

Perking up smallholder coffee production

RIU

Validated RNRRS Output.

New ways of managing coffee trees are now available to boost yields and cut losses caused by insect pests and diseases. In Malawi, a new dwarf variety of Catimor coffee called 'Nyika' is spreading fast, as it is resistant to both coffee leaf rust and coffee berry disease. Other parts of the 'integrated crop and pest management' system that farmers are taking up are painting stems with Fipronil insecticide to combat the white stem borer pest, inter-planting Catimors with banana to improve food security, and better ways of using fertilizer and saving water in soils. Information leaflets on coffee berry disease, white stem borer and managing Catimors are available in two local languages in Malawi, in Kiswahili in Kenya and in English in Zambia.

Project Ref: **CPP26:**

Topic: **1. Improving Farmers Livelihoods: Better Crops, Systems & Pest Management**

Lead Organisation: **Natural Resources Institute (NRI), UK**

Source: **Crop Protection Programme**

Document Contents:

[Description](#), [Validation](#), [Current Situation](#), [Environmental Impact](#),

Description

CPP26

Research into Use

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Geographical regions included:

[Kenya](#), [Malawi](#), [Zambia](#),

Target Audiences for this content:

[Crop farmers](#),

A. Description of the research output(s)

1. Working title of output or cluster of outputs.

In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

ICPM for smallholder Arabica coffee [R8423]

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2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Crop Protection Programme

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R6807: An investigation of pesticide and microbial interactions on coffee as a means of developing an IPM strategy for economically important coffee pests in small-holder farming systems in Malawi

R7942: IPM for smallholder coffee farmers in Malawi

R8203: Promotion of ICPM for smallholder coffee in Malawi

All Projects led by Rory Hillocks, NRI, UK

R8423 worked closely with a project funded by the Common Fund for Commodities [CFC] and led by CAB International – Biology & management of white stem borer.

4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? (**max. 400 words**). This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.

Coffee is one of the most traded agricultural commodities on world markets, yet production is still dominated by the smallholder sector. As a consequence **smallholder livelihoods** have been drastically affected by the collapse of the world price. Nevertheless, coffee remains one of the main sources of rural household income in many parts of SSA and increased yields, through improvements in crop and pest management, can help to offset losses caused by falling world prices.

The problem being addressed was **low yields** in smallholder coffee due to a combination of poor crop management and losses caused by **pest and disease damage**. During the period of the project new '**Catimor**' varieties were introduced with a large-scale programme funded by the EU, to distribute planting material. The objective of the project shifted then to the development and promotion of **integrated crop and pest management [ICPM]** systems for Catimors to ensure that the poorer growers were not excluded from the benefits of the new varieties. The objective was to improve the income of coffee smallholders through promotion of appropriate ICPM.

The main pest and disease problems constraining coffee yields in the smallholder sector in Malawi had been identified under R6807, as **white stem borer**, together with coffee leaf rust [CLR] and **coffee berry disease [CBD]**. Catimor varieties promoted by the EU programme are resistant to CLR but not to CBD. The CPP project promoted the use of a variety derived from **Catimor 129 [C129]** which carries resistance to both diseases. The ICPM package was based on the use of C129, the use of **fipronil** to control WSB and a crop management package which included appropriate **fertiliser recommendations**, combined with **mulching**. **Inter-planting with tall banana** varieties was included to provide a food crop and reflect preferred farmer practice.

The ICPM system was promoted through **training of trainers**, supporting **information media** in local languages and direct interaction with farmers through **on-farm demonstration plots**.

Outputs:
Technology

- i] Stem painting with Fipronil to combat white stem borer
- ii] Mother garden established of 'Nyika' derived from Catimor 129 which is resistant to both coffee berry disease [CBD] and coffee leaf rust [CLR].
- iii] Planting Catimor in combination with banana as a low-technology alternative system
- iv] Soil moisture conservation methods

Product

i] Information leaflets on coffee berry disease, white stem borer and management of Catimors were produced in two local languages for Malawi, in Kiswahili for Kenya and in English for Zambia.

ii] The project also translated the Smallholder Coffee Manual from English into Chichewa [would be suitable for Zambia].

5. What is the type of output(s) being described here?

Please tick one or more of the following options.

| Product | Technology | Service | Process or Methodology | Policy | Other Please specify |
|----------------|-------------------|----------------|-------------------------------|---------------|-----------------------------|
| X | X | | | | |

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

COFFEE. The technology outputs are commodity specific but the process and method outputs could be applied to other commodities, particularly cash crops i.e. the use of on-farm demonstration supported by capacity development and appropriate information media. The principles of promoting integrated crop management [ICM] for smallholders applies to all smallholder crops and farming systems.

