



# A BRIGHTER FUTURE FOR COCOA FARMERS

How the Vision for Change programme is  
raising productivity and improving rural livelihoods





The World Agroforestry Centre (ICRAF) is one of the Centres of the CGIAR Consortium. ICRAF's headquarters are in Nairobi, Kenya, with six regional offices located in China, India, Indonesia, Kenya, Peru and Cameroon. We conduct research in 28 other countries in Africa, Asia and Latin America.

Our vision is a rural transformation in the developing world as smallholder households increase their use of trees in agricultural landscapes to improve food security, nutrition, income, health, shelter, social cohesion, energy resources and environmental sustainability.

The Centre's mission is to generate science-based knowledge about the diverse roles that trees play in agricultural landscapes, and to use its research to advance policies and practices, and their implementation that benefit the poor and the environment.

The World Agroforestry Centre is guided by the broad development challenges pursued by the CGIAR. These include poverty alleviation that entails enhanced food security and health, improved productivity with lower environmental, and social costs, and resilience in the face of climate change and other external shocks.





*Although yields have been declining in recent years, Côte d'Ivoire is still the world's largest cocoa producer.*

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Author: Charlie Pye-Smith, Christophe Kouame and Yossi Toledano

Editor: Betty Rabar

Design and layout: Martha Mwenda

Cover photo by Charlie Pye-Smith

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Front cover: H el ene Amenan, a Cocoa Village Centre operator produced over 10,000 seedlings in her nursery in 2015. Photo ICRAF/Charlie Pye-Smith

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World Agroforestry Centre  
United Nations Avenue, Gigiri  
P. O. Box 30677-00100  
Nairobi, Kenya.  
Phone + (254) 20 722 4000  
Fax + (254) 20 722 4001  
Via USA phone (1-650) 833-6645  
Via USA fax (1-650) 833-6646  
Email: [worldagroforestry@cgiar.org](mailto:worldagroforestry@cgiar.org)  
Website: [www.worldagroforestry.org](http://www.worldagroforestry.org)

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## Foreword

This booklet tells the story of the Vision for Change (V4C) project. Supported by Mars Incorporated and managed by the World Agroforestry Centre, the project seeks to improve the fortunes of Côte d'Ivoire's cocoa sector. If the country is to retain its status as the world's leading producer, radical measures are required to increase yields, enhance environmental sustainability and improve the welfare of the 800,000 farmers who grow the crop.

Many cocoa farms are over 30 years old and their yields are a fraction of what they once were. Exhausted soils, poor agricultural practices, unimproved germplasm and a lack of inputs have contributed to poor performance. As a result, many cocoa-growing communities suffer from high levels of poverty. The V4C project is tackling the problem in two ways: by helping farmers to rehabilitate their cocoa farms and by encouraging and supporting community development.

The project has developed innovative platforms to help farmers increase their productivity. Initially, this involved establishing 16 Cocoa Development Centres (CDCs). These centres of excellence are used for demonstration and training. More recently, the project has established a network of Cocoa Village Centres (CVCs). Owned and managed by young local entrepreneurs, these small businesses are now delivering high-quality planting material, agricultural inputs and training.







By 2020, Mars hopes that 10,000 farmers will have access to services such as these.

Working closely with the Conseil du Café Cacao, the project has done much to improve the welfare of cocoa farmers. By late 2015, 34 communities had benefited from new boreholes and access to clean water, and almost double that number from new classrooms, canteens, latrines and teachers' homes.

We believe we can look back on the first five years of the project with a great sense of satisfaction. The World Agroforestry Centre and Mars Incorporated would particularly like to thank the many local organizations, both within and outside government, for their support and dedication. We would also like to acknowledge the enthusiastic response of the people who matter most in this story – the men and women responsible for an industry which accounts for 40 percent of the country's exports.

**Tony Simons**  
Director General  
World Agroforestry Centre

**Howard-Yana Shapiro**  
Chief Agricultural Officer  
Mars Advanced Research  
Institute Fellow  
Mars, Incorporated





*The V4C project has focused on Nawa Region, where 40% of the country's cocoa is grown.*



## Introduction: tackling Côte d'Ivoire's cocoa crisis

The welfare of some 6 million people in Côte d'Ivoire, including 800,000 farmers, depends on the cocoa industry. The country is the world's largest cocoa producer and the crop accounts for around 15 percent of Gross Domestic Product (GDP). Although production has risen significantly since 2000 – from 1.2 million tonnes to 1.8 million tonnes – most farmers have experienced declining yields and incomes, and many cocoa-growing communities suffer from high levels of poverty and poor nutrition.

