development Center's (IFDC) 1000s+ project*, an agri-business cluster was established, uniting SMA, the Rice Farmers Coalition (RFC), TradeAid, input suppliers and a bank: over 650 individuals.

Getting farmers on board

To meet the demand of SMA, and support its own members, RFC, with support from TradeAid, created linkages with input and credit suppliers. The input suppliers agreed to supply fertilisers at a negotiated rate and credit was easily attainable because the farmers had a secure market.

"The emphasis has been on using better agronomic practices and application of inputs at the right time, which is key to maximising yields, rather than on increasing amount of land used," explains TradeAid's Desmond Yesseh. Through the application of technological improvements and improved agricultural management practices - including the use of organic fertilisers, growing seedlings in nurseries, timely transplanting and use of improved seeds - RFC farmers increased their average production from 11 to 38 bags per farmer.



To produce high quality parboiled rice, SMA required good quality rice, with a low percentage of broken grains
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In addition to increasing production, farmers began to bulk rice at specific locations to reduce transport costs for SMA and agreed to thresh rice on a tarpaulin or cemented floors to prevent stones being mixed with the rice. "We also make sure that the winnowing is done two or three times so that we are able to remove all of the chaff from it," explains Gilbert Atanga, president of RFC.

To produce high quality parboiled rice, SMA required good quality rice, with a low percentage of broken grains and a better taste. In response, RFC farmers began to use improved jasmine seed - a high quality rice variety preferred by local consumers. SMA also requested that farmers harvest the rice at the right time, before it becomes overripe and too dry. In return for producing increased amounts of high quality rice, RFC was able to bargain with SMA for a higher price.

Financial barriers



Schools are encouraged to buy local, good quality parboiled rice
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Once a price had been agreed for the rice, SMA had to overcome the challenge of having to pay for the rice on delivery. "This required a financial intervention and so a bank was brought on board," Yesseh explains. With a loan from the bank, SMA was then able to purchase rice from the farmers before they were paid by the schools. But due to the high interest rate, Desmond is concerned that this arrangement isn't sustainable in the long-term. The farmers would like to sell more rice to SMA, but the association is reluctant to increase its loan in order to purchase greater quantities of rice.

"The issue is that the RFC expects SMA to pay cash at the moment of purchase and therefore SMA needs a loan," explains Faustina Teni, SMA staff member in charge of the rice processing unit. "One solution would be for the farmers to agree to be paid only part of the sum up front and the rest when SMA has been paid. SMA would then be able to increase its supply to government institutions and buy more

paddy from RFC."

"To overcome this challenge, we are looking at increasing the promotion of local rice so that we have more individuals consuming more locally produced rice," Desmond adds. "We are also looking at alternative buyers, such as the military, who would pay cash up front to help solve the issue of accumulating interest rates on loans from the bank."

Spreading success

From fertiliser and seed providers, to the credit institutions, the farmers and SMA members, everyone in the rice value chain has benefitted from being involved in the agri-business cluster. RFC farmers have secured input supplies and a guaranteed market to sell their produce, input providers have increased their business with RFC and SMA has increased its revenue.

The total revenue of the 450 farmers involved has increased from 400,000 to 600,000 Ghanaian cedis (US\$300,000) over the last two years, which is about US\$650 per farmer per year. With the cash, many have purchased improved seeds and paid for ploughing services and fertilisers, instead of having to rely on credit. Farmers are also able to pay for school fees and subscribe to national health insurance services.



In 2011, the women sold about 120 tonnes of parboiled rice. Most was sold in Upper East Ghana to schools, but they are also marketing it in Burkina Faso through agri-food fairs, which have resulted in contracts with some retailers. Increased revenue has enabled the women to send more of their children to school and have at least two meals a day. The women also benefit by using the chaff to feed their pigs and charcoal that is produced during rice processing for their household cooking.

Some of SMA's increased revenue has been kept to reinvest in parboiling vessels which were purchased to reduce parboiling time. Thirty six women have already received training to use the vessels. This training has now been passed to each of the 200 women involved in rice processing. "The agri-business cluster has boosted the production of rice and the incomes of farmers and SMA members," Teni explains. "The combination of government policy, changes to the way RFC grow, harvest and sell their rice, and SMA's entrepreneurship have reorganised the local rice industry and increased the consumption of locally produced rice."

* From thousands to millions: accelerating sustainable economic growth in West Africa - a Dutch-funded project, now followed-up by the 2SCALE project (2012-2017).

Links

- United Through Markets (http://www.dailymotion.com/video/xntv8k_united-through-markets-africa_shortfilms)

- MOOV-ON Productions (<http://www.moovonproductions.org/our-products1.html>)

Written by Marie Loosvelt and Toon Defoer