3
Farms and Farmers: Agronomic and Socio-economic Surveys

Mr Alexander Kempanju (75) from Ibosa village, in Bukoba district, was initially harvesting an average of 16 bags of coffee from his farm. However, after the outbreak of CWD in 1997, the annual production has been reduced to only five bags. He has to date uprooted 403 out of 1030 coffee trees due to CWD.[1]

3.1   Main Findings

- Through field surveys in Ethiopia, Uganda and Tanzania, a very wide range of farming practices was found; in most cases coffee was in a poor state, with very old trees (>50% over 15 years), poor soil fertility and consequently very low yields.

- Many farmers weed by machete and hoeing, both of which may tend to spread coffee wilt disease (CWD). Ethiopian farmers especially control weeds by machete, which causes frequent cuts to the base of the main stem.

- Farmers are highly diversified in their cropping patterns, and nine or more crops per farm are common. Across the countries, most think that the CWD is getting worse and that coffee is becoming less important to them.

- The surveys suggest that Tanzanian farmers carry out the greatest amounts of mulching and intercropping and the least amounts of pruning and slashing. All these are consistent with practices believed to lessen the spread and impact of CWD, and correlate with the lower incidence of the disease in this country.

- Ugandan farmers carried out the lowest level of fertilizer use and the highest level of pruning – though they also had low levels of weed slashing. Shade levels were the highest, primarily from plantain.

- The surveys suggest that the past few years have seen a marked reduction in inputs applied to coffee across the East African region, though it is difficult to separate the effects of low prices and CWD on this decline.

- Farmers clearly found it difficult to understand the nature of the disease and their use of diseased coffee wood for a range of purposes confirms that many still do not understand how the disease is propagated.

- Many instances were found of farmers removing diseased coffee wood from coffee plots to be sold or used in other fields. This presents a major route of infestation that must be stopped by increased training and quarantine inspections across frontiers.

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[1] Kagera farmers unite to fight coffee disease. Meddy Mulisa in Bukoba, *Daily News on Saturday,* Tanzania, 16 June 2007.

Phiri N. and Baker, P.S. (2009) *Coffee Wilt in Africa Final Technical Report*. CAB International.

3.2   Introduction

Surveys of the three East African CWD-infected countries were carried out to discover more about:

- The characteristics of farms affected;
- What farmers knew about the disease;
- What they were doing to cope with it; and
- What activities might be having an effect on reducing CWD infection levels on small farms.

See Appendices 1 and 2 for further details of how the surveys were carried out.

3.3   Farm Characteristics

A wide range of variables was recorded for each farm to see if any particular factors might be associated with incidence of the disease (Table 3.1). In all three countries, the majority of trees were over 15 years old and more than 80% of production was classed as smallholder or forest coffee.

Some potentially significant points of interest were:

Table 3.1: Description of typical farm characteristics and agronomic practices on smallholder coffee farms in East and Central Africa.[a]

Farm characteristic and agronomic practices	Uganda (n = 1374 Robusta)	Ethiopia (n = 1607 Arabica)	Tanzania (n = 964)		Rwanda (n = 1560 Arabica)
			Robusta (n = 295)	Arabica (n = 669)	
Production system					
Forest	0.2	0.4	-	-	-
Semi-forest	0.8	13.3	-	-	-
Garden	84.1	79.7	92.0	93.3	90.0
Plantation	15.0	5.0	4.8	4.4	4.0
Semi-plantation	-	1.1	-	-	-
Coffee type					
Seedling	90.2	-	98.0	98.6	-
Seedling and clonal	3.4	-	-	-	-
Clonal	3.1	-	0.4	0.2	-
Local	-	75.8	-	-	-
Local and improved	-	5.3	-	-	-
Improved	-	18.0	-	-	-
Age of coffee					
<5 years	4.1	2.6	1.2	16.8	4.3
5-15 years	14.6	38.8	24.3	6.2	34.2
>15 years	77.5	56.8	68.5	70.2	61.5

Continued

Table 3.1: Continued.