This is an environmental, as well as a social crisis. Production has risen largely because more and more forest land has been cleared to grow the crop. In 1960, there was an estimated 12 million hectares of forest in Côte d'Ivoire; a recent European Union study suggests that just 2.5 million hectares remain. In 2002, 14 percent of classified forest was under agricultural production. This figure has now risen to 32 percent, and some protected areas have been virtually destroyed by cocoa production.

Visit the village of Petit-Bondoukou and you will get a flavour of what has happened. When Datte Koffi Yeboua arrived here in the 1970s, he cleared a swathe of forest and planted cocoa. "For many years, cocoa was a very good business, very profitable," he says. "We used to get lots of pods and high yields." However, over the last decade, yields have declined, partly because trees have aged and the soils are exhausted, and partly because the area has been affected by cocoa swollen shoot virus (CSSV). In the past, Datte and his neighbours used to harvest around 1.5 tonnes per hectare; now most are lucky if they get 500kg. The local cooperative used to handle around 500 tonnes a year; now it trades less than 200 tonnes a year.



*Datte Koffi Yeboua is owner of one of the demonstration sites in Petit-Bondoukou.*

There is an urgent need to develop a more sustainable form of cocoa production in Côte d'Ivoire, one which improves productivity, enhances biodiversity and takes good care of the land. This is the aim of the Vision for Change (V4C) project. "If we don't intervene in the cocoa sector now, the crop could disappear from this region," says Béné Kouadio Yeboi, who manages the production side of the project, which currently focuses on Nawa Region, where 40 percent of Côte d'Ivoire's crop is grown.

Launched in 2010, the V4C project has three main objectives. It is helping farmers increase their yields, supporting community development and encouraging greater use of agroforestry. The project is closely aligned with the Ivorian Government's 2QC (*quantité, qualité, croissance*) programme, which seeks to rehabilitate 40 percent of the country's cocoa orchards and increase yields to 1.5 tonnes per hectare per year by 2023.

The key players in the V4C project are Mars Incorporated, the world's leading chocolate company, the World Agroforestry Centre and a range of national institutions and farmers. Mars is concerned about the global supply of the raw material and eager to establish sustainable production systems. It is providing US\$50 million to support the project over a ten-year period. The V4C project is benefiting from its experience in other parts of the world. For example, the use of grafting to increase yields was first piloted by Mars in Indonesia (and described in an earlier 'Trees for Change' booklet).

In March 2010, Mars Incorporated and the Ivorian Ministry of Agriculture signed a Memorandum of Understanding (MoU) which established the basis for a long-term public-private partnership. The key national policy partner is the Conseil du Café-Cacao, which guides the development of the cocoa and coffee sectors and oversees the activities of the Centre National de Recherche Agronomique (CNRA) and the Agence Nationale d'Appui au Développement Rural (ANADER), the government's research and extension agencies. Both organizations have signed MoUs with the World Agroforestry Centre to facilitate collaboration on agroforestry research, development and education. Other national organizations involved in the V4C project include the Fonds Interprofessionnel pour la Recherche et le Conseil Agricole (FIRCA) and four university departments. The World Agroforestry Centre is responsible for programme management and overseeing research to improve cocoa productivity.

The project partners recognize that cocoa production in Côte d'Ivoire will be more sustainable if there is a shift away from full sun-cocoa cultivation to cocoa agroforestry. Incorporating shade trees with cocoa improves the agro-ecological balance in the landscape. This can enhance soil fertility, help conserve biodiversity, protect orchards against drought and provide additional income for farmers through the sale of timber, fruit and other products. It can also increase cocoa yields, increase nutrient and water use efficiency, and reduce deforestation and forest degradation. Recent predictions indicate that high temperatures will make some areas currently under cocoa no longer suitable for the crop, although good shade management could reduce the impact of rising temperatures.

This booklet provides a brief summary of the V4C project's achievements during its first five years. The project has proven that the use of various techniques, including grafting in old orchards, can improve cocoa yields in a relatively short period of time. The project has also achieved much in the field of community development, leading to significant improvements in education, nutrition and health care in some 75 villages.



*The V4C project is a collaboration among several organizations.*





*Germain Yao is responsible for managing the CDC in Petit-Bondoukou.*



## Chapter 1: BOOSTING PRODUCTIVITY

Many of Côte d'Ivoire's cocoa orchards were planted 30 or more years ago and most now yield a meagre 500kg or less of cocoa per hectare per year. It is not just age which is an issue, but management: poor agricultural practices, a lack of access to fertilizers and the failure to treat diseases are part of the problem.

