

## **CROP PROTECTION PROGRAMME**

**Promotion of ICPM for smallholder coffee  
R 8423 (ZA 0650)**

## **FINAL TECHNICAL REPORT**

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## **Executive Summary**

The purpose of this project was to contribute to poverty reduction by improving the level of crop management in smallholder coffee. The objectives were to more widely disseminate information on project outputs in the region and to assess the impact of previous project activities and outputs in Malawi. This short extension has added value to previous work funded by CPP by disseminating the lessons learned in Malawi to Zambia, by consolidating the work in Malawi where we completed two impact studies and promoted our ICM system for Catimor varieties directly to farmers through field days held at the project's on-farm demonstration plots.

The project has complemented an EU programme to rehabilitate smallholder coffee which has seen production increase dramatically over the last two years as new Catimor varieties came into full bearing.

Project activities, previously confined to Malawi were extended to Zambia where we found smallholder coffee still in the early stages of development. The project was able to contribute to this development due to Zambia having very similar constraints and adopting the same Catimor varieties as in Malawi. Following a socio-economic and biological survey of smallholder coffee in Zambia, a workshop was held with the Coffee Growers Association and the Coffee Board of Zambia, at which we highlighted a number of constraints that smallholder coffee faced in Zambia. The most significant problems were a lack of commitment to extension support and timely delivery of inputs, the need to concentrate on Catimor 129 to control CBD in the north of the country and the need to control white stem borer. A modification of our leaflet on CBD was distributed to smallholders and other coffee stakeholders in Zambia.

The main focus of activities in Malawi was to expand training activities to concentrate more on knowledge-sharing with farmers instead of training of trainers. The coffee x banana intercrop demonstrations planted previously, provided the venue for working with lead farmers who then transmitted the lessons to their own farmer groups.

Although the number of households impacted by this research is only around 3000 in Malawi and 120 in Zambia, there is a large potential for smallholder coffee in Zambia, it is expanding in Malawi and outputs are relevant to Tanzania where there are 40,000 coffee growers.

Two monitoring surveys were conducted. The first to assess the extent of coffee berry disease [CBD] in new plantings of Catimor 'populations' distributed 3 – 5 years ago under EU funding to the SCFT. The findings showed that CBD was a significant problem that required chemical intervention to prevent yield loss. This is in contrast to the situation with Catimor 129 and cv. Nyika that were promoted by the project, in which CBD was not recorded. The second survey was to assess the impact of the projects communication strategy and also the wider strategy of the SCFT.

The impact survey used PRA techniques to assess the impact of project activities and effectiveness of our communication strategy. There still seems to be a problem in effective distribution of extension literature to all coffee farmers. Furthermore, while the more literate farmers appreciated our information leaflets, most farmers considered that the best way to share knowledge of agricultural technologies was through direct contact through training programmes and field days. Our demonstration plots and training days were therefore the

most valued communication medium but farmers complained that the plots were too few with long travel distances for some farmers to reach them. This is a resource issue for research programmes with limited funding but a message that has been taken-up by the SCFT.

The popularity of our demonstration plot with farmers and the use of more conventional [rather than high density] planting with banana, has persuaded the SCFT to consider promoting this a less intensive option for Catimor varieties. Also, a much higher proportion of Catimor 129 will be planted in future due to its resistance to CBD and the mother garden we established at Lunyagwa will be a lasting resource to supply planting material.

### **Background**

NRI has been working with coffee smallholders in Malawi for a number of years with projects funded by DFID-Crop Protection Programme [CPP]. The project has identified and quantified the major pest and disease problems, as well as other agronomic and socio-economic factors affecting smallholder coffee production in the north of Malawi. Subsequent phases of the project, developed and then promoted appropriate integrated crop and pest management [ICPM] systems for smallholders. The period of the project in Malawi has coincided with substantial financial support to the sector from EU Stabex and more recently, the Common Fund for Commodities [CFC] has supported a project on the biology and control of white stem borer. The EU financed the conversion of the Smallholder Coffee Authority to the Smallholder Coffee Farmers Trust [SCFT] which is more responsive to farmers needs, has farmer representation on the board and which brought about devolution of the smallholder organisation, including control of primary processing plants to farmers groups. As part of this programme to rehabilitate smallholder coffee growing in Malawi, the EU supported large-scale distribution of seed of Catimor populations to replace the old trees of Geisha and Agaro. The CPP project responded by developing ICPM system for Catimors and training farmers groups to plant and manage Catimor 129, using this system. A one year extension to the project to January 2006 was granted by CPP management, on the understanding that outputs had regional application.

Coffee growing is an important livelihood strategy for smallholders in the region. The countries where coffee is produced by large numbers of smallholders are Tanzania, Kenya, Uganda and Rwanda. In these countries coffee is the most important agricultural export. In Malawi although the smallholder sector is small, coffee is the main source of income for rural households in the north of the country that are remote from markets for other farm products. These countries have a comparative advantage in coffee growing because the climate is suitable, the quality is high and total national production can be increased without having a significant impact on world prices.

The world price for coffee is still close to its all time low but the medium-term outlook is good as large producers such as Vietnam diversify and consumption increases. Because average coffee yields are low in the African smallholder sector, there is scope to increase yields and gross margins through improvements in the standards of crop management.

The researchable constraint addressed by this project was poor pest management practice associated with poor agronomic management and poor access to knowledge and information about coffee production technology.

Generally poor levels of crop management, against a background of the importance of coffee growing as a livelihood strategy and in the economy of several countries in the region, represent the development opportunity.

### **Project Purpose**

Benefits for poor people generated by application of new knowledge on crop protection to smallholder coffee.

The project addressed the development opportunity by contributing to better crop management through capacity building and the development of communication media.

### **Research Activities**

Research activities were conducted mainly in Malawi but also in neighbouring Zambia. [Activities related to scaling-up of previous project outputs were intended for Tanzania which has more than 40,000 coffee smallholders. However, the Tanzanian Coffee Research Institute [TaCRI], having agreed initially to the collaboration, then rejected the sub-contract because of the clauses on intellectual property rights]. The Zambian Agricultural Research Institute is just beginning to develop smallholder coffee and were keen to take up the collaboration. This change to the PMF was agreed with Andy Ward.

The main research activities were; surveys, promotion of integrated crop management through farmer training and, design, production and distribution of crop management information and M & E activities.

Three surveys were conducted:

Survey 1: Of smallholder coffee in northern Malawi to determine the incidence of coffee berry disease in new Catimor plantings.

Survey 2: Of smallholders in Malawi to determine access to and usefulness of communication media developed by earlier phases of the project [M & E activity].

Survey 3: Of smallholders in Zambia to compare with Malawi and if appropriate to disseminate relevant project outputs from Malawi.

Capacity building:

In Malawi, 12 on-farm demonstrations located in the centre of the main coffee growing areas were set-up under the previous project. These were used as the focal points for direct farmer training and to improve the knowledge of coffee extensionists.

In Zambia the projects economist worked with a newly appointed social scientist at ZARI to transfer PRA methods while working with coffee smallholder groups.

Communication:

Having established that CBD was an important disease in Zambia, the leaflet on CBD biology and control that was designed for Malawi was modified and reprinted in Nairobi for distribution in Zambia.

A workshop was held in Zambia attended by representatives of the coffee Growers Association, Coffee Board and other stakeholders. This provided the opportunity for the project team to present the conclusions from our survey of smallholder coffee groups and how lessons learned in Malawi could be applied in Zambia.

### **Outputs**

All Outputs were achieved as outlined in the PMF [Zambia replaced Tanzania as our second collaborating country]

#### **OUTPUT 1. Outputs from the Malawi project disseminated more widely in the region.**

In order to more widely disseminate lessons and outputs from the project in Malawi a visit was arranged to Zambia in collaboration with the Zambia Agricultural Research Institute [ZARI] and the Zambia Coffee Growers Association [ZCGA]. The objectives of this visit were to compare the smallholder sector in Zambia with that in Malawi, to determine where there were opportunities to adopt outputs from the Malawi project and then to explore possibilities for a regional project proposal for submission to the new DFID Research Strategy commencing in 2006. This was achieved through an agronomic and socio-economic survey of the smallholder sector, followed by stakeholder meetings and ending with presentations from project members [Rory Hillocks, Alastair Orr [NRI] and Noah Phiri [CABI, Nairobi] and round table discussions with stakeholders.