Farm characteristic and agronomic practices	Uganda (*n* = 1374 Robusta)	Ethiopia (*n* = 1607 Arabica)	Tanzania (*n* = 964)		Rwanda (*n* = 1560 Arabica)
			Robusta (*n* = 295)	Arabica (*n* = 669)	
Topography					
Flat	38.1	51.3	65.7	33.6	4.4
Hilltop	2.3	0.5	-	0.3	11.2
Slope	40.7	46.7	31.3	60.2	83.9
Valley	1.6	0.8	-	-	-
Other	9.0	-	-	0.1	0.4
Shade					
No	17.4	14.4	52.2	29.9	-
Yes	79.3	83.0	40.6	66.7	-
Fertilizer use					
No	81.5	77.7	65.3	22.6	93.3
Yes	14.7	18.6	34.3	73.2	6.7
Pruning					
No	46.1	95.6	96.8	4.6	31.0
Yes	52.0	2.9	1.2	95.4	69.0
Intercropping					
No	20.3	50.3	4.8	20.3	84.8
Yes	79.0	49.2	94.0	79.6	15.2
Weed management					
None	9.1	0.2	39.4	26.0	4.4
Slashing	8.0	44.2	0.8	0	0.4
Hoeing	75.5	29.2	46.6	71.5	63.8
Herbicide	2.0	-	2.4	0.4	-
Uprooting	-	0.9	-	-	30.6
Combinations	2.0	24.2	-	0.1	0.8
Mulching					
No	89.1	95.7	41.4	82.2	27.9
Yes	8.6	2.1	52.6	11.9	72.1

[a] Percentages may not add up to 100 due to missing values.

Uganda: Quite high levels of pruning (52%) and intercropping were encountered, especially with banana, beans or groundnuts (79%) and weeding, especially by hoe (76%). However, the use of fertilizer (15%) and mulch (9%) were uncommon.

Ethiopia: The coffee is mainly of local landraces grown in gardens of less than 1 ha. The great majority of coffee is grown under shade, and about a half of farmers

control weeds with slashing. Pruning and use of fertilizer or mulch was rare however. Intercropping, especially with enset, maize or banana was observed in approximately half the sampled farms.

Tanzania: Very little slashing and pruning was reported for Robusta, but quite high levels of mulching and intercropping and highest fertilizing levels of the three countries were found in this country.

Rwanda: Only 3% of the farms visited grew Robusta coffee. Most of the coffee trees were over 20 years old and grown on farms averaging only 334 trees. Most of the coffee was grown on slopes, in pure stands, with high levels of pruning, mulching and weeding by hoe. Farms where coffee was shaded or fertilizer applied were rare.

3.4   Statistical Analysis

A large number of socio-economic factors were evaluated for their influence on the incidence and severity of CWD. Few were found to have a significant correlation with disease incidence, and the factors varied in each country. For example, in Ethiopia, the age of the farmer, total number of crops grown and the number of coffee trees were all related to the severity of CWD, but these trends were not repeated in Tanzania or Uganda. None of the socio-economic factors evaluated was found to influence CWD in Tanzania.

None of the farm characteristics, agronomic practices or environmental characteristics evaluated had a consistent effect on the occurrence of CWD across all three countries. Coffee tree age, shade, soil type, mulching and weeding method had significant but quite minor effects on the incidence of CWD in both Uganda and Ethiopia so that any practical implication of these differences remains unclear. Other factors which had a significant effect on CWD occurred only in one country. In both Uganda and Ethiopia, trends were similar, and the incidence of CWD was higher on coffee trees which were older, shaded, planted on loamy soil and weeded by slashing. The effects of mulching and topography, however, were not consistent.

Perhaps the clearest differences seen were for Arabica tree age and weeding method in Ethiopia, compared in Figure 3.1 with Robusta in Uganda. Older Arabica trees were more prone to infection, but as can be seen in Uganda, the effect becomes minimal when infection levels are generally very high. For weeding, there seems to be a higher CWD incidence when slashing was employed.

The survey results show that levels of mulching, fertilizer application and intercropping were all at their highest in Tanzania whereas pruning and slashing were at their lowest (Table 3.1). Tanzania also had the lowest CWD levels (both in incidence and severity), so it is tempting to suggest that the combination of factors found in Tanzania was exerting a positive effect on CWD control. These Tanzanian factors are consistent with what we know from pigeonpea wilt for example, where green manuring, nitrogen application and intercropping were all deemed to reduce wilt incidence (Reddy *et al.*, 1990).