7. What production system(s) does/could the output(s) focus upon?

Please tick one or more of the following options. Leave blank if not applicable

| Semi-Arid | High potential | Hillsides | Forest-Agriculture | Peri-urban | Land water | Tropical moist forest | Cross-cutting |
|------------------|-----------------------|------------------|---------------------------|-------------------|-------------------|------------------------------|----------------------|
| | | X | X | | | | |

8. What farming system(s) does the output(s) focus upon?

Please tick one or more of the following options (see Annex B for definitions).

Leave blank if not applicable

| Smallholder rainfed humid | Irrigated | Wetland rice based | Smallholder rainfed highland | Smallholder rainfed dry/cold | Dualistic | Coastal artisanal fishing |
|----------------------------------|------------------|---------------------------|-------------------------------------|-------------------------------------|------------------|----------------------------------|
| | | | X | | | |

9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).

This was one of only two coffee projects funded by the RNRRS and coffee crop management does not have much in common with other crops; so it is difficult to see potential for clustering. The other coffee project addressed the specific issue of coffee wilt disease which affects 'robusta' coffee, whereas these outputs apply to 'arabica' coffee and the two types grow in different ecologies.

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

The outputs could be clustered with those from the CFC project on white stem borer which works in Malawi and Zimbabwe.

Technoserve works with coffee growers in eastern Africa, mainly on marketing/quality issues. The production system outputs would complement the Technoserve activities with coffee smallholders, especially in Tanzania, where there are 40,000 coffee smallholders.

There are numerous projects around the world that address market issues for smallholder coffee; quality control, fair trade, eco-friendly coffee etc. However, production issues are being neglected. These need to be integrated with market development initiatives as yield enhancement through improved crop management can compensate for low world prices and make coffee growing a profitable enterprise for smallholders.

Validation

B. Validation of the research output(s)

10. **How** were the output(s) validated and **who** validated them?

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation (**max. 500 words**).*

Validation of the ICPM package was carried out by the project collaborators in the NARS using on-farm plots with end-users which served both as replicated trials and as demonstrations. Because of the perennial nature of coffee and the years taken to come into bearing, the project had to use existing farmers' plots. Application of the full ICPM package resulted in improved crop vigour and less disease. The demonstration plots were used by the Smallholder Coffee Farmers Trust [SCFT] for farmer training days.

Twelve new Catimor demonstration plots were planted in 2001/02, with lead farmers [end-users]. These were

used both for validation and for farmer training. The promotion of Catimors planted at conventional spacing and interplanted with banana proved popular with farmers as it was more similar to their previous coffee farming system and offered an alternative to the high-input 'hedgerow' system being promoted by the SCFT.

Validation of insecticidal stem paints was done in a similar manner except that 16 on-farm sites were used and sites were used as replicates. The trials were carried out over three seasons and the data was used to obtain official approval for Fipronil to be recommended in Malawi for WSB control in coffee.

When in 1999/200 the new Catimor cultivars began to be widely distributed by the SCFT, with support from the EU, the project adapted by developing an ICPM package for Catimors which was adapted to smallholders needs. From 2001/02, the project planted 12 new demonstration plots with lead farmers [end-users]. These were used both for validation and for farmer training. The promotion of Catimors planted at conventional spacing and interplanted with banana proved popular with farmers as it was more similar to their previous coffee farming system and offered an alternative to the high-input 'hedgerow' system being promoted by the SCFT. Each site was contained 4 replicates and the plots were used both as demonstrations and to test the effect of the banana intercrop on coffee yields. The plots came into bearing only at the end of the project but the early indications were slight yield suppression in coffee rows closest to the bananas.

As coffee is a perennial crop the system could not be fully validate during the project and the crop only came into bearing as the project ended. However, the demonstrations were well attended by farmers who asked for more demonstrations plots closer to their homes.

The information leaflets were not validated but were produced in local languages in response to demand from farmers identified by the CPP project and by the SCFT.

Coffee growers in northern Malawi range from the poor to the moderate poor and while coffee is primarily the responsibility of male family members, often the women would have their own plot as a source of independent income and also, female headed households have become more common among registered coffee growers due to the impact of HIV.

11. **Where and when** have the output(s) been validated?

*Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above (**max 300 words**).*

The Validation was done only in northern Malawi where most of the country's smallholder coffee is grown. The production system is rain-fed highland, where maize is the main food security crop. It was directed towards the poorer coffee farmers who were put off growing Catimors because the system being promoted by the SCFT was intensive and very different from their traditional coffee planting system.

Validation of the ICPM system for traditional [tall] coffee varieties was carried out from 1999 to 2002, but Catimor demonstrations were planted in 2001/02 and were used to demonstrate and validate ICPM technologies to extension and farmers until the end of the project in January 2006.

Smallholder coffee is grown in remote and inaccessible areas of northern Malawi where high transport costs mean that farmers have few alternative opportunities to grow cash crops. Smallholder coffee growers range from the poor to the moderate poor. While coffee is primarily the responsibility of male family members, women often have their own plot as a source of independent income. An impact study in 2004 showed that in one-third of coffee-growing households wives grew their own coffee on separate fields. Female headed households have become more common among registered coffee growers due to the impact of HIV.