#### Agriculture in Zambia

Arable land is one of Zambia's most important natural resources with 58% of its 7.5 million ha classified as medium to high potential for agriculture. Zambia's population is only 11 million, of which, 2.5 million live in and around Lusaka. The high ratio of land to population means that smallholder farming methods are extensive rather than intensive, with a great deal of shifting, slash and burn [Chitemene] cultivation being practised. Most of the commercial farming before and since independence has been done on large estates, mainly growing maize. Since independence there has been an expansion on the estates in growing of sugar, tobacco, cotton, coffee and horticultural products for export. Most smallholder agriculture has been subsistence farming based on slash and burn. Under the terms of the Poverty Reduction Strategy Paper [PRSP] for Zambia, the government is now backing the expansion of commercial smallholder farming, to address issues of rural poverty that has led to urban migration and to counteract widespread use of slash and burn, as well as to make some contribution to national economic growth.

The country is divided into three agricultural zones defined by rainfall. The northern zone has high annual rainfall up to 1400 mm, the central zone has medium rainfall of 700 –

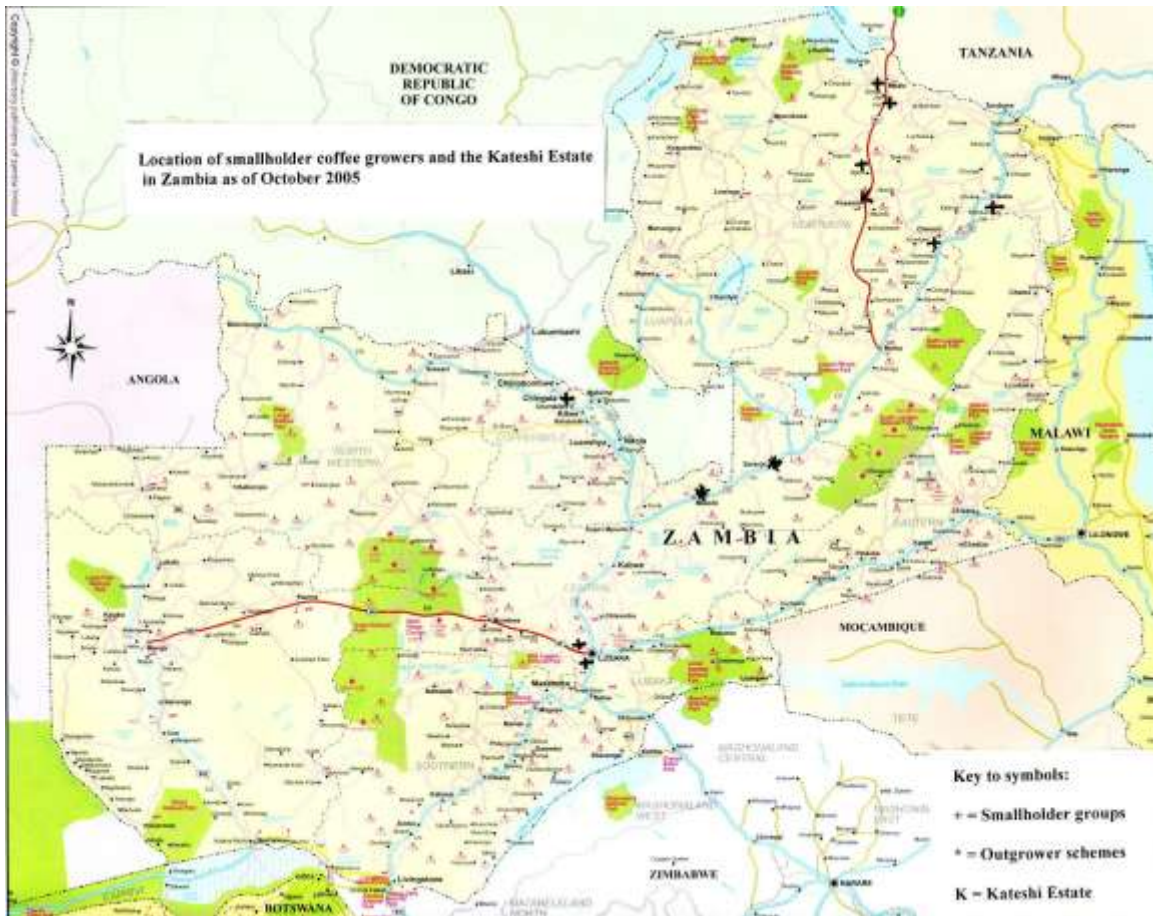
1000, while the southern zone has low rainfall of 700mm or below. The largest coffee area is in the northern zone, but there are a few estates in the south.

### Coffee in Zambia

Until the 1990s coffee was grown only on medium sized and large estates with an average coffee holding of 30 ha, although the largest have over 1000 ha of coffee. There has been considerable investment in coffee in recent years, often by farmers from South Africa and Zimbabwe. National production has increased from 330 metric tonnes in 1984 to 6000 Mt in 2004, making Zambia the second largest producer of arabica coffee in southern Africa.

The small-scale sector, defined as those farmers with less than 10 ha, was promoted by a World Bank project, when the total number of smallholders reached 900, with an average of 0.5 ha. This scheme collapsed due to a number of management factors and because farmers became discouraged by long delays, often over a year, between delivery of their crop and receipt of payment. Some farmers we spoke to never received their payment. The financing of coffee development through loans for inputs and irrigation infrastructure was taken over by the Coffee Board of Zambia [CBZ] and they asked the Coffee Growers Association [CGA] to take over responsibility for promotion of coffee growing and extension services for the smallholder sector.

The CGA began by rationalising the number of smallholder groups. They eliminated those that were not performing well, did not have access to water or were too inaccessible for effective extension to be delivered. This brought the number of smallholders down to only around 120 in 8 groups with an additional 50 or so, in two outgrower schemes. Government policy is to increase the involvement of smallholders in commercial farming and coffee is seen as a suitable cash crop, particularly in the northern zone. The Government favours the approach of out-grower schemes but at present, few have been established. In the first phase of this programme the CBZ hope to be able to establish around 50 outgrower schemes with a target of 4 new groups each year over the next 10 years. The CGA will support the outgrower schemes when they are ready to begin and is currently supporting the groups rescued from the WB project. The target for each of the smallholder groups is that they should have at least 20 members and a target coffee area of 1 ha each. This will then be used as a platform to expand the sector and donor funds are being sought to support that expansion.



**Fig.1. Location of smallholder coffee growers in Zambia**

### Field Survey

Alastair Orr from NRI conducted a PRA survey with coffee smallholder groups in Zambia. He was accompanied by Mr Ndhlovu, a newly appointed social scientists at ZARI, for whom this was a capacity-building exercise [The full report can be read in Appendix I]. A survey of pests and disease was carried out by Noah Phiri from CABI [full report in Appendix 2] and results of both surveys were presented and discussed at a workshop at the end of the field visits.

The socio-economic report is based on visits to three smallholder coffee groups in the northern Province, visits to two peri-urban smallholder coffee groups, two estates (including the biggest, Kateshi) and meetings with the Zambia Coffee Growers Association and the Coffee Board.

The findings are impressionistic but they suggest that fundamental changes are needed if Zambia is to replicate the recent growth of smallholder coffee in Malawi. These include:

- Development of a clear strategy for smallholder coffee.
- Increased budgetary support for extension and material inputs.
- Greater transparency in pricing and the cost of inputs.
- An appropriate credit facility for smallholder growers.
- Stronger research-extension linkages.

Without these changes it is unlikely that smallholder coffee will increase much above current levels. The current strategy is not designed to significantly expand the number of smallholder growers in the near future. Extension services are very limited and the system of credit and input purchase by the Coffee Board and delivery by the ZCGA has led to delays in provision. The pricing strategy offers adequate incentives for smallholders but because credit will be repaid from future income smallholders will not receive the full benefits of these prices for several years after they start to produce coffee. At present research on coffee is conducted exclusively by estates, with ZARI confined to maintaining a gene bank.

The structure that is required for research to have significant impact on smallholder livelihoods is not yet in place. Under the current structure, the most useful role for research is to strengthen farmers' technical knowledge of coffee through (1) providing more appropriate extension materials in local languages and (2) funding demonstration plots that would serve as a focus for farmer learning and also strengthen linkages between national researchers and coffee extension.

### **Case study – Twande Village**

**Table 1. Ranking of cash crops by Twande Chafunika group in northern Zambia.**

<b>Crop</b>	<b>Rank</b>
Beans	1
Groundnuts	2
Maize	3
Millet	4
Cassava	5

At present, maize, millet, groundnuts, beans, and soybeans are the main cash crops. Farmers said that selling maize is difficult because the nearest market is on the border with Tanzania, 160 km away. Groundnuts and millet also have to be sold at the border but soybeans can only be sold in Zambia. Coffee has the advantage that through the ZCGA there is a marketing channel and their crop is collected from the village. This is why although the present coffee group at Twande is only 20 people, more than 40 attended the meeting.