Worryingly, in this study, it was found to be common practice to use coffee wood for staking out tomatoes, yams and climbing beans, hence giving the disease the opportunity of a free ride from plot to plot (Figure 3.2). Even more worrying is the habit of

Figure 3.1: Probability of coffee wilt disease (CWD) infection with respect to age of tree (*above*) and weeding method employed (*below*). Note, very few Ethiopian farms did not weed, so lack of weeding cannot be assumed to eliminate disease risk.
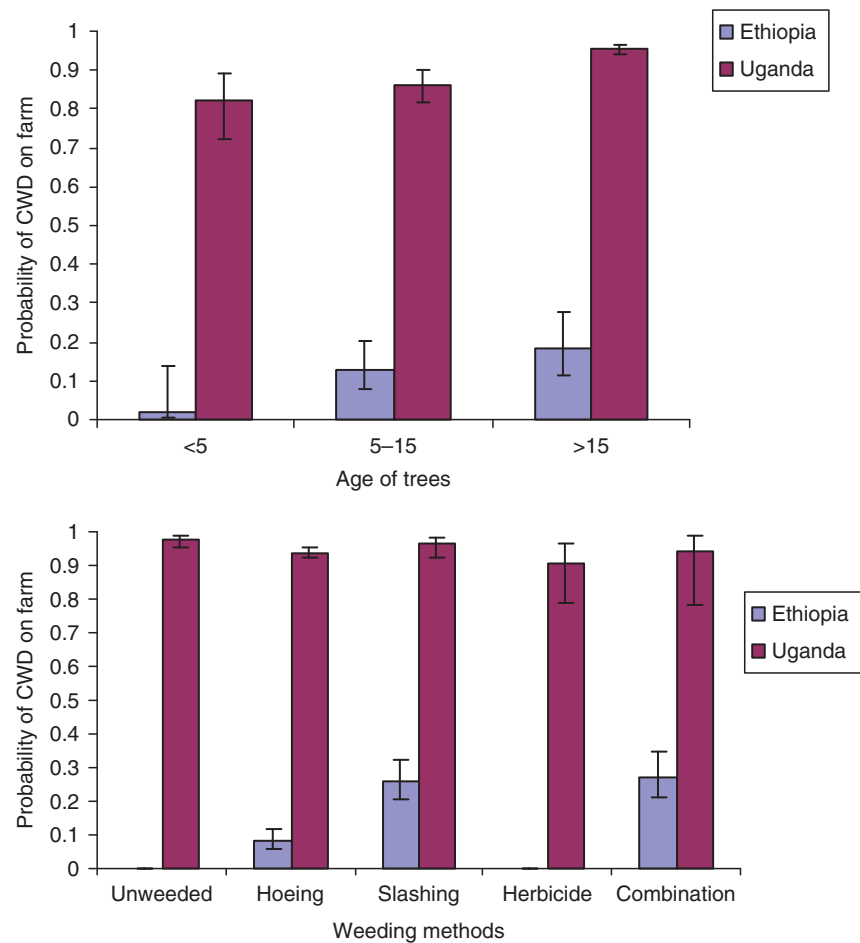

Figure 3.2: Farmers use diseased coffee stems as support stakes for other crops.

collecting coffee wood piles near the road to sell it to passing travellers, suggesting that any future effort to detain the advance of this disease should prohibit transportation of coffee wood across boundaries, wherever possible.

3.5   Farmers

The average age of the head of household for the farms surveyed in the East African region was 50 years old with a mean of 25 years of coffee farming experience. The average size of family per household was eight persons on a farm of 3.1 ha (ranging from 0.2 to 20 ha) with a mean of 9.3 crops cultivated in each farm. The average number of coffee trees per farm was 2343, with Ethiopia having the highest – an average of 5514 trees per farm (Table 3.2).

Table 3.2: Household and farm characteristics of smallholder coffee holdings in the region.