There are three main options for the rehabilitation of cocoa farms in V4C interventions. The first involves clearing old trees and replanting with improved hybrid seeds or grafted seedlings (improved clones grafted onto cocoa seedling in nurseries). The second involves the introduction of good agricultural practices, such as regular pruning. The third option involves grafting improved clones onto mature trees. This is only suitable where there are low levels of the cocoa swollen shoot virus disease. In 2011, grafting was introduced to five Cocoa Development Centres (CDCs) established by the V4C project in Nawa Region, using budwood from improved clones selected and developed by CNRA.

“If farmers clear their cocoa orchards and replant with hybrid seeds, they have to wait at least three years before they get their first harvest,” explains Kingoun Sauveur Camara, a V4C master trainer. “It has been proven that old trees which have been restored through grafting will start fruiting within nine months. That means farmers don't suffer any significant loss of income.”

Technicians have compared five different technologies at the CDCs. The first (T0) involves business as usual. The second (T1) involves the use of good agricultural practices, without the application of fertilizer. The third (T2) involves the



*Preparing for a new graft.*

use of good agricultural practices with the application of fertilizer. The fourth (T3) involves grafting, together with good agricultural practices and the application of fertilizer. The final treatment (T4) uses the option commonly recommended for unproductive orchards over 30 years old: total clearance and replanting using improved seeds or seedlings.

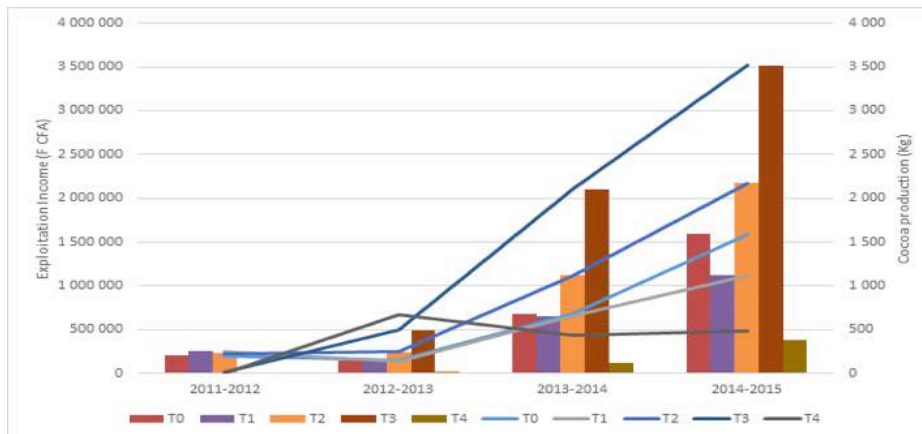


Figure 1: Income and yields under different treatments over four years

The scientists found that grafting improved clones onto mature trees (T3) has led to a significant increase in yields. As Figure 1 illustrates, the average yield for five CDCs for the T3 treatment, involving grafting and good agricultural practices, was 2.10 tonnes per hectare after three years. This compared to 1.12 tonnes per hectare for T2 (use of good agricultural practices and fertilizer), and 654kg per hectare for T1 (use of good agricultural practices without fertilizer). This shows that grafting improved clone onto a mature tree can produce 3-4 times more cocoa than current average yields, three years after the graft.

“All the farmers are now saying: ‘If we could do grafting, we’d do it in all our orchards,’” says Germain Yao, the technician responsible for the CDC in Petit-Bondoukou. However, researchers remain cautious about promoting the technology in Côte d’Ivoire, unlike in Indonesia. This is mainly because of the challenges posed by CSSV in some production areas of Côte d’Ivoire.



## Facing up to the challenges

The benefits of grafting far outweigh the disadvantages, provided extension agents and farmers recognize that it has the potential to hasten the spread of CSSV, a disease which leads to a rapid decline in yields and eventually the death of the tree. If the mother tree – the source of the budwood used for grafting – is infected with CSSV, then the grafts might transmit the virus. If the tree – the rootstock – is already infected by CSSV, it will transmit the virus to fresh and healthy budwood. Researchers have found that mealy bugs, the vector of CSSV, lose their ability to transmit the disease if the bugs move 6m without sucking or feeding on an infectious plant.



*Cocoa Swollen Shoot Virus is a devastating disease.*

“Our research shows that these risks can be reduced,” says Christophe Kouamé, manager of the V4C project in Côte d’Ivoire. “Barrier trees like coffee can be planted around clonal gardens and rehabilitated farms to prevent transmission by mealybugs, which are the main vector. And in areas where there is a high incidence of the virus there should be a presumption against grafting.” Instead, the focus should be on cutting down all the trees in year 1, establishing food crops and non-host vegetative barriers against further infection the same year, and replanting the farm in year 2 with high-yielding clones, using either cuttings or grafted seedlings.