One farmer was particularly well organised with an irrigation supply and his own shaded nursery [see Fig.2]. Coffee was his main source of cash income. His main problems were lack of access to inputs and extension support. The main biological problem was coffee berry disease [CBD] in his Catimor 'populations'.



**Fig 2. Smallholder coffee nursery [Twande]**

Conclusions from the field survey

1. Most of the biological constraints faced by coffee smallholders are the same in Zambia as in Malawi. The main diseases are CBD and CLR and the main pests are white stem borer, leaf miner and Antestia.
2. The long distances from Lusaka of the groups and distances between groups makes it very difficult to give adequate extension support from Lusaka [or Kabwe].
3. Need for training of trainers within the groups and good quality extension literature in local languages.
4. Delivery of inputs on time is not organised
5. Water for irrigation is the main technical factor limiting expansion of the smallholder sector in the north. This raises the issue of rain-grown coffee.
6. Limitations of family labour also constrain coffee expansion among smallholders, especially in view of migration of young people to work in Lusaka and on the estates.
7. Coffee berry disease [CBD] is a problem north of Kasama [we did not visit the copper belt]. This influences the choice of variety grown.
8. Catimor 129 is the most CBD-resistant.
9. Catimors are however, management intensive, requiring large amounts of fertiliser to prevent overbearing die-back.
10. The main needs at present appear to be capacity building and the development of technical information in local languages.

At the end of the field survey the CPP Project team presented a summary of our survey of smallholder coffee groups at a workshop hosted by the Coffee Board of Zambia [Fig. 3] and attended by representatives of all the coffee stakeholders in Zambia. At the end of the workshop made some recommendations based on a comparison with recent

developments and project outputs in Malawi and these were discussed with the stakeholders.



**Fig. 3. NRI, CABI and Zambian members of the survey Team**

#### Recommendations made to research, extension and Coffee Board

One of the most important achievements of the ZCGA in its mission to rehabilitate smallholder coffee is having established a firm marketing chain so that smallholders now have confidence that their crop will be collected and they will be paid soon after it is sold. However, this good start is being undermined by late delivery of inputs.

Recommendation 1: Ensure that inputs are delivered to coffee groups well before they are needed.

Smallholder coffee groups are scattered widely and the long distances between them make extension difficult.

Recommendation 2. Two more extension officers will be required under the supervision of Mr Sandando. One to be posted at Kasama and the other in the copper belt.

Lack of water for irrigation is one of the constraints to the expansion of smallholder coffee. Because coffee is grown on the estates with irrigation it has been assumed that this should be the case for smallholders as well. While the short rainy season might indeed prove to make rain-grown coffee uneconomic, it would be worthwhile to treat this as a researchable constraint.

Recommendation 3. Research should be conducted into the feasibility of growing arabica coffee without irrigation using appropriate integrated crop management:

- Using a planting trench instead of separate holes, making the trench deeper and wider than the present practice for planting holes and placing manure or compost at the bottom of the trench.
- Keeping the plants well mulched during the dry season
- Use of shade trees to reduce transpiration loss
- Testing of varieties for drought tolerance [Catimors are not]

This year 2005, was particularly bad for coffee berry disease [CBD]. Kateshi estate was severely affected as were the farmers groups north of Kasama. CBD did not seem to be a problem at Ilomfi for some reason and it may be too dry for the disease in coffee areas further south.

Recommendation 4. F6 Catimor populations should not be grown by smallholders in the north of the country in areas prone to CBD. Also, care should be taken not to introduce CBD into disease-free fields. This disease does not spread over long distances unless carried by humans!

The groups that we met were in need of more information on coffee growing and all aspects of crop management, including pest management.

Recommendation 5. Extension information is needed in local languages. To begin with a manual specifically for smallholders is required.

#### Communication Media

A number of information leaflets on aspects of coffee crop management were produced in the previous project and printed in local languages for Malawi. With the funds available we were only able to redesign and print one of these [Fig.4.] on CBD for Zambia. 500 leaflets were redesigned by Noah Phiri and printed in Nairobi for distribution in Zambia to coffee farmers and extensionists.



Fig.4. Information leaflet on CBD for Zambian extension officers and smallholders

## **OUTPUT 2. Sustainable ICPM systems for Catimors promoted in Malawi.**

Under this output we continued to promote the ICPM system for Catimors developed under the previous project. In collaboration with Lunyangwa Research Station and the SCFT the project carried out direct training to farmers, research on the impact of banana on coffee yields and two surveys were done; one to assess the extent of CBD in Catimor populations and the other an impact study of project activities.

### Farmer Training

The project continued to support the EU-funded expansion of smallholder coffee in Malawi through training direct to farmers using our demonstration plots as the meeting point. Our M & E activities show that on-farm demonstrations and direct contact with research and extension are the preferred communication medium by smallholders [see below]. We promoted a banana x coffee intercrop [Fig.4] and demonstrated the benefits of proper fertiliser use, mulching and control of white stem borer.

Attendance at Field days [By invitation to lead farmers]:

Chakaka (Phoka)	:	25 farmers	(23 males and 2 females)
Nchenachena (Phoka):		26 farmers	(22 males and 4 females)
Mondo (Misuku)	:	25 farmers	(20 males and 5 females)
Kakomo (Misuku)	:	30 farmers	(27 males and 3 females)
Total	:	106 farmers	

We were limited in the number of farmers who could attend the field days due to the need to provide transport due to the long distance involved. The approach adopted was to invite lead farmers to the open days and they would disseminate the lessons to their own farmer groups based around the 'Business Centres' [The basic level of farmer representation in the devolved system of representation in the SCFT]. Field day messages were mainly on balanced nutrient supply (NPK) and timely application of fertilizers. Management of bananas to minimise coffee/banana competition was also included. The farmers who managed the demonstrations were the major speakers but researchers/field staff supplemented where applicable. Questions and answers were given during the presentations by the farmers and field staff.

Farmers were very impressed with the demonstrations and requested if all their Business Centres could have one demonstration. However, research and extension staff were already stretched in servicing 12 demonstrations scattered over the whole of northern Malawi where smallholder coffee is grown. All field staff involved in the running of the demonstrations were eager to expand the programme given adequate resources.

The contact farmers have already agreed to reinvest the money realised from the demonstration plots through buying fertilizers, the major input. Research will continue to use the coffee /banana plots during training programme on "good agricultural practices" under the CFC project.

The SCFT are also keen to maintain and if possible expand the demonstrations programme and it is hoped that they will provide resources to run a modified coffee/banana demonstration in all coffee growing areas in 2006/07 growing season.

### Banana x coffee intercropping [effect on yield]

The intercrop demonstration plot was laid out in such a way that we were able to collect some research data on the effect of banana on coffee yields. While the advantage of including banana is that it has been a traditional practice [Fig.5.] with the older coffee varieties and provides smallholders with a food crop as well as a cash crop, our results show that the banana trees suppress coffee yields to some extent [Table 1]. Yield suppression was greatest for the rows closest to the banana and was small but statistically significant for the next two rows compared to the furthest row 6 metres from the banana row.

**Table 1. Effect of intercropping with banana on coffee yields**

Distance from banana row [m]	Yield of green* coffee beans [kg/plot]
1.5	14.5
3.0	18.7
4.5	18.8
6.0	21.9
LSD <sub>[13,0.05]</sub>	2.42

\*Mean derived from 8 sites



**Fig. 5. Farmers plot of Catimor 129 x banana [Malawi]**

CBD survey

The project has been advocating the growing of Catimor I29 and the variety derived from it [Nyika] in areas prone to CBD. C129 is resistant to both CBD and CLR. The other Catimor populations distributed with EU support are CBD-susceptible. As part of our collaboration with the SCFT, the project carried out a survey [Fig.6.] to determine the incidence of CBD in Catimor populations that were now in full bearing [see Appendix 2 for survey methods and full report]. This is an M & E activity because this is the earliest opportunity we have had to see if CBD is indeed a problem on the new varieties distributed by the EU project and widely adopted by farmers.

