CROP PROTECTION

VISIT TO THE GOPDC / SIAT / NUCLEUS ESTATE - SMALLHOLDERS AND OUTGROWERS

23 to 28 February 2004

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Oil Palm

CP Sic 1703
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CONTENT

SUMMARY

The time allowed for the visit was very short, so it was not possible to carry out a more detailed and more meticulous analysis than the one presented in this report.

Nevertheless, it was possible to see the seriousness of the outbreak of this dangerous pest for oil palm throughout West Africa.

For the Nucleus Estate (NES), the situation is highly catastrophic and is approaching the situation seen in 1985, which required aerial intervention in 1986-87 throughout the NES.

The current situation (over 2 000 ha infested) arises from two main factors:

- Unden stocks have run out on several occasions, or treatment cycles were ineffectual as they usually remained incomplete.
- Hesitation in treating as some blocks were reserved for organic oil production. In fact, treatments lead to quarantining of plots treated with synthetic insecticides for a period of three years.
- It is clear that other factors are also involved, given the large volume of work arising from this massive outbreak: programming of inspections, treatment dates linked to inspection frequency, etc.

The deterioration in the phytosanitary condition of the NES has irremediably led to contamination of the Smallholders (1 000 ha) and Outgrowers (over 1 000 ha), which are also very severely defoliated.

This deteriorated situation in the Kwae zone results from three intensive pest multiplication cycles (i.e. 9 months), as in 1985 moreover. The Kwae site is therefore highly suitable for this oil palm leaf miner.

Of course *Coelaenomenodera* does not kill the palms, but the very severe defoliation it causes simply induces an average 50% drop in production for two years. This effect is all the stronger the drier the climate is in the years following severe defoliation.

Such an outbreak would have warranted aerial treatment if Unden powder at 75% a.i. or Evisect S had been sure to be available, but the latter was only available in December 2003, imported directly from Japan.

VISIT TO GOPDC/SIAT AT KWAE
23 TO 28/02/2004

MISSION SCHEDULE

Tuesday 24 February 04	Morning / Trip from Accra to Kwae by private car. Afternoon / Analysis of plot inspection record sheets with Mr BOATENG and short visit to the Nucleus Estate with Mr AMOH-OTU.
Wednesday 25 February 04	Morning: Visit to Okumaning with WIAFI and Mr AMOH-OTU Afternoon: Visit to Nucleus Estate with Mr AMOH-OTU
Thursday 26 February 04	Visit to Nucleus estate and Smallholders with Mr AMOH-OTU
Friday 27 February 04	Visit to Outgrowers with Mr KEME-MENSAH.
Saturday 28 February 04	Brief discussion with Messrs AMOH OUT, KEME MENSAH, Emmanuel WIAFI, Pascal DIEZ and VANDERSMISSEN. Departure for Takoradi at about 11:30 am.

NB: Throughout the visit Mr Pascal DIEZ, a new SIAT Project Manager, accompanied us to acquire information on the leaf miner situation.

ACKNOWLEDGEMENTS

We should like to thank all the managerial staff at the Kwae plantation: Mr. AMOH-OTU, Director of the Agriculture Service, Mr Maxwell BUABENG, Plantation Manager, Mr KEME-MENSAH Outgrowers manager, Mr Pascal DIEZ, new Project Manager, and particularly Mr Gert VANDERSMISSEN, for the warm welcome received and for doing everything to ensure the smooth running of the mission.

INTRODUCTION

Following the previous visit from 9 to 20 April 2001, the phytosanitary condition of the Kwae oil palm plantation was found to be very worrying but not yet alarming at that time. Since the beginning of 2001, numerous small foci had been appearing, especially in bottomlands that remain humid, where the palms produce higher yields than on the ridges.
During the visit from 21 to 24/10/02, it was seen that the *Coelaenomenodera* situation was already very worrying. A recurrence of the populations had been seen since the end of 2001 (CP SIC 1349, 09-20 April 01). Several series of treatments were carried out in numerous plots, sometimes successfully, but in half the cases reinfestation has occurred, though the treatments were apparently effective against adults (2002 mission report).

A short visit was made in February 2003 (brief note on the visit dated 13/02/03). The new cycle of treatments against *Coelaenomenodera lameensis* had begun well at Kwae but manufacture of the Unden liquid formulation at Kumasi was halted, which annoyingly resulted in stocks running out. Consequently, a certain number of plots were fortunately treated perfectly in 3 to 4 rounds, but a large area remained that had only been treated in one round or in two rounds. At that time, the plantation placed an urgent order for Unden liquid 20% EC with Brussels. It was hoped that the product would reach Kwae within a week at the most, in time to prevent the new generation of females from laying eggs.

Information was received regularly about the *Coelaenomenodera* populations at Kwae in the form of a computer file in Excel format. We made comments where necessary.
No further information was received on the leaf miner situation at Kwae between February 2003 and December 2003. A visit was requested in December 2003 by the plantation, but my work programme at Takoradi meant that the request could not be met. The visit was only able to take place in February 2004.

Over the last two years, the plantation has experienced insecticide supply problems (Unden, then Evisect S).