Another major challenge relates to the lack of high-quality planting material. At present, the demand for improved hybrid seeds produced by CNRA, far exceeds availability. The V4C project is seeking to overcome the shortage by developing clonal budwood gardens and using tissue culture to produce large quantities of high-performance clones developed by CNRA. This will

provide material which can be grafted onto selected rootstock in nurseries or which can be used to produce orthotropic cuttings. These will then be distributed to farmers. “One of the advantages of propagating clonal material using somatic embryogenesis is that it reduces the risk of spreading CSSV,” says Jane Kahia, who manages the somatic embryogenesis laboratory at CNRA’s headquarters in Adiopodoume. By 2014, V4C had established 18 hectares of clonal gardens at the CNRA cocoa research stations in Divo and Soubré.

### Delivering success

The V4C project has developed an innovative delivery platform to help cocoa farmers increase their productivity. Initially, this involved establishing 16 CDCs in Nawa Region. Six of these CDCs are funded by the Sustainable Trade Initiative (IDH). These centres of excellence are used for demonstration and training in advanced agronomic practices, particularly the rehabilitation of old cocoa orchards using superior planting material.

“During the past year, we’ve organized two training sessions ourselves and another one was held by ANADER,” says Augustin Yra Kouadja, the technician in charge of Kouamekro CDC, near the town of Gueyo. “We try to limit numbers to around 60, but on one occasion we had over 120 farmers. The training programmes are extremely popular.” The CDCs, all of which have been established near roads, also attract many casual visitors. “Today is market day,” says Augustin, “I could get 30 or more people dropping in for 15 minutes or so. Visitors always say how impressed they are, how they’d like to do the things we are already doing here – especially grafting – on their own farms.”

The next stage in establishing the V4C delivery model involved the creation of Cocoa Village Centres (CVCs). These small, independent businesses are owned and managed by local entrepreneurs and



*Augustin Yra Kouadja conducts frequent training sessions for farmers at Kouamekro CDC.*

linked to specific CDCs. The core business of the CVCs is to provide farmers with the “triple productivity package” (3PP) of high-quality planting material, training in good agricultural practices, and – in the case of those associated with Mars – agricultural inputs such as fertilizers and pesticides.

Of the first tranche of 47 CVC operators in Nawa Region, 25 are fully funded by Mars Incorporated. The rest are associated with other organizations: 15 with cooperatives linked to Cargill, a major international food company; four with ZAMACOM, a cocoa-buying subsidiary of Ecom Agroindustrial Corporation; and three with HKF, a local cocoa buyer. The main difference between the two groups is that Mars CVC operators can sell fertilizers and other inputs, whereas the rest leave this to the cooperatives. Otherwise they perform the same functions.

When the operators return to their villages after the six-week training – the first was held in 2014 – they establish their CVCs with guidance from local CDC technicians. Each is provided with a starter kit which consists of a metal shipping container fitted out for use as a storeroom and shop, equipment such as wheelbarrows, pruning gear and spades, and an initial supply of agricultural inputs. At present, each CVC serves an average of 100 farms of varying sizes. Some have been particularly successful. For example, Jérôme Bolé, who runs Dabouyo CVC, has taken on two full-time staff. “I’m very satisfied with the way the business is developing, and I feel I’m doing something useful,” he says.

Besides providing farmers with superior cocoa seedlings, fertilizers and pesticides, Jérôme also offers pruning services. He has also been trained to perform grafting. One of the many farmers to benefit from his CVC is Moustafa Sawadogo. “Jérôme came to my farm, pruned the cocoa trees and showed me how to use fertilizers,” he says. “My cocoa yields are now three times higher than they used to be.”



*CVC operator Jérôme Bolé (right) selling inputs to a cocoa farmer.*



By the end of 2015, the 47 CVC operators had produced enough seedlings to establish 236 hectares of new cocoa orchards. With a germination rate of 90 percent, the CVC operators are far more successful than farmers who get their seeds directly from ANADER to produce their own nurseries. Hélène Amenan, one of just two female CVC operators among the 2014 cohort, produced over 10,000 seedlings in her nursery in 2015, enough to establish 7 hectares of new cocoa orchards. She sold the seedlings for 100 CFA each (US\$0.60), earning around 1 million CFA (US\$1630).