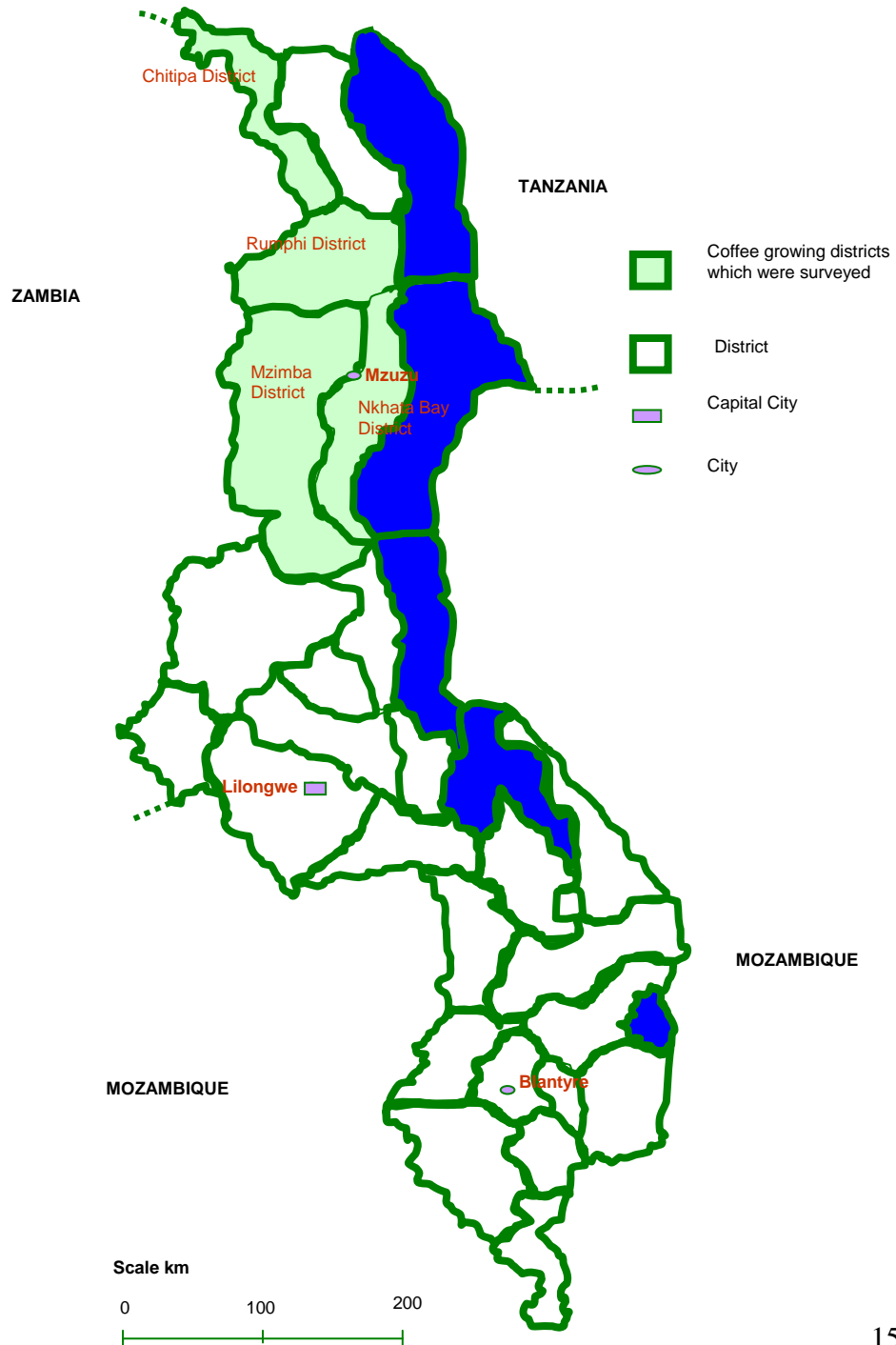


Fig. 6 Map of Malawi showing coffee growing districts where Catimor coffee survey was carried out

## Results

A total of 120 Catimor growing farms were surveyed in the five associations. Among the surveyed farms, 111 farms had Catimor populations; most of which were population 3, and 9 farms had Catimor 129, all of which were in Misuku Association.

### *Agronomic practices*

Fifty-nine percent of the farms surveyed were growing Catimor coffee under hedge-row system, which was planted at the spacing of 3m by 0.6m. Eighty-six percent of the farms had Catimor coffee bushes aged between 3 and 4. However, the age of the bushes ranged from 2 to 5 years. Only 28% of the farms were intercropped. The most common intercrop was banana (86% of intercropped farms). Almost all the Catimors were grown in the sun – only 12.5% of the Catimor farms were grown under shade of some sort. The majority of farmers (89.2%) applied inorganic fertilisers to their Catimor coffee. However, no significant relationships were found between the practices and CBD incidence, even though farms under high shade had higher CBD incidence. This was not analysed further because the number of farms under shade were too few to warrant proper statistical analysis of the result.

### *Use of pesticides*

Eighteen percent of the farms used fungicides, most of which were in Misuku Association. Frequency of applying fungicides varied from one to three times per season. The most common fungicide used was copper oxychloride (12.5% of farms), while others were chlorothalonil and copper hydroxide (funguran). CBD was equally severe on fungicide applied farms just like where fungicides were not applied. There was apparent evidence of inappropriate application of fungicides, for example in terms of frequency of application per season and inappropriate spraying techniques.

### *Prevalence and incidence of coffee berry disease*

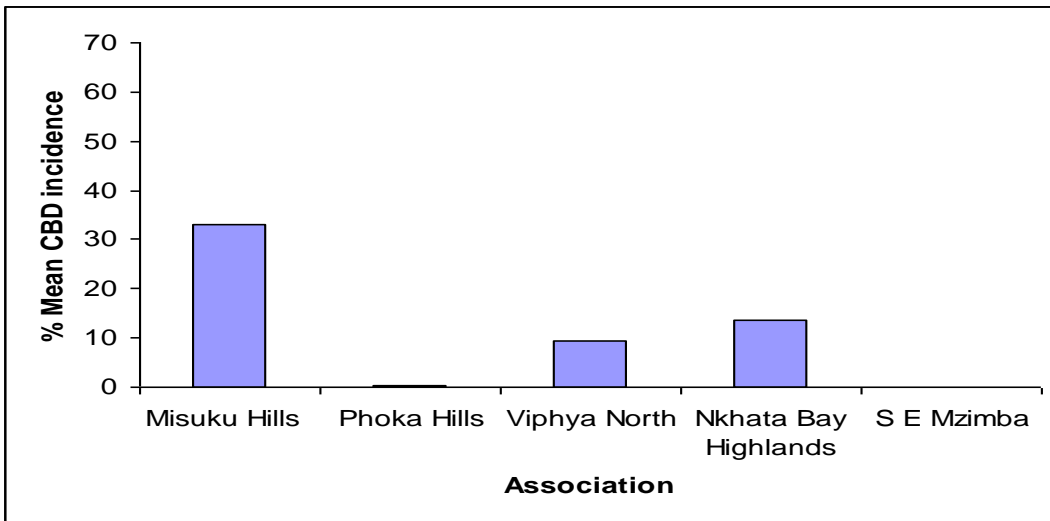
*Prevalence of Coffee berry disease* - Coffee berry disease was recorded on Catimor populations in all associations, except South East Mzimba where rains tailed off in February. Coffee berry disease was recorded on 47.5% of all Catimor farms which were surveyed. In addition CBD was wide-spread on the Catimor population in Misuku Hills Association where it was recorded on 71% of the Catimor coffee farms (Table 2). Further more, CBD was also wide-spread in Viphya North Association with 42.9% Catimor farms with CBD, and Nkhata Bay Highlands where CBD was recorded on 36.4% of Catimor farms. Chibula and Katowo zones of Misusku Hills had the highest proportion of CBD infested farms, at 90%.