Household characteristics	Uganda	Ethiopia	Tanzania
Age of head of household (years)	51.7	47.3	52.4
Education of head of household (% farmers)			
No education	16.5	24.3	1.0
Primary	50.0	37.5	81.3
Secondary	28.9	15.4	11.5
Post-secondary	4.6	2.9	1.0
Non-formal	-	19.9	5.2
Gender of head of household (% farmers)			
Male	86.0	91.9	94.9
Female	14.0	8.1	5.1
Average family size (number)	8.9	9.0	8.4
Farm characteristics			
Average land size (ha)	3.5	3.2	2.5
Land tenure (% of farmers)			
Customary	28.7	-	41.4
Freehold	40.1	-	38.4
Government	-	100.0	8.1
Customary/freehold	-	-	12.1
Tenancy	22.9	-	-
Number of crops cultivated on farm	8	12	8
Number of years cultivating coffee	25	25	25
Average number of coffee trees on farm	321	5514	1193
Average age of coffee trees	36.5	15.0	28.5
External labour inputs on coffee (hours/household/year)	-	13.0	-

In Ethiopia, three different socio-economic factors, i.e. age of the farmer, total number of crops and the number of coffee trees were significantly ($p < 0.001$) correlated with the severity of CWD. The greater the age of the farmer, and the higher the number of coffee trees, the higher is the likelihood of severe levels of CWD. Conversely, farms with more crops tended to have lower levels of CWD. Greater dependence on coffee may imply more intensive management, that with a disease like wilt affords greater opportunities for spread of infection. It could also mean that more intercropping and companion planting inhibits the spread of the disease, something that has been shown to happen with pigeonpea wilt (*Fusarium udum*), CWD's closest relative (Reddy *et al.*, 1990).

3.5.1   Farmers' perceptions

Farmers' awareness and knowledge of CWD varied widely; unsurprisingly, in Uganda, where the disease has been severe, 90% of coffee farmers were aware of CWD as the cause of tree death. In the Democratic Republic of Congo (DRC), 40% of farmers interviewed knew about it. Awareness levels were lower and similar in Ethiopia (17%) and Tanzania (15%).

Farmers attributed CWD to a range of different causes, including insects, nematodes, ants, soil nutrient depletion and the environment. Farmers' perceptions about how the disease spreads were diverse – about half of the farmers felt that the disease spreads more during the dry season while the other half said the same for the rainy or wet season (the correct answer is believed to be the wet season). The great majority of farmers (94% in Tanzania, 74% in Uganda and 97% in Ethiopia) believed that the problem was increasing.

The interviews also revealed that coffee is of declining importance to most farmers. This has apparently happened over the period of CWD spread, though it may also be due to other factors, especially the prolonged period of low prices. Remarkably, only 15% of Ugandan farmers regarded coffee as 'important' compared to 95% in DRC, 91% in Ethiopia and 95% in Tanzania.

3.5.2   Control strategies used by farmers against CWD and factors influencing them

A range of different methods had been tried by coffee farmers in their attempts to control CWD and some of these may well have made things worse. These included: uprooting and burning (47%), pruning (26%, although this was not practised in Ethiopia), cutting and burning (12%), soil digging, use of compost or manure, removing the bark of infected coffee trees (7%) and the use of concoctions such as ash, tobacco and cow urine (5%).

However, by the time of the surveys, the majority of coffee farmers (80%) had abandoned attempts at controlling CWD using the aforementioned methods because they were found to be ineffective. A few (6%) indicated that the control methods were too laborious given the rate of infection of the coffee, and households did not have enough labour to carry them out. Farmers considered that hired labour was too expensive. Only 4% of coffee farmers who were uprooting and burning thought the method worked well. Of the coffee farmers who were not practising any control method, 30% of them

indicated that they were not aware of any control methods and 23% said it was because control methods were ineffective or that the disease was incurable.

Among the coffee farmers with CWD, there was enormous variation across the region in terms of their attempts to control the disease. The average of farmers who have attempted some form of control of CWD was only 2% in Uganda, through 13% in Ethiopia to 83% in Tanzania.