The CVCs also focus on other agricultural crops. During their first year of operation, 42 CVC operators built 52 propagators for raising banana plantlets, which are sold to farmers for use as shade trees when establishing new cocoa plantations. By the end of 2015, 19 CVCs were involved in the production of soybean seed, which is sold to women's groups who grow soybean as an income-generating activity.

"The CVC approach is one of the project's biggest milestones," says Thomas Kouakou, the V4C operation manager. "The CDCs established the best ways of improving productivity. Now the CVCs are helping much greater numbers of farmers to benefit from techniques which increase cocoa yields."



*CVC operator Elise Nguessan.*

## Assessing land health

If cocoa is to continue to play an important role in Côte d'Ivoire, a range of constraints, such as low productivity, declining soil fertility and diseases like cocoa swollen shoot virus (CSSV), must be addressed. To understand these constraints, the V4C project is undertaking a comprehensive cocoa land health surveillance data-gathering exercise, using the Land Degradation Surveillance Framework (LDSF) developed by the World Agroforestry Centre. The methodology provides a framework for assessing land degradation and the effectiveness of rehabilitation measures – such as those being introduced by the V4C project in Côte d'Ivoire – over time.

Between 2013 and 2015, the exercise gathered data at five sentinel sites, each measuring 10km x 10km, at Kipiri, Petit-Bouaké, Koda, Petit-Bondoukou and Kragui. On average, 97 percent of each sentinel site is devoted to farming activities. The research assessed the prevalence of CSSV disease and found that some areas are suffering more than others. In Koda, CSSV was found in just 4.9 percent of plots containing cocoa trees. The figure for Kipiri, in contrast, was 77 percent.

There was considerable variability in terms of soil fertility and nutrient status, with most of the sentinel sites exhibiting poor nutrient status. Less than 50 percent of the soils have an optimum organic matter content and N content for sustainable cocoa production. Similar observations were found for other nutrients such as P, K, Ca and Mg. The findings of the land health



*Collecting soil samples for analysis.*

surveillance were presented in a Working Paper, published in 2014. The authors made a number of recommendations for future management practices. For example, in sites with high CSSV prevalence, farmers should continue to abide by existing recommendations. These stipulate that all infected trees should be uprooted and burnt. New farms should be established with high-performance germplasm, which are disease-free. As no CSSV-resistant planting material exists, farmers should be encouraged to put in place sanitation measures, such as planting non-host barrier trees around new plantations.





*The V4C project places emphasis on empowering women.*



## Chapter 2: STRENGTHENING COMMUNITY DEVELOPMENT

When Coulibaly Beh arrived in Koda in 2000 he bought 4 hectares of old cocoa orchards, hoping that these would provide him with a decent living. But life today remains as much of a struggle as it was then. He and his wife now have eight children and there are times when they don't have enough to eat. They live in a modest shack with three rooms, crumbling mud walls and a roof made out of plastic and palm fronds in a small village which lacks running water, a health clinic and decent schools.

Four years ago, the V4C project established one of its CDC plots on Coulibaly's land. "I'm very happy with the way the yields have increased there, but that's just a small plot," he says. "If I could graft all my cocoa orchards, then I'd be able to earn more money and we would be much better off." Many of his neighbours tell a similar story. The new technologies introduced by the V4C project will improve their livelihoods when they are scaled up over larger areas. But this will take time. In the meantime, the V4C project is helping to improve the welfare of cocoa-growing communities by supporting community development projects which promote the three Es of education, empowerment and equality.

Côte d'Ivoire is slowly recovering from a series of political crises which damaged the economy and reduced living standards, but cocoa communities have yet to benefit from the economic upturn. One study found that child mortality and stunting as result of malnutrition is four times greater in cocoa-producing areas than in non-cocoa producing areas. Another revealed that a third of households in Nawa Region lack sufficient nutritious food for



*Like many cocoa farmers, Coulibaly Beh and his family struggle to make ends meet.*

significant periods each year. Almost half the children – and 70 percent of girls – between the age of six and 11 do not go to school. Poor attendance stems from a lack of availability of teachers, inadequate facilities, the poor quality of teaching and the failure of parents to send their children to school.

In 2012, Mars Incorporated signed a protocol of agreement with the Conseil du Cafe-Cacao under which they agreed to independently fund specific community development projects in Nawa Region. They allocated US\$2.6 million over a three-year period and pledged to attract other donors. Projects are divided into three categories: building new social infrastructure, rehabilitating old infrastructure and income-generating projects. In each case, local communities are expected to pay a share of costs: 10 percent in the case of social infrastructure, 5 percent for rehabilitation projects and 20 percent for income-generating projects.