**Table 2. Prevalence of CBD on farms in the different associations and zones**

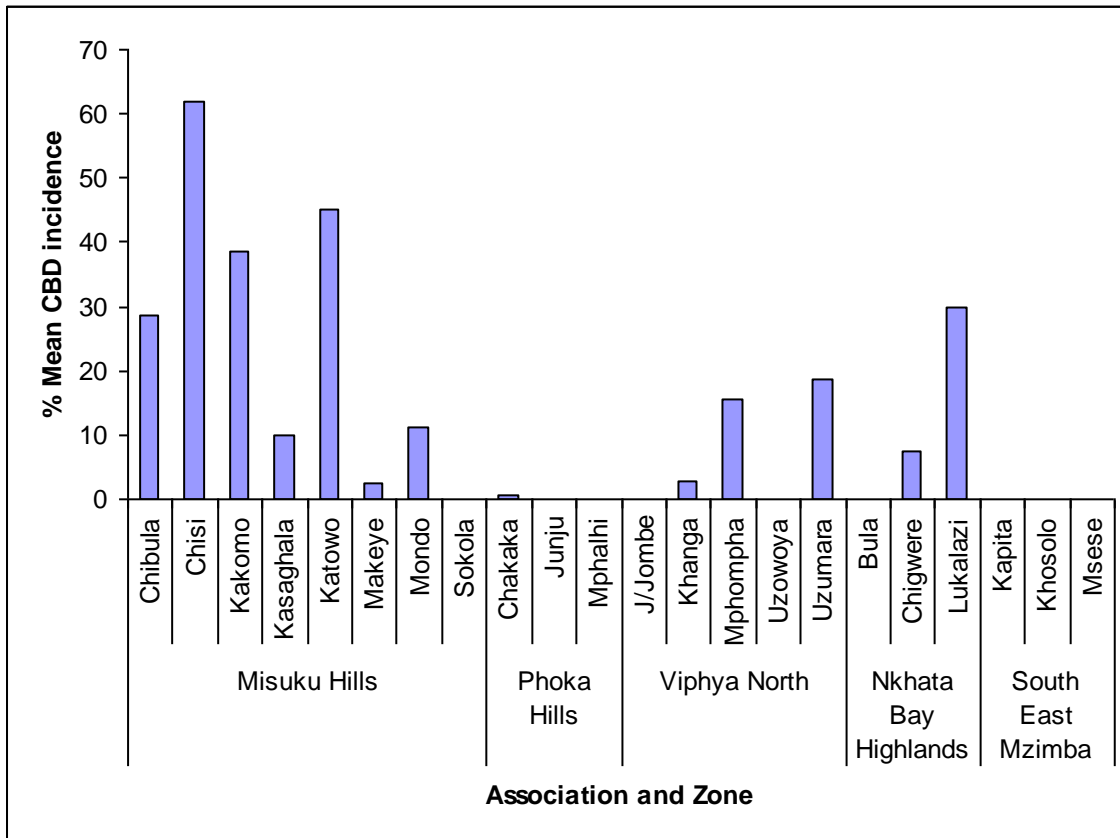
<b>Association</b>	<b>Zone</b>	<b>Total farms surveyed</b>	<b>%farms with CBD in each zone</b>	<b>% farms with CBD in each association</b>
<b>Misuku Hills</b>	Chibula	10	90.0	<b>73</b>
	Chisi	15	86.7	
	Kakomo	5	80.0	
	Kasaghala	3	66.7	
	Katowo	10	90.0	
	Makeye	4	50.0	
	Mondo	8	50.0	
	Sokola	5	0	
<b>Phoka Hills</b>	Chakaka	11	9.1	<b>3</b>
	Junju	3	0	
	Mphachi	4	0	
<b>Viphya North</b>	Jintha Jembe	2	0	<b>29</b>
	Khanga	7	42.9	
	Mphompha	3	33.3	
	Usoyoya	3	0	
	Uzumara	7	71.4	
<b>Nkhata Bay Highlands</b>	Bula	3	0	<b>34</b>
	Chigwere	4	50.0	
	Lukalazi	4	50.0	
<b>South East Mzimba</b>	Kapita	7	0	<b>0</b>
	Khosolo	1	0	
	Msesse	2	0	

*Incidence of Coffee berry disease* - The incidence of CBD, which was calculated as percentage of trees infested on a farm, zone, or association was highest in Misuku Hills Association with a mean incidence of 33.1% for all surveyed farms (Fig. 7). However the mean incidence of CBD for CBD infected farms is much higher (46.2%) for the same association. Nkhata Bay Highlands recorded the second highest CBD incidence followed by Viphya North and Phoka Hills associations. The mean CBD incidence per infested farm was 40.1%, however, this ranged from 3.3% to 96.7% depending on the association. Chisi zone in Misuku Hills Association recorded the highest incidence of CBD at 62% (Fig. 8). However, CBD was not recorded in South East Mzimba Association. In addition, CBD was not recorded on farms with Catimor 129/Nyika coffee variety.

Generally, 2004/5 season was much drier than normal. CBD was very destructive on infested farms of Catimor populations, particularly in Misuku Hills association resulting in more than 80% yield loss on some of the infested coffee bushes. Most lesions were active mostly in areas which were still wet at the time of the survey, such as Misuku Hills, Viphya North and Nkhata Bay Highlands Associations. However, Misuku Hills was the wettest of all.



**Fig. 7. Mean CBD incidence (%) for all farms surveyed in each association**



**Fig.8. CBD incidence in each Zone**

*Discussion of CBD survey results*

It is apparent that CBD is wide-spread on Catimor populations in Misuku Hills, Viphya North and Nkhata Bay Highlands associations. This result confirms the earlier laboratory and research plot studies on Catimor population in which Catimor populations were very susceptible to CBD (Phiri, unpublished). This is the first systematic and quantitative survey of CBD on the Catimor coffee varieties in Malawi. The susceptibility of the Catimor population is also confirmed by the presence of active lesions on the infected berries. Active lesions develop on susceptible varieties (Bock, 1956; Masaba and Van der Vossen, 1982; Phiri *et al.*, 2001). However, Catimor 129/Nyika coffee variety is resistant (Phiri *et al.*, 2001).

The high incidence of CBD in Misuku Hills, Viphya North and Nkhata Bay Highlands associations can be explained by the fact that the associations were wetter than the rest of the associations and are at higher elevation. Rainfall data presented during the previous studies showed that Misuku Hills, Viphya North, and Nkhata Bay Highlands associations all receive high annual rainfall, which is associated to the high elevation in the associations (Phiri *et al.*, 2001). In Kenya occurrence of CBD was related to high rainfall and altitude (Griffiths and Waller,

1971). Rainfall is required for the dispersal and germination of the CBD pathogen, *Colletotrichum kahawae* (Nutman and Roberts, 1969).

It is apparent that coffee berry disease is very important on the Catimor populations. Incidence of up to 73% is very severe, coupled with the wide-spread of CBD on the populations, and a possible yield loss to the farmer of up to 80% warrant urgent action by the relevant authorities. However, proper loss assessment can be carried out by studying the fate of berries on tagged branches because substantial amount of infected berries drop off especially during the early stages of berry development (Griffiths *et al.*, 1971a). A lot of Catimor population seedlings have already gone and are still going to farmers in the region. It is important that in areas where the CBD is endemic, such as Misuku Hills, Viphya North and some zones of Nkhata Bay Highlands, the more CBD tolerant/resistant varieties must be promoted. Catimor 129 which has apparent field tolerance to CBD should be promoted. Single tree selections with resistance to CBD were made from Catimor 129, and was named "Nyika" coffee variety (Phiri *et al.*, 2001), and should be utilised in the CBD endemic associations. "Nyika" is currently being propagated by the DFID funded Malawi Coffee IPM project. In addition, there should be deliberate efforts to select and develop more varieties with resistance to CBD and other coffee diseases. Earlier studies showed that Geisha is more tolerant to CBD than Agaro coffee variety (Phiri *et al.*, 2001). There should therefore be projects which should carry out single tree selection from the Geisha trees in the field in Malawi. Single tree selections with CBD resistance are being successfully deployed for CBD control in Ethiopia (Van der Graaff, 1983). In Kenya, Ruiru 11, a CBD resistant variety was successfully bred for resistance to CBD in the country (Van der Vossen and Walyaro, 1981). However, the susceptible Catimor populations can be successfully deployed in associations without or with less CBD, such as Phoka Hills, South East Mzimba, and some zones of Misuku Hills, Viphya, and Nkhata Bay Associations. In addition, in areas with CBD where the Catimor populations have already been deployed and will be deployed, fungicides will have to be used to manage the disease and reduce economic loss to the crop. This undoubtedly will increase the cost of coffee production in such areas. There was evidence of some fungicide use recorded during this study; however, it was apparent that farmers lacked knowledge of proper fungicide use, as evidenced by improper spraying frequency, timing, and number of sprays per season. It is therefore imperative that farmers of Catimor populations in the associations with CBD should be trained in effective use of fungicides. Tank mixtures of organic and copper-based fungicides are most effective and economic (Okioga, 1978; Masaba *et al.*, 1990). In Malawi a tank mixture of Chlorothalonil (Bravo) and Cupric hydroxide (Kocide 101) at half rates was found to be more effective in controlling CBD on Caturra coffee variety (Phiri *et al.*, 2001).

Agronomic practices (intercropping, fertiliser use, shading, spacing) were not found to affect CBD incidence during the study. However, intercropping and fertiliser use have direct benefits and should be encouraged. Studies are currently in progress to determine the best way of intercropping bananas in coffee. Shade ought to be studied further because there were not many Catimor population farms which were under shade. The close spacing too should be studied further because close spacing results in prolonged leaf/berry wetness which is ideal for CBD

development. In addition, close spacing in a form of hedge-row will make spraying for CBD control difficult because of poor spray penetration between trees, and may result in reducing the efficacy of the fungicides.