CURRENT SITUATION

On the afternoon of Tuesday 24/02/04, a brief visit to the Nucleus Estate revealed the wide extent of damage caused by this leaf miner. Defoliation is already severe to very severe in blocks J, I, H, G, F and E. It is generalized throughout the plots. These are not simple scattered foci as in 2001 and 2002. The situation is truly critical and approaching that of 1986. At Kwae, the pest finds the best conditions for an outbreak: existence of bottomlands, production maintained at a high level through satisfactory nutrition on the whole, etc.
The drop in yields will therefore be substantial over the next two years.

DETAILED ANALYSIS

Phytosanitary file

The old Excel file has been converted to an Access file, which makes use of Coelaeno indexes more difficult. Sometimes, dates are not listed in chronological order, making it difficult to keep track of changes in the pest populations. This is due to a strange reaction of the Access program. Automatic generation of false dates makes it extremely difficult to understand the file.

Apparently, the plantation is going to switch to using a special file from a management software developed by an Indian company. It was promised that conversion to an easily usable Excel file would be possible.

Be that as it may, the phytosanitary computer file is still well kept and entries are made with care.

The recap sheets are also well kept, which facilitates their inputting into the computer file.

But the detailed field sheets are not classed by plot and by chronological order as before, so it is not possible to check data details easily.

However, some data are missing, namely the indexes for larvae and adults inside any foci that might exist in the plots. Yet two columns are provided in the file, but they are never filled in, as indexes for inside the foci are never calculated. Knowledge of those indexes makes it possible to assess the distribution of larva and adult populations inside plots. It may be a matter of a localized focus, or of generalized infestation within a plot. These calculations also make it possible to bring out any irregularities in hot-fogging treatments, and to repeat treatments only in a zone that is still infested and not over the entire zone initially marked out.

It is also useful to record any rainfall, which might disrupt treatments and explain why intervention was ineffective. Other details, such as a lack of insecticides during treatment cycles can be useful for understanding the spread of damage caused by this pest in the different plots.

Thus, the person in charge of entering data in the computer file must keep informed at all times by the head of the phytosanitary inspectors.

PHYTOSANITARY INSPECTIONS

The results of the inspections seem to be satisfactory, based on a few checks made during the visit.

However, the frequency of inspections is sometimes not respected or not correctly followed, so it is not always possible to calculate the treatment dates properly. This is probably due to overloading of the special inspection programmes and the insufficient number of phytosanitary inspection teams. When the time comes, the number of teams will have to be adjusted to satisfy the requirements of the Nucleus Estate. The same applies for the Smallholders and Outgrowers.

Such requirements need to be estimated more rapidly, as a certain amount of training has to be organized for new phytosanitary teams.

PHYTOSANITARY TREATMENTS

In view of the area to be treated, the plantation managers have set up two treatment teams: one operating very early in the morning, the other at night. Daily work output is around 15 ha per day per team. As this method is known to be highly dependent upon climatic

conditions-wind speed, upward air currents especially at dawn, rainfall, etc.-daily output consequently varies.

The plantation now has 5 Pulsfogs for the Nucleus Estate and the Smallholders and only one for the Outgrowers. The number of Pulsfogs will have to be increased given the size of the *Coelaenomenodera* problem.

On the whole, the treatment dates have been well calculated in accordance with the recommended norms. However, it does happen that a few dates are not properly estimated due to inspection frequency errors.

Of course, a plot is considered to have been cleared of the pest once adult indexes are below 1 after the three treatment rounds. However, applications require more discernment: the three hot–fogging treatment rounds are usually compulsory. The treatment should be repeated if it rains less than an hour after application. At the end of the third round, if inspections reveal adult indexes over 1, it means there have been treatment irregularities resulting from various known causes beyond anyone's control. Such irregularities then need to be localized within the plot and only the remaining pockets of the pest should then be treated, not the entire area initially treated in a given plot. This will save on insecticides, especially in a crisis period when rapidity is called for!! Carrying out 4th and 5th treatment rounds might delay intervention in other parts of the plantation where the situation is more urgent.

The machines are now well maintained: a mechanic accompanies each treatment team to intervene as and when needed. Given the intensive operation of these machines, some parts are rapidly worn out: e.g. carburettor diaphragms, product tank (the plastic melts with the intense heat of the combustion chamber). There were too few of these spare parts in the store at the time of the visit.

A complete list of spare parts available at the plantation has been drawn up. This has revealed the missing parts that need to be ordered quickly.

DATA ANALYSIS AND VISIT TO THE NUCLEUS ESTATE

Block J

An analysis of the computer file reveals, for example:

Plot JN20 :	06/11/03	173 Larvae	0 Pupae	3 Adults
	06/12/03	164	175	13.75 = Wrong frequency
	23/12/03	17 "	138 "	29 "
		24/12/03	T1	Treatment date too late
		11/01/04	T2	interval between 2 rounds is too long (18 days instead of 14 days).
			No T3 (lack of insecticide?)	