“We believe that when communities contribute to the cost of new projects, they have a greater sense of ownership and will be keen to make sure that they are effectively managed,” says George Bredou, who oversees V4C’s community development work. “But we also recognize that raising large sums of money is a serious challenge for poor communities. That’s why provision is made for donors to increase their share of project costs which reduces the amount communities have to pay.”

The process of selecting projects is thoroughly democratic, and carried out under the guidance of ANADER. By the end of 2015, three-day diagnostic meetings had been held in 72 communities. At the end of each, the villagers were in a position to draw up a Local Development Plan. The plans describe the projects and activities which the communities believe will help to improve their



*Many children are still educated in shabby facilities such as this.*

economic and social wellbeing. For example, in Liagui, the villagers identified the following in order of importance: three new classrooms; the rehabilitation of three old classrooms; a school library; a school canteen; improvements to the road into the village; three water pumps; and a health clinic.

Much has been achieved in a short space of time. The community raised 400,000 CFA (US\$660) as their contribution towards improving the road and 700,000 CFA (US\$1150) towards the cost of rehabilitating old classrooms and building new ones. “These projects are going to make a big difference both to us as teachers and to the children,” says headmaster Kouadio N’guessan proudly as he shows us the almost completed classrooms.



*Choosing projects is a democratic process. A village meeting organized by ANADER.*

A similar story is told in Bobouo, where the school has benefited from the building of a new canteen, new classrooms and new washrooms. “At the moment, there are about 140 children in the catchment who come to school and 300 who don’t come at all,” says Mathieu Djebble Boga, the vice-president of the Village Development Committee. “I’m sure more children will come to school now that we’ve got better facilities.”

By late 2015, 34 communities had benefited from new boreholes and access to clean water. The project had provided funding for four health care centres, three nurses’ homes and two ambulances. Sixty-three communities had benefited from new and rehabilitated classrooms and the construction of 20 school canteens, 16 blocks of latrines and three teachers’ homes.



## A better deal for women and girls

Cocoa is often referred to as a “man’s crop”, although women do over 40 percent of the work in cocoa orchards. They seldom benefit from training or access to resources such as fertilizers, and it is the men who take the profits from cocoa. Yet women play a vitally important role in supporting their families. During the “hungry months”, when there is no cocoa to sell, women are often the only ones earning an income. For example, Coulibaly Beh’s wife sells fish in the local market; others sell bananas and vegetables.

In response to the findings of a gender assessment of its activities, Mars Incorporated launched a Women’s Empowerment Plan for the V4C project in June 2015. This includes commitments on training women, diversifying their incomes and increasing the role they play in community development. Initiatives carried out under the empowerment plan fall into two main categories: those related to social empowerment and activities which focus on generating an income.

Reports from ANADER farmer training sessions revealed that less than 3 percent of those participating in V4C Farmer Field Schools were women. The Women’s Empowerment Plan has set a target of involving 700 women in these activities by 2017. In mid-2015, the World Agroforestry Centre and ANADER selected five groups, comprising over 100 women, to attend regular women-only Farmer Field Schools. These were led by two male and one female ANADER community



*The new canteen at Bobouo.*



*Income generating activities include growing crops such as plantains, chilli peppers and soybeans.*

development agents. “Since women have so many different tasks to perform at home and on the farm, they were allowed to determine the date and duration of the field schools,” says Inge Jacobs, a consultant on women’s issues to the V4C project. “That made it much easier for them to attend the training sessions.”

The first tranche of CVC entrepreneurs included just two women. “Having the opportunity to become a CVC operator is one of the best things that ever happened to me,” says H el ene Amenan. “It means I can earn a living for myself and support my parents as well.” The V4C project seeks to significantly increase female involvement and the next cohort of 40 trainees will include at least 10 women. The selection process during the first round of recruitment had a strong academic bias. In future, there will be greater emphasis on practical skills; this will make it easier for young women to become CVC entrepreneurs.



*CVC operator Hélène Amenan.*

The local development plans drawn up during the diagnostic meetings organized by ANADER identified income-generating activities which could benefit women. By late 2015, 22 women's groups were undertaking income-generating activities, such as rearing chickens or growing plantains. In each case, the women contributed 20 percent of the start-up costs.

The women's groups were established with the help of the V4C project, which is providing training in marketing and financial management. Most of the groups have set up their own bank accounts and are already earning an income. For example, in Liagui, the women's group has grown several hectares of chilli peppers, plantain and soybean. "This is not only helping us to improve our own incomes, it is providing money to support the school canteen," says Marie Dje Ahou. "I've got five children at the school and they're all going to benefit from this."