#### *Conclusion and recommendations from CBD survey*

1. The incidence of CBD on Catimor varieties has been established. The following recommendations for integrated control of CBD are proposed:
2. The CBD susceptible Catimor populations should be promoted in associations/zones with less or no CBD.
3. “Nyika” coffee variety and other CBD resistant varieties should be promoted in areas with CBD. Research in developing other CBD resistant varieties should be supported and executed.
4. Catimor population bushes in associations/zones with CBD should be protected with a tank mixture of organic and copper based fungicides. An example of a tank mixture is chlorothalonil ( $2.2 \text{ l ha}^{-1}$ ) and copper hydroxide ( $5.0 \text{ kg ha}^{-1}$ ) to be applied during the immature (expansion) berry development stage (February to April in the Northern Region of Malawi or January to early April in Southern Region of Malawi) and during the onset of weather conditions ideal for CBD development, such as temperature between 20 and 25 °C or lower, RH higher than 90%, and conditions resulting in morning precipitation.
5. Farmers should be trained in proper use of fungicides for CBD control, so that they do not waste their money.

#### Monitoring and evaluation

[Impact of promotional activities conducted by the project and its predecessors]

Neussie Efa and Noah Phiri of CABI Africa Centre, conducted an impact survey of project activities and communication strategies used to promote improved crop and pest management in smallholder coffee [The full report can be read in Appendix 3].

#### *Assessment of the demonstrations and field days*

Both on-farm and on-station demonstrations were used by the project, followed by field days. Five types of demonstration trails were carried out in different associations and on research station. These include: *Coffee-banana intercropping, Evaluation of different pesticides against coffee stem borer, Physical control of coffee stem borer, ICM demonstration, and Demonstration on fipronil.*

It was realized that the distribution of the demonstrations was not fair across the different associations as they were established at few locations. Thus they had limited coverage and could not reach many farmers. It was also noted that in most cases

farmers' and extension workers' role in demonstration activities were limited, and research staff seemed to play a dominant role in demonstration activities.

It was noted that five field days were held on the project's demonstration plots, though a number of field days were organized by SCFT on different coffee activities. More field days were also planned by the project to be held in September, 2005. But it was noted that no field day was organized on some the demonstrations. The fact that most demonstration plots were located close to the zonal centres where farmers are frequently assembled for various purposes provided some farmers the opportunity to visit them. However, though the visits of the demonstration fields could have been easily facilitated, the exposure was not as wide as expected.

Despite their limited coverage, the demonstrations and field days appeared to be effective in transferring knowledge to farmers, particularly, in promoting use of physical and chemical control of CSB such as smoothening of bark and the use of fipronil.

#### *Assessment of training of extension workers*

Four training programs were reported to be organized for extension workers by the project (IPM project in collaboration with CFC project). In addition, the SCFT organized periodical courses for their staff. Almost all the SCFT staff in the different Associations and district extension coordinators attended the training programs, while the extension officers participated only in one or two of the training sessions. The trainees indicated that the trainings were impressive, participatory in approach and educative in several aspects, though the frequency of the forum was low, as well as did not involve all extension workers. They claimed that the training helped them to improve their approach by adopting participatory methods, whereby farmers are actively involved in the training activities. It also allowed them to gain adequate technical knowledge on such areas as CSB control.

#### *Assessment of the printed dissemination materials used*

The IPM project in collaboration with the CFC white stem borer project developed and disseminated three types of leaflets and one coffee hand book in different languages. The leaflets were produced in 2003 on: How to grow Catimors, Biology and control of white stem borer, and Coffee berry disease. The leaflets were initially prepared in English, but later on translated into Tumbuka and Chindali/Chisukwa. Initially, 500 copies of each leaflet were printed and distributed. Later on 3000 leaflets (in local languages) were produced and distributed to different associations, of which 1200 were Ndali/Chindali version, while the remaining was in Tumbuka. Almost all the SCFT and district extension coordinators had the English leaflets, though most of the extension officers didn't receive them. The distribution of those in local languages was carried out in 2005 and also reported to reach few farmers. Thus obviously it is too early to expect significant impact from the leaflets. However, it was indicated by farmers that the leaflets in local languages were useful. SCFT and extension staff also felt that leaflets were somehow effective tools in getting across brief information to farmers. They are simple, informative and can be understood as they combined both simple text and pictures. But there is a need to supplement them by training and follow-up from extension workers as well as should be produced in large quantity to improve coverage, and ensure wider impact.

Similarly, a detailed coffee hand book was initially prepared in English in 2001, and later on translated into 'Tumbuka'. About 1000 copies of the Tumbuka version were produced of which 494 copies were distributed to zone and BC officials, contact farmers, extension workers and relevant institutions. The extension workers of all associations received the English version two years or so ago. But it was noted that most of the associations received the Tumbuka version from May - July, 2005 and distributed to zone and BC officials and contact farmers recently. Thus it does not seem realistic to expect significant impact at this stage. Moreover, since the hand book was prepared only in two languages (English and Tumbuka), it was also of little help to farmers in some of the associations (non-Tumbuka speakers). Some extension workers said that the book is too bulky to read, understand and retain; but some farmers claimed that the hand book was comprehensive and an important source of information.

#### *Assessment of the role of contact farmers*

The SCFT seemed to rely on contact farmers to communicate technical information to farmers. There were about 200 contact farmers in the five associations; one for each BC. The SCFT staff indicated that contact farmers were very much active in offering trainings to fellow farmers after being trained at association level, though some could not live up to expectations. It was also noticed that contact farmers at some zones had created information bureaus whereby different written extension materials were documented and used as a reference materials for other farmers. Group of farmers indicated that though contact farmers play crucial role, they lack adequate knowledge, confidence and necessary materials/resources, and thus need continuous support.

#### *Assessment of the role of tour/exchange visit*

Different associations reported that they had organized tour/exchange visit for farmers and extension staff, although it was not held directly on the project activities. It was felt that it gives exposure to new ideas and experiences, though it involves few people and high cost. Both farmers and extensionists believe that it is effective in persuading and motivating farmers to try out new practices and experiences and brings rapid change.

#### *Assessment of Farmer Field School as a dissemination tool*

The project, in collaboration with the CFC project, used Farmer Field School as an important training and dissemination tool. The SCFT and government extension workers were trained on FFS concepts and practices, and formed pilot FFSs on IPM (two at each association – but there was a plan to establish more), with especial emphasis to CSB control. It was reported by extension workers of all associations that farmers realized the power of FFS as a participatory learning and experience sharing tool and showed greater interest in the group activities. It was noticed that the activities of FFS groups were well on the right way. It was, however, observed that only farmers in close proximity to the FFS groups and few of the extension workers were aware of the existing FFS activities, though most extension workers were found to have idea about FFS concept. Generally, it is too early to show significant impact, though there is promising signs of success. The need for refresher course and continuous technical back-up as well as forming more FFSs and encouraging visits among the groups were realized.

### *Assessment of the workshops organized in relation to project activities*

Two workshops were held by the project to discuss with various stakeholders on achievements of the project and issues related to coffee management and production in general. Participants drawn from Lunyangwa Research Station, SCFT, CABI-ARC and other relevant institutions attended the workshops. The workshops played important role in bringing relevant stakeholders together; though the events held were few in number.

### *Assessment of agricultural show*

The annual agricultural show was used for experience exchange and information dissemination. Although it seems a powerful dissemination tool, its frequency and coverage did not seem to have wider impact. Thus such fora can be an important dissemination path-way if regularly and more frequently organized by all associations.

### *Assessment of farmers' preference for communication channels*

#### *General views of farmers on communication methods*

Farmers indicated their preferred channels as: training by extension workers, demonstration and field days, contact farmers, tour/exchange visit, and printed extension materials, in that order. In general, extension workers were the most preferred source of information on coffee management for majority of the farmers, though it was noted that they were few in number and had limited coverage.

Farmers also acknowledged the persuasive power of demonstration and field days, and many tended to consider them as important dissemination media. They indicated that it boosts their confidence and encourages them to put into practice the experience they gained. But they emphasized that the number of demonstration fields should be large enough to ensure wider coverage and impact unlike what has been happening with the current project. The need for holding field days on a regular basis was also emphasized.

Farmers indicated that contact farmers are instrumental in disseminating information timely as they have regular contact with the community, though they appeared to lack detailed knowledge.