The same Catimor varieties are grown also in Zambia, so although smallholder coffee is still in its infancy there, project outputs are highly relevant.

Current Situation

C. Current situation

12. **How and by whom** are the outputs currently being used? Please give a brief description (**max. 250 words**).

Outputs are being used by smallholders who are replacing their old coffee trees with dwarf Catimor varieties. Some of the holdings are very small with less than a half hectare of coffee. The better-off farmers are expanding their coffee gardens with 3000 or even 5000 trees.

The project promoted from the outset, the variety Nyika which was developed by one of the project collaborators by selection from Catimor 129. It is resistant to both CBD and CLR, whereas the other Catimors show some susceptibility to CBD. Farmers demanded greater access to planting material of C129 and, through their representation on the board of the SCFT, forced a resolution that at least 25% of new plantings should be of C129.

In order to meet this demand, the project developed a mother garden as a source of planting material of Nyika. The C129 mother garden at Lunyangwa Research Station in Mzuzu, continues to be a source of clonal planting material for smallholders to purchase.

Having chosen to plant C129, farmers can opt to use the cropping system promoted by the project and several hundred information leaflets and the coffee manual were distributed through the SCFT to support the technology.

The recommendation for use of Fipronil to control WSB was taken-up by a project on WSB biology and control funded by the CFC. From 2005 onwards this project conducted research on WSB, part of which was to refine the recommendations to make use of the expensive insecticide more cost-effective.

13. **Where** are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used (**max. 250 words**).

The farming system outputs are being used in northern Malawi where Catimors are now the predominant

varieties. The SCFT has recently included intercropping with banana in their basket of options. The information leaflets were distributed in Malawi [2 local languages], Zambia [English] and Kenya [Kiswahili].

14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading (max 250 words).

There are only 3000 households in northern Malawi that are registered with the SCFT and currently selling coffee. The wealthier farmers who were the first to adopt Catimors went for the high-input hedgerow planting system, but most of the poorer farmers around 2000] who have food security concerns have opted to plant Catimors with banana. The SCFT with EU support continues to promote Catimors and to make planting material available. The projection is that by end 2007 production will have increased to the level where the SCFT will be self-funding and no, longer require EU support.

Adoption of project outputs is closely linked to the adoption of Catimor varieties in Malawi. In 1999 the SCFT with assistance from the EU distributed Catimor planting material and estimated that there were 250,000 new plantings. This increased to 1,750,000 new plantings by 2003. In 1999 only 100 tonnes of green beans were produced, rising to 160 tonnes in 2003 with a projection for 5,000 tonnes in 2009, when the Catimor plantings are all in full bearing. The number of growers is also expected to increase to 4000 which represents a population of around 20,000 directly dependent on coffee production for their livelihood and many more than this who benefit indirectly from an expanding industry.

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? (max 350 words).

The EU is supporting commodity development for coffee in a number of SSA countries and these programmes represent an appropriate platform for the promotion of ICPM.

The SCFT in Malawi is the main agency for the promotion of coffee and still the main buyer for the smallholder crop and the main entry point for work with smallholders and the main dissemination pathway.

In Zambia the coffee smallholder sector is being developed under the aegis of the Zambia Coffee Growers Association.

In Tanzania, rehabilitation of the coffee sector is supported by EU, CIRAD and Technoserve. The EU programme has supported the transition of coffee research in Tanzania from the NARS to the private sector [Tanzania Coffee Research Institute], funded by export levy.

Lack of extension support is the main factor constraining crop development. Farmers are starved of appropriate information. The leaflets were popular with the more literate farmers but are too complex for many. Their preferred method of communicating extension information is by direct contact with research and extension and through training based on demonstration plots.

The key to success was the development of the technology with the end-users and the technology was supported

by information media in local languages and direct contact with farmers through the on-farm demonstrations.

Until the intervention of the EU under Stabex, the smallholder coffee sector in Malawi [and elsewhere] was in serious decline. The EU programme to rehabilitate the sector was also a key factor in building an expanding industry in Malawi to which the CPP project was able to add value.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? (max 300 words)

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Coffee growing has become an environmental issue mainly because of the effect of forest clearance on biodiversity. When forest is cleared for farming the continuance of tree cover has been shown to be beneficial especially if coffee is shaded with indigenous trees. Even where coffee is grown without shade as is the case for Catimors in Malawi, the cover provided by the coffee trees still reduced soil erosion and water run-off.

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? (max 100 words)

There are adverse effects of sun-grown coffee on biodiversity but these are less than would occur if forests were cleared to grow maize. The main adverse effect is from the high water requirement for processing and the effluent created by processing.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? (max 200 words)

The income derived from coffee increases the resilience of poor people enabling them to purchase food if for instance, their maize crop should fail due to drought.