In Ethiopia, most of the farmers uprooted the wilted coffee trees; however, instead of burning the wilted trees on the spot, they were dragged to the farmers' kitchens where they were used or sold for firewood. Dragging of these trees may serve to spread the disease in the farm. Plots where wilted trees were uprooted were frequently replanted with several coffee seedlings. For every cut or uprooted wilted coffee tree, three to eight coffee seedlings were replanted in the same space. About 80% of the farmers used the wood for fencing, 26% used it for constructing houses and animal sheds, 10% gave surplus wilted coffee trees to their neighbours for firewood and 2% sold them.

Whether to control or not was influenced by the education of the farmer and the current income from coffee. Farmers with a higher income from coffee were more likely to attempt methods of controlling CWD than farmers earning a lower income from coffee. Surprisingly, however, farmers with higher levels of education were less likely to control the disease than farmers with lower levels of education ($p < 0.01$). This is perhaps because higher education is associated with greater opportunities for generating alternative sources of income, and as such, those farmers who are more highly educated, may have opted to diversify to other sources of income rather than attempt to control CWD.

Most farmers surveyed obtained information on control strategies either from extension workers (37%) or from other farmers (22%). A smaller number received information from the radio (19%), visiting researchers or newspapers and pamphlets. This is something we found also in a previous Common Fund for Commodities (CFC) project (IPM of the coffee berry borer, ICO/CFC 02, 1998–2002) – farmers much prefer to get their information through some form of personal contact.

3.5.2.1   Changes in input use

Across the region, there has been a significant decrease ($p < 0.01$) in the use of inputs on coffee. It should be noted that in Ethiopia inputs were not generally used on coffee, even prior to CWD. Prior to the onset of CWD, an average of 24% of farmers were using inputs on coffee (19% in Uganda and 29% in Tanzania). Of the farmers who were using inputs, 46% were using organic manure (30% in Uganda and 62% in Tanzania), 16% were using pesticides (ranging from 6% in Uganda to 31% in Tanzania), 44% were using herbicides (only in Uganda), while 14% were using fertilizers (20% in Uganda and 7% in Tanzania). After the onset of CWD, the percentage of farmers using inputs on coffee across the region decreased to only 7% (11% in Uganda and 3% in Tanzania). Of those farmers still using inputs, use of manure fell from 46 to 14%, while the use of fertilizers also decreased from 14 to 6%.

Labour inputs into coffee production fell by an average of 34% (25% in Uganda, 51% in Ethiopia and 16% in Tanzania). Hired labour, however, increased by 28% probably due to additional labour used in uprooting infected stems and other control methods.

3.5.2.2   Farmer coping strategies and factors influencing them

Earlier we looked at specific control methods against CWD, but because methods are not effective farmers are forced to adopt alternatives, so here we examine farmers' broader strategies. Following the onset of CWD, farmers adopted a range of different strategies for coping with the effects of the disease. These included:

- Reallocating labour to other on-farm activities;
- Diversifying into other crops not previously grown, including bananas, beans, cassava, fruit, groundnut, maize, millet, sorghum, onion, peas, sweet potato, tomato, vanilla and yams;
- Starting other non-farm activities, including brewing, fishing and trade;
- Opening up new coffee fields;
- Replacing infected coffee trees;
- Renting out coffee fields; and
- Borrowing money.

There were notable variations in the relative importance of different coping strategies across the region. In Uganda, the most common strategy was abandonment, i.e. to leave the coffee trees to their fate (Figure 3.3): 58% of farmers reallocated labour to other on-farm activities, 22% reallocated labour to off-farm activities and 2% rented out their coffee fields.

In Ethiopia however, farmers included replanting coffee (77%) and replacing infected coffee trees (22%) in their coping strategies, where 'replacing' means planting a new coffee tree in the same place where the uprooted coffee was, and 'replanting' means finding another locality. Unlike other countries in the region, farmers in Ethiopia did not start other off-farm activities nor diversify into alternative crops. This reinforces the impression gained from the spread of the disease described earlier, that the Arabica strain of this disease may be less aggressive to the very diverse coffee varieties there than is the case with Robusta.