Farmers also pointed out that though the printed dissemination materials are primarily intended to serve the literate section of the community, still there is some multiplier effect of the information to the illiterate groups. Their literate friends can read and explain to them, as well as they can copy the practices adopted by others. They also stated that written materials provide detailed information and can be referred to at any time; but if they are to have better use and impact, they have to be produced in local languages, being supported with good pictures and illustrations.

Most farmers tended to disfavour radio as a channel of communication for their situation. They indicated that despite its speed and wider coverage, the messages can be missed when they are on farm activities, as well as it does not allow asking questions. Language problem was also mentioned as a constraint. But a few farmers

indicated that it can have important role in disseminating information as most farmers possess radio. The current project, however, did not make use of radio as a communication channel.

The government extension workers and SCFT staff also showed more or less similar preference with farmers for communication channels. But they included more channels such as FFS, radio, film and video (motion pictures), and poster in addition to those mentioned by farmers.

*Assessment of the acceptance of the information/ technologies being promoted by the project: Overall impact*

In general, the evidence indicated that some information was reaching the target clients on most of the technologies/practices promoted by the project. Farmers indicated that although the recommended technologies/practices were found to be effective, they involve high costs (expensive inputs and extra labour) and these limited the extent of their adoption.

Some of the improved coffee management practices/technologies being promoted by the project have been taken up by farmers. Of these, CSB (the most important pest) control measures such as smoothening of bark seemed to enjoy wider acceptance among farmers, though it is a tedious duty to use on large number of trees. Other control methods such as killing of larvae on the ground and in the stem using wire spoke were also widely practiced by farmers. Few farmers reported practicing uprooting and painting. Farmers stressed that chemicals were more effective than other methods of CSB control, and were enthusiastic about using chemicals such as fipronil, though its use was highly hampered both by unavailability and high cost.

Farmers also claimed that now they are capable of identifying the different coffee diseases. Though most farmers indicated that they are aware of the different pesticides and insecticides, they felt that they lack adequate knowledge on amount, time and frequency of application. Some farmers reported using chemicals against CBD, CSB, CLR and anthesitia bug.

With regard to the use of fertilizer, it became clear that most farmers more or less knew the rate, frequency, time and method of application, and the critical need for fertilizer in growing Catimor. However, virtually all farmers reported that they grew Catimor without applying full recommendation rates mainly due to the its escalating price. But they seemed to apply no fertilizer to their traditional varieties, such as Geisha.

Although almost all farmers reported that they have adequate knowledge of proper nursery management, most of them could not use all the recommended nursery practices because of the high cost and scarcity of some of the materials and inputs.

Generally, being motivated by the relatively better yielding abilities of the new variety (Catimor), coupled with aggressive extension effort to promote Catimor, farmers were inclined to abandon the old varieties such as Geisha and Agaro.

Regarding the status of coffee-banana intercropping, it seemed to be too early to see the effects/results of the demonstration as they were established very recently. On the

other hand, most farmers knew the importance of mulch and how to use it. But due to shortage of labour and lack of commitment, very few of the interviewed farmers reported using mulch except for SE Mizumba where virtually all farmers reported using mulch because of the prevailing moisture stress problem in the area.

### *Achievements*

Despite the above challenges, the project generated some remarkable achievements. The following are the major ones:

- The communication efforts of the project were successful in terms of awareness creation among the target clients. It enhanced farmers' awareness and knowledge of improved crop/coffee and pest management practices and also assisted in adopting some of them, especially those which involve low or no extra costs.
- It was indicated by the base-line survey that farmers had no control measure for white stem borer other than to try to kill the larvae that are already in the stem with a wire spoke. Now farmers use alternative measures recommended by the project such as smoothening of bark, painting, and to some extent chemicals such as fipronil though widespread use was constrained by high cost of the chemical.
- Helped to build better linkage and communication/collaboration, especially, between the two partners of the project (SCFT and Research).
- Development of technologies/improved practices such as fipronil, and other integrated pest and disease management practices.
- Production of printed extension materials were carried out by the project, and these are of great importance especially to the extension workers as reference materials.
- Assisted research to develop a culture of moving out of station to on-farm and to adopt a participatory operation.

### *Major challenges, constraints and limitations*

The following were identified as challenges, constraints and limitations that appeared to influence the impact of the project's communication efforts.

- Vastness and geographical locations of the coffee associations where the project operates, coupled with logistical and staff shortage in collaborating institutions (SCFT and research), somehow made execution and monitoring activities difficult.
- Delay in production and distribution of some of the dissemination materials, inadequacy of the quantity produced, and language problem.
- Lack of continuous and regular forum for planning, implementation, monitoring and evaluation that involve all relevant stakeholders.
- Lack of appreciation and support for coffee extension work from government extension agency higher officials was noted as a constraint. This in turn has led to lack of ownership and accountability for the project activities among field level extension workers, and this appeared to have impact on the execution of the project activities. This collaboration and linkage appeared to be weaker, especially, at Misuku and Nkhata-Bay highlands.

- Scarcity/unavailability and high cost of some of the recommended inputs, such as pesticides and fertilizer.

### *Conclusions and recommendations from impact survey*

Though there are indications that some of the information being promoted by the project was reaching the target clients, most of the communication materials and products are yet to bring significant impact as their production/establishment and dissemination is a recent phenomenon. The communication strategies of the project, however, appeared to have remarkable impact in terms of raising the target groups awareness and knowledge with regard to integrated crop and pest management. Wider adoption and acceptance of the information/practices were constrained by several factors, such as high costs and scarcity of inputs or technologies, shortage of labour, lack of complete information and continuous support, etc. It was also realized that the aggressive Catimor promotion activity has serious implication for the old varieties and related management practices.

The evaluation team makes the following recommendations both in order to enhance wider impact of the current project; as well as to provide a basis for designing more effective communication strategies in future similar projects:

- In order to enhance their effectiveness, printed extension materials should be backed up with other communication mechanisms such as training, field days, etc. Moreover, further large scale production and distribution of these materials in local languages is needed.
- Encouraging exchange visits and farmer-to-farmer information dissemination as fellow farmers were mentioned as important source of information. In particular, encouraging visits to FFS fields needs due attention.
- It was noted that the old varieties such as Geisha and Agaro have been offered attractive prices from some buyers. Moreover, it was indicated that the new variety (Catimor) has high fertilizer requirement, and that farmers could not afford to apply the recommended rate. Thus aggressive transfer of Catimor at the expense of the older varieties needs caution. The old varieties are generally at great risk and their maintenance needs critical attention from the loss of genetic resource point of view as well.
- Demonstration is obviously one of the most important mechanisms of information/technology transfer and should be widely and systematically used as a powerful dissemination tool. Use of simple demonstration plots with few treatments and large plot size that are located in accessible places should be focused in future activities. Moreover, it is essential to organize field days more frequently to expose the demonstration fields to large number of farmers.
- FFS can play crucial role in accelerating the dissemination of technical information or outputs of the project in a participatory manner. Thus establishing more FFS and providing continuous technical backstopping to their facilitators should be given attention.
- The need for use of mass-media (especially radio) to create awareness need to be seriously considered in future similar projects as most farmers were said to have radios;
- Indigenous communication channels such as local organizations and informal networks, and local fora can play important role in facilitating information flow

within the communities. Therefore, the use of such local channels for information/technology dissemination needs attention.

- There is also a need for a wrap-up workshop to communicate the achievements and outputs of the project, and help the other partners to take up and use the outputs of the project in their future programs.
- Strengthening research efforts to serve as a spring board and continuously deliver technologies and back-up the extension efforts. It is crucial to come up with economical and appropriate basket of options for disease and pest management.
- Regular and active collaborative links need to be established between SCFT, government extension agency and research.
- Financial support should be solicited to design and implement a follow on project to widely push the available information/technologies (current project outputs) to users.

## **Dissemination Outputs**

### *Internal Reports and Working Papers:*

PHIRI, N. (2005) BTOR- Report of a visit to Malawi to conduct a survey of CBD incidence in Catimor coffee varieties, 27 March – 09 April 2005. CABI Africa Centre, Nairobi, Kenya, 2 pp.

HILLOCKS, R.J. (2005) BTOR - Report of a study of smallholder coffee in Zambia, 17 – 30 October 2005. Natural Resources Institute (NRI), Chatham, UK, 6 pp.

HILLOCKS, R. J., ORR, A. and PHIRI, N. A. (2005) A study of smallholder coffee in Zambia. Natural Resources Institute (NRI), Chatham, UK, 6 pp.

ORR, A. and NDHLOVU, M. (2005) Smallholder coffee in Zambia: a socio-economic report. Working Paper A1163/1, Natural Resources Institute (NRI), Chatham, UK, 24 pp.