One of the most recent undertakings, launched under the banner of “Women for Change”, is a Village Savings and Loans (VSL) programme, which is being managed and implemented by CARE International through a partnership with Mars. Since most women do not own land, and therefore lack collateral to access loans by conventional means, the VSL programme will help them to make modest savings using a methodology which has been developed over many years by CARE.

Although the saving schemes are entirely self-financing, the women benefit from a comprehensive training programme of financial management. Experience in other parts of Africa has shown that VSL programmes can help women to increase their incomes and their business acumen. Following their involvement in VSL schemes, many gain the confidence to approach micro-finance institutions to secure larger loans to establish businesses.



*Cocoa growing under the tree canopy.*



## Chapter 3: PROMOTING COCOA AGROFORESTRY

An understory tree native to the Amazon basin, cocoa was introduced to Côte d'Ivoire by French settlers in the 19<sup>th</sup> century. Since independence in 1960, government agencies and extension workers have promoted the development of smallholder cocoa plantations. Originally produced in a mixed cropping system, the rapid development of the sector has led to full-sun cocoa production. This maximizes short-term yields, but productivity can only be sustained if farmers can afford to apply large quantities of input such as fertilizers and pesticides. The majority cannot, and this is one of the reasons for the recent decline in yields. Today, there is a growing body of evidence to support the view that well-managed cocoa agroforestry systems can provide a range of benefits for the environment, farmers and the local community.

Agroforestry tree species grown in cocoa farms can help to improve soil fertility. This is particularly true of leguminous trees, which increase the nitrogen content of the soil. One study in Côte d'Ivoire compared new cocoa gardens planted with leguminous trees with gardens planted without leguminous trees. The former increased survival rate



*Photographing Cocoa Swollen Shoot Virus.*



of young cocoa trees and yields were also higher under the shade of leguminous trees than under full-sun cocoa.

Climate researchers from the International Centre for Tropical Agriculture (CIAT) anticipate that a temperature rise of 1°C by 2030 will make cocoa growing at low altitudes in countries like Côte d'Ivoire and Ghana increasingly difficult. By 2050, when temperatures could have risen by 2.3°C, farmers might find it difficult to even grow the crop. Shade management could be used to buffer this. Agroforestry, referring here to planting or managing the regeneration of companion trees with cocoa, can make important contributions to enhancing and sustaining cocoa productivity across its current range.

Cocoa grown under shade can yield a harvestable crop for 60-100 years, whereas full-sun cocoa may only be productive for 30 years or so. At Soubré, the degradation of full sun cocoa starts as early as 15-20 years after planting. Empirical observations suggest that for the best results, and highest yields, shade levels in mature cocoa plantations should average around 30 percent. In Ghana, the introduction of shade trees to cocoa plantations



*Farmers often use plantains to provide shade when establishing new cocoa orchards.*

was found to increase yields by 12 percent. In Cameroon, the introduction of agroforestry cocoa systems led to a 23 percent increase in cocoa production, when compared to cocoa monocultures, and increased profits by 14.5 percent.

A major incentive to shifting from full-sun cocoa to cocoa agroforestry is that it can help farmers to diversify their sources of income and provide a degree of protection against volatility in the commodity market. Besides earning money from the sale of cocoa, farmers can sell a range of agroforestry products. In West Africa, as in many other parts of the developing world, there is a strong demand for wild vegetables, fruits, building materials, resins, palm wine, chewing sticks and firewood.

### The farmers' perspective

In 2012, researchers from the World Agroforestry Centre interviewed 355 farmers in Bas-Sassandra District. Although the density of non-cocoa trees was relatively low, over 100 different tree species were identified in cocoa orchards. It was found that 95 percent of farmers wanted to grow more trees on their land. They provided the researchers with detailed information about how 32 species interact with cocoa in terms of soil moisture retention, soil fertility improvement and pests and diseases.



*Cocoa agroforestry can provide farmers with more than just cocoa. Edible giant snails thrive in the habitat.*

“Cocoa landscapes in South West Côte d’Ivoire appear to be at a turning point,” suggests Emilie Smith Dumont, a researcher at the World Agroforestry Centre. “Their productivity is declining along with their conservation value. However, our research suggests that both issues could be addressed by promoting appropriate tree diversity and good management practices.” She also suggests that appropriate policies, including better security of land and tree tenure and certification schemes, would help to encourage agroforestry.

To gain an insight into what sort of species farmers would like to plant, scientists from the World Agroforestry Centre and the University of California, Davis, interviewed 400 cocoa farmers in and around Soubré in another study. They found that they tend to favour trees which have a market value. This is particularly true for better off farmers living near towns. However, poorer farmers and those living in isolated areas are more likely to inter-crop their cocoa with trees which provide products they can use themselves, such as oil and fruit.