In Ethiopia, the choice of coping strategy was influenced by the level of education of the farmer. Farmers with a lower level of education were more likely to replant

Figure 3.3: Dead coffee tree stumps following infestation by coffee wilt disease (CWD) on a smallholder coffee farm in Uganda.

coffee (97%) than farmers with higher levels of education (73%; $p = 0.012$). Similarly, in replacing coffee trees as a coping strategy, farmers with no education at all (29%) were more likely to replace than farmers who had primary school or higher levels of education (9%; $p < 0.05$). Not surprisingly, the greater the severity of CWD, the higher is the probability of the farmer replacing the infected coffee trees ($p = 0.024$). Similarly, the higher the yield before CWD, the higher is the probability that farmers would replant their coffee ($p = 0.037$). Ethiopian farmers, therefore, seem to be especially attached to coffee and those with the least education are the most attached, presumably because they see fewer alternatives to coffee.

In Tanzania, the main coping strategies included replacing infected coffee trees (54%), diversifying into other crops not previously grown (33%), as well as starting off-farm activities such as brewing, fishing and trading (19%).

In Uganda, the choice of reallocating labour from coffee to other on-farm activities as a coping strategy for CWD was influenced by the number of years of experience in coffee farming, the yield of coffee prior to the onset of CWD and whether coffee was the only source of income for the head of the household. Switching to non-farm activities as a coping strategy for CWD was influenced positively by the income of coffee prior to the onset of CWD and the proportion of household labour input into coffee. The likelihood of adopting non-farm activities as a coping strategy was also increased by the proportion of trees lost and quantity of coffee produced before CWD. Thus, the better-off farmers seemed to be most deterred by CWD, whereas the poorest, like the least educated in Ethiopia, who gained the least from coffee, nevertheless were more likely to retain it on their farms (Figure 3.3).

3.6   Conclusions

A principal difficulty is to explain the widely different experience of CWD in the three countries, though it is hard to make firm conclusions from the survey data presented in this chapter, which covered such a wide range of coffee-growing experiences in different countries.

For instance, there seemed to be a significant effect of shade on disease incidence, but to accurately measure type and level of shade was beyond the scope of the surveys, and might well be merely an association between the widespread use of shade in Uganda and the severity of the disease there, which are unrelated. What follows are therefore only tentative conclusions.

In the case of Tanzania, we know from Chapter 2 that it has the lowest rates of severity and spread of the disease of any country afflicted with the disease, despite being present there for over 10 years. From the surveys presented in this chapter, farmers' agronomic practices seemed to fit with what we suspect are the correct actions to take: they carried out the greatest amounts of mulching and intercropping and the least amounts of pruning and slashing. We also found that Tanzanian farmers were those with the highest levels of primary education, as well as the highest percentage who considered coffee to be important to their livelihood. A recent survey by Murphy,[2] however, finds less enthusiasm for coffee among north-west Tanzanian coffee farmers.

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[2] Catherine Murphy, Café Africa Tanzania, personal communication, August 2009.

Additionally, as stated in Chapter 2, Tanzania seems to have had the most proactive approach to controlling the disease through an eradication campaign which is reflected in this chapter in the revealing figure of 83% of farmers who had taken action against CWD, compared to less than 15% in the other countries.

We conclude, therefore, that a combination of educated and motivated farmers, carrying out sensible agronomic activities, adequately supported by government extension efforts, can make an appreciable difference to the impact of the disease. However, this apparent success story is presently only a hypothesis that needs further study to support or disprove.

In contrast, Uganda had the highest level of pruning – though they also had low levels of weed slashing. Shade levels were the highest, which must come primarily from plantain. Remarkably, only 15% of Ugandan farmers regarded coffee as 'important', which is a surprisingly low level for a country where coffee exports are so important. The disease levels measured in Uganda (Chapter 2) were the highest encountered, in fact losses due to CWD were well in excess of the roughly 50% estimates of tree loss and decline in national production, so we must conclude that the sample was not truly representative of CWD in Uganda and may have unwittingly over-sampled the most affected districts. Also, the surveys were undertaken at a time (2002/2003) that we can now see to be probably the worst moment in the history of Ugandan coffee, with very low prices and high CWD incidence, so that farmers' opinions of coffee at that time might have been unduly negative.

It seems somewhat counter-intuitive that the survey should find that the better educated farmers are less likely to try to control CWD, but support for this comes from a study by Benin *et al*. (2002), who state:

> More educated households use less fertilizer and manure, more slash and burn, and obtain lower yields for several crops than less educated households. Thus in Uganda, education appears to cause a trade-off between more intensive land management and higher non-farm income, and improvements in access to education through the Universal Primary Education policy may be one of the factors limiting agricultural intensification in Uganda.