PHIRI, N. and KAYANGE, O. (2005) Incidence of coffee berry disease (*Colletotrichum kahawae*) on Catimor coffee farms in Northern Malawi: Survey report. CABI Africa Centre, Nairobi, Kenya, 14 pp.

EFA, N. and PHIRI, N (2005) Assessment of the Impact of the Communication strategy used by the coffee IPM project in Malawi. CABI Africa Centre, Nairobi, Kenya, 45 pp.

### *Extension literature:*

NRI/CABI (2005) Coffee Berry Disease: symptoms and control. CABI Africa Regional Centre, Nairobi, Kenya, 2 pp.[Leaflet] 1000 copies

### *Text Book:*

WALLER, J. M., BIGGER, M and HILLOCKS, R. J. (2006) Coffee Pests, Diseases and their Control. CAB International, Wallingford, UK, 300 pp [In Press, January 2006].

*Appendices attached to the FTR*

Appendix I : Socio-economic survey report [Zambia]

Appendix II : CBD survey report

Appendix III: Impact survey report

## **Contribution of Outputs to developmental impact**

*How is the knowledge promoted benefiting the poor?*

Coffee growing remains the principle source of income for smallholders in the more remote parts of northern Malawi where it is difficult to reach markets for other products. With support from the EU the smallholder sector is expanding at a time when the estate sector is diversifying out of coffee into tea and Macademia. The SCFT are having some success in promoting 'Mzuzu coffee' in speciality and fair-trade markets. Increased production will allow the SCFT to be self-financing when the EU project ends in 2007. The CPP projects has complemented the work of the EU to design and promote improved crop management packages that help to make coffee growing more profitable. The project has developed solutions for white stem borer and for the main coffee disease, CBD. Our work to develop control measures for white stem borer has been taken-over by a project funded by the Common fund for commodities in Malawi and Zimbabwe. We have also promoted and provided training to farmers in general crop management for the new Catimor varieties showing that they can be grown at wide spacing, that banana can be grown as a food crop with the coffee and that crop vigour is helped by mulching and proper fertiliser application. We then introduced some of these innovations to the Coffee Growers Association and their smallholder groups in Zambia. With smallholder coffee still in its infancy in Zambia the project was able to make a significant impact on plans for extension of the sector over the coming years.

*What coverage has been achieved (numbers of farmers, institutions and production areas adopting the technology).*

Most of the work of the project in its several phases has been conducted in northern Malawi with 4000 coffee-growing households or 30,000 people. The lessons learned in Malawi were extended to Zambia where there are at present about 10 smallholder groups within villages with a total population of about 20,000.

*What is the potential for wider scale impact.*

Project outputs are relevant to the much larger number of coffee growing households in Tanzania where about 500,000 – 1 million people depend on income from coffee. Some project outputs are relevant also to coffee smallholders in Zimbabwe.

*What follow up action/research is necessary to promote the findings of the work to achieve their development benefit?*

The large number of coffee smallholders in Tanzania remains a major target for uptake of project outputs. As in Tanzania the EU is supporting rehabilitation of the smallholder coffee sector. The Tanzania Coffee Research Institute [TaCRI] has been recently

privatised and there is a need for baseline survey on which to base a demand-responsive research programme. The lessons learned in Malawi about developing a communication strategy for agricultural information required by coffee smallholders, and about appropriate technologies to maximise profits from coffee growing would be appropriate to Tanzania and could be promoted there in collaboration with TaCRI.

The fragmented nature of the research –extension- farmer-market chain in Malawi was a constraint to the project achieving greater impact. It does not seem to be clear who has the main responsibility for smallholder coffee research. The Ministry of Agriculture sustains coffee research staff at Lunyangwa Research Station [LRS] but their resources are meagre and as a consequence, the SCFT conducts its coffee promotion, extension and marketing activities with little collaboration with LRS. This situation is exacerbated by the existence of the Coffee Research Unit [CRU] within the Tea Research Foundation based at Mulanje in the south of Malawi. Historically the CRU has conducted research mainly on behalf of the large-scale estates and this was the situation when the CPP project first began. Recently, the CRU has received support from the EU and advice to the SCFT and the provision of Catimor seed was done by the CRU, also with financial assistance from the EU and, with little reference to LRS. Under the EU coffee rehabilitation project, the CRU has been encouraged to become more involved in smallholder research which further undermines the role of LRS. The large financial support that the SCFT received from the EU has led to expanding coffee production in the smallholder sector which should result in a sustainable funding source for the SCFT, but has not fostered sustainable research/extension linkages.

### Exit Strategy

Future development of smallholder coffee in Malawi:

The projects exit strategy is based on the sustainable rehabilitation of the smallholder coffee sector resulting from EU support to the SCFT. The programme is on-target to provide a sustainable funding stream for the SCFT by 2007 [see tables and comments below from an EU consultants report]. Several of the projects outputs have been adopted by the SCFT – Information leaflets, CBD control through planting of cv.'Nyika' [The project has established a mother garden as a source of planting material] and has accepted the principle that some farmers may wish to plant Catimors at wider spacing with some inter-planting with banana. Earlier phases of the project initiated work on white stem borer control leading to the recommendation of fipronil. That research was taken-up and is continuing under a project funded by the Common fund for Commodities.

**Table 4. Current membership and production in the 5 associations of SCFT**

Organisation	Misuku	Nkhata Bay	Mzimba	Phoka	Viphya	Total
Business Zones	14	8	7	8	6	43
Business Centres	84	12	40	24	16	176
Production of parchment in 2003	145	5	17	20	35	222
Association members	1956	256	520	488	271	3491
SCU members	369	83	166	266	91	975

Only in Misuku Association is there a possibility in the short-term to develop an economically viable production base [Table 4]. However, rejuvenation, replanting and new plantings by current members is going on at an increased rate. A summary of these figures appears in the following table. Based on these estimates, all associations should have a viable production level in five years time - 2008 [Table 5].

**Table 5. Estimate of coffee production plant population by year**

<b>Year</b>	<b>Plantings (no. of seedlings transplanted)</b>	<b>Production estimate (tonne) (parchment)</b>	<b>Production estimate (tonne) (green beans)</b>
1999/2000	259,000	137	
2000/2001	218,000	143	
2001/2002	739,000	90	
2002/2003	1,153,000	156	
2003/2004	1,750,000	222	160
2004/2005			339
2005/2006			733
2006/2007			1,729
2007/2008			3,379
2008/2009			5,720

## PROJECT LOGFRAME

<b>Narrative Summary</b>	<b>Objectively Verifiable Indicators</b>	<b>Means of Verification</b>	<b>Important Assumptions</b>
<b>Goal</b>			
Benefits for poor people generated by application of new knowledge on crop protection to tree crops in forest Agriculture production systems	To be completed by CPP Programme Manager	To be completed by CPP Programme Manager	To be completed by CPP Programme Manager
<b>Purpose</b>			
Benefits for poor people generated by application of new knowledge on crop protection to smallholder coffee.	To be completed by CPP Programme Manager	To be completed by CPP Programme Manager	To be completed by CPP Programme Manager
<b>Outputs</b>			

1. Outputs from the Malawi project disseminated more widely in the region	Livelihood survey completed by July 2005	Socio-economic report as project Working paper.  CPP progress reports  TaCRI annual reports	Logistic support from TaCRI  Social scientist from TaCRI available
2. Sustainable ICPM systems for Catimors promoted in Malawi.	Farmer field days during pre-harvest period June/July 2005. Yield assessment in intercrop demo September 2005 and CBD survey completed by June 2005	BTORs  CPP progress reports	Logistic support from Lunyangwa and assistance from SCFT HQ and field staff.
<b>Activities</b>	<b>Inputs</b>	<b>Means of Verification</b>	<b>Important Assumptions</b>
1.1 Livelihood survey  1.2 Extension literature for Kenya produced.  1.3.Stakeholder meeting in Arusha to present ICPM outputs from Malawi  1.4.Design of an appropriate ICPM system[s] for Tanzania	Total Budget here £69,983	CPP progress reports	Adverse weather does not hamper activities
2.1.Farmer field days at the Catimor x banana demonstration  2.2. Assessment of shading effect of banana.  2.3.Planting of Nyika nursery and distribution of seed  2.4. CBD disease incidence survey in Catimor plantings			Adverse weather conditions do not damage coffee plots  Transport can be obtained to carry farmers to field days.

Note: Outputs should be numbered 1, 2, 3, *etc.* Activities should relate to these outputs and be numbered 1.1, 1.2, ...2.1, 2.2, ....*etc.*

*It is expected that most projects will achieve only one or two outputs and a small number of activities.*