“Farmers who receive information from cooperatives and extension agencies about the benefits of intercropping are more likely to plant trees in their cocoa gardens than farmers who haven’t benefited from similar contacts,” says Amos Gyau, a markets researcher with the World Agroforestry Centre. The researchers found that as



*Charles Yao Yao is now a firm believer in cocoa agroforestry.*



increasing numbers of farmers inter-crop their cocoa with specific trees, the likelihood of others doing the same increases. This suggests that extension agencies should focus on the promotion of intercropping to a core population of farmers. They will then spread the good news to others.

Charles Yao Yao, the owner of one of the CDC plots in Petit-Bondoukou, recognizes that introducing new technologies, such as grafting superior germplasm onto old trees, is very important, but not an end in itself. "It's a great technology and we can see that it's going to increase yields significantly, but many of us would also like to diversify our incomes," he says. He intends to plant coffee around his orchards as a barrier to cocoa swollen shoot virus, and he also plans to plant a range of native trees.



*Drying cocoa beans in the sun.*



## Chapter 4: LOOKING TO THE FUTURE

During its first five years, the V4C project illustrated that grafting superior clones onto mature trees in old orchards, and using good agronomic practices, enables farmers to significantly improve their productivity. At the same time, scientists have recommended that the use of this rehabilitation technology needs to consider the prevalence and management options for CSSV disease.

V4C has established 18 hectares of clonal gardens and refined tissue culture techniques for the mass propagation of elite cocoa clones. This will ensure that sufficient high-quality germplasm is available for large numbers of farmers during the scaling up of the project. “In 2010, we embarked on a journey to contribute to the revitalization of the Ivorian cocoa sector to secure the long-term supply of sustainable cocoa. Using a holistic approach to cocoa sustainability in the region of Soubré, V4C has developed the foundation for improving cocoa productivity and farmer incomes,” says Yossi Toledano, Mars Incorporated West Africa Director.

In 2015, the Conseil du Café Cacao approved a pilot project in Nawa Region which will take the practice of grafting beyond the CDCs to the wider landscape. This involves the V4C project and the Conseil du Café Cacao, as well as the



*Sorting cocoa pods after the harvest.*



national research and advisory services, CNRA and ANADER. Restoration of old orchards using three rehabilitation options, including grafting, will take place on some 1200 farms, with the CVC operators playing a key role by providing grafting services and advice.

“We are also in the process of setting up demonstration sites beyond Nawa Region,” explains Christophe Kouamé. “This will allow us to illustrate the performance of different germplasm, so that farmers can learn about the available rehabilitation options.” Demonstration sites are being established in five key cocoa growing regions at Abengourou, Gagnoa, Bouaflé, Divo and San Pedro. This is being done in conjunction with Nestlé and Mars Incorporated within the framework of CocoaAction, an industry-led initiative implemented by the World Cocoa Foundation (WCF).

There is, as we have seen, a considerable appetite among farmers for planting native tree species in cocoa orchards. This will not only lead to more sustainable production systems, but provide farmers with a diverse source of income. However, if cocoa agroforestry is to take off, farmers will need to have access to a good supply of seeds and seedlings of the most favoured species. At the somatic embryogenesis laboratory in Adiopodoume, scientists have already begun carrying out experimental work on a number of native



*The future of millions of people in Côte d'Ivoire depends on the cocoa sector.*

agroforestry species and had some early success with black plum (*Vitex doniana*), an indigenous species valued for its nutritious fruits and leaves, as well as its medicinal properties.

To help the cocoa industry adapt to climate change, the V4C project intends to develop climate-smart cocoa rehabilitation technologies by designing and testing different combinations of tree species which do not host CSSV in a variety of agro-ecological zones. The scientists recognize that achieving the full benefits of agroforestry systems requires appropriate management of both the companion trees and the cocoa growing among them.

There is a sense of impatience among farmers who have seen the project in action in Nawa Region. They are now eager to move away from the proof-of-concept stage and get down to the practical business of transforming their cocoa orchards. “We are very impressed with the results so far,” says Datte Koffi Yeboua, who owns one of the cocoa orchards in Petit-Bondoukou which has benefited from the introduction of grafting. “But so far it’s been on a small scale – we’d like to see these practices introduced to all our cocoa farms.” He adds, tellingly, that he would be prepared to pay for the introduction of yield-enhancing improvements.





*Many women have benefited from the V4C project.*



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