Place and Otsuka (2002) also link coffee farming to tenure issues in Uganda:

> The results indicate that coffee planting is used by farmers to enhance tenure security, while fallowing is practised to a greater extent by farmers on more secure holdings. This supports the notion that farmers consider tenure implications when making investments and that different tenure systems do not inhibit the promotion of tree-planting investment. Tenure had no impact on the productivity of crop farming.

If such non-agronomic issues are a widespread phenomenon, it goes some way towards explaining why some Ugandan farmers may not always be too concerned about the state of their coffee trees, which is a problem for the control and eradication of CWD. With over 1 million farmers reported to have coffee on their farm, however, the true picture in Uganda is inevitably complex and warrants further study.

A tentative picture emerges however: Uganda was slow to react to this disease which has spread especially quickly, perhaps because of substantial movements of people

between coffee zones and this, combined with historically low prices and farmers who were concerned with other crops (e.g. banana that was also affected by a wilt disease) and other off-farm affairs, led to widespread neglect of the disease. Tanzania may well have learnt from the Ugandan experience and implemented control measures in a more timely fashion. However, we feel that the results for the Uganda survey should be augmented by a comprehensive new survey, to elucidate in some depth the history of the spread of CWD because we need to understand what happened, as the CWD epidemic in Uganda is possibly the greatest natural disaster to befall coffee production in an African country.

In the case of Ethiopia, with CWD on Arabica, we see a situation different from both Tanzania and Uganda. Ethiopian CWD is equally well dispersed throughout the country as Uganda, but the severity levels are more similar to Tanzania. The reasons for this are hard to assess and the surveys carried out in this chapter do not throw much further light on them, but it is reasonable to suggest that the virulence of the disease is perhaps less marked on Arabica, possibly due to the greater genetic diversity of tree stock found in Ethiopia. Again, as for the other two countries, further work is needed to assess the validity of these tentative claims.

If we put all these observations together, a disease syndrome can be postulated. It would seem that farms where the coffee trees are old and neglected, with little or no fertilizer, with perhaps only an occasional slash weeding or pruning from farmers who are managing a range of crops – farmers who regard coffee as a sideline – these coffee trees are the most likely to be badly affected by CWD.

At the other extreme, plantations where intensive management is practised, with substantial use of hired labour, these conditions also favour CWD because of the increased risk of infection spread by daily paid workers who are not too careful about damaging a trunk during weeding or cracking a branch during harvest.

In the middle of these two extremes, a smallholder with a good concept of the disease and how it spreads, who practises good soil nutrition techniques and minimizes disturbance to his or her plot – this farmer might be best placed to cope with this disease.

Farmers' own efforts at control have mostly been unsuccessful and many of them have simply abandoned coffee altogether, or reduced dependence on it. It was obvious from these surveys that nearly all farmers are generally in a distressed situation, with a great preponderance mentioning declining incomes from coffee and hence a decline in the importance that farmers attribute to coffee. It is difficult to disaggregate the effects of disease and low prices in their decisions and perceptions, but it is clear that farmers themselves attribute declines in yield to increased disease levels.

Overall, the surveys revealed some uncomfortable facts. Levels of fertilizer application, mulching and pruning, which are essential to maintain a good yield, were mostly very low. Despite the prevalence of the disease throughout the East African region, the surveys revealed that farmers' awareness and knowledge of CWD was unexpectedly low, except for Uganda where 90% of coffee farmers were aware of it.

Farmers clearly found it difficult to understand the nature of the disease and their use of diseased coffee wood for a range of purposes confirms that many do not understand

Figure 3.4: Infected coffee trunks for sale.

how the disease is propagated. One of the most disturbing aspects of the surveys was to find situations such as that in Figure 3.4.

This tranquil and apparently innocuous scene shows how easy the transport of infected material can be. It potentially constitutes a major infestation route, as people buy firewood on their way to visit other farms or to sell their produce. Currently, there is little to stop this happening in most countries of the region, including across borders.