Plots JN19 and JN18 Same situation as JN20

N.B. = T1 = First treatment round
T2 = Second treatment round
T3 = Third treatment round
T4 = Fourth treatment round
T5 = Fifth treatment round

Plots visited:

JN19: Severe to very severe defoliation. Existence of small larva galleries on F9. Few living adults. On another F9, no living adults and a few small larva galleries. Average treatment effectiveness. Recovering. To be monitored.

JN18: Severe to very severe defoliation. Two F9 with a few adults and a few small larva galleries. Recovering. To be monitored.

Block I

An analysis of the computer file shows, for example:

IN24 Since 20/04/03, there has been no treatment.
25/12/03 The treatment was only carried out from this date lack of insecticide.....?

IN23 After 18/11/03 checks were made every two weeks, then every week but T1 was not well estimated. No T3 (lack of insecticide?)

IN22 and 23 Same situation as IN23

IN15 T2 on 28/01/03 without T1
07/05/1936 cat 1 wrong date generated by the software.
T3 on 30/01/04 (curious!)

IN14, IN13, IN12 Same situation as IN15

Visited plots:

IN23 Moderate to severe defoliation. One F9 with a few living adults and a few fresh egg-laying sites. A second F9 with a few living adults and some dried up egg-laying sites. Treatment has been effective. Recovering. To be monitored.

IN22 Moderate to severe defoliation. One F9 with a few adults, some small larva galleries and a few dried up egg-laying sites. Recovering. To be monitored.

Block H

An analysis of the computer file shows, for example:

HN12 treatment too late
13/12/2 138 Larvae
17/01/03 New check wrong frequency

Error in inspection date presentation in the Access base, e.g.

: HN11 03/03
30/04 ??
26/03
15/04

Visited plots:

HN23, HN24 :Severe to very severe defoliation. One F9 with a few adults, some small larva galleries and some fresh egg-laying sites. Recovering. To be monitored.

HN15 : Severe to very severe defoliation. One F9 with some adults, no small larva galleries and no fresh egg-laying sites. Recovering. To be monitored.

Block G

An analysis of the computer file shows, for example:

GN26 No treatment even with a high index in 2003
GN25 No treatment since 2002
GN24, GN23, GN22, GN21, Last treatment in July 2003
GN20 Last treatment in February 2003
GN19, GN18, GN17, GN16 Last treatment in June 2003
GN15, GN14, GN13, GN12 Last treatment in September 2003
GN11 to GN05 22/01/04 T1 without T2 and T3

Block F

An analysis of the computer file shows, for example:

FN22, FN21, FN20, FN19 Last treatment in June 2003
FN18, FN17 Last treatment in August 2003
FN6, FN15 Last treatment in September 2003
FN14, FN13 Poor inspection frequency since 11/11/03
Poor treatment round interval: from T2 to T3
FN12, FN11, FN10, FN09 Last treatment in September 03, but the adult indexes where not high even after very high larva indexes in November 03.
FN08 Last treatment in July 03. No other treatment despite an increase in the adult indexes in November 03.
FN07 Last treatment in July 03. No other treatment despite an increase in the adult indexes in September 03.
FN06 No treatment despite high adult indexes (22 adults) in August 03.
FN05 to FN01 No treatment despite high adult indexes (10 adults maximum) throughout 2003.

N.B.: In some plots there were up to 5 treatment rounds (T4 and T5) when indexes were around 2 adults, whereas in FN06 to FN08, no treatment was carried out despite indexes over 10.

Visited plots:

FN05 : Defoliation still only slight. Numerous small larva galleries on F17 (L1 and L2). The adult cycle will begin in 45 days (around 9 April 04). Meticulously evaluate the adult population. The decision to treat will be taken if the adult population exceeds 10.

FN04	:	Defoliation still only slight. Some L3 on F25 – On F9, predominance of L1 and L2. The adult cycle will begin in 45 days (towards the end of March, beginning of April 04). Meticulously evaluate the adult population. The decision to treat will be taken if the adult population exceeds 10.
FN08	:	Defoliation still only slight, but there is more defoliation of lower fronds inside the focus. A few small, healthy larva galleries (L1 and L2) on F25. On F17, numerous small galleries (L1 and L2). Meticulously evaluate the adult population. The decision to treat will be made if the adult population exceeds 10.
FN07	:	Defoliation still only slight, but there is more defoliation of lower fronds inside the focus. Numerous small galleries (L1, L2 and beginning of L3) on F17. Meticulously evaluate the adult population. The decision to treat will be taken if the adult population exceeds 10.
N.B.:		Block F warrants close monitoring as defoliation is not very marked in some plots. Production potential can still be saved. However, careful thought should be given to the decision to treat. *The adult population must be over 10 on the 1st round.* ***Severely to very severely defoliated zones in this block F are currently recovering. So no further treatments are necessary. To be monitored.***

Block E

An analysis of the computer file shows, for example:

ES04 to ES01	Fluctuation in the indexes but no outbreak
EN 18 to EN 15	Despite larva indexes of 500 to 1 000 on fronds, the adult indexes remain low.
EN14	No treatment with very high larva and adult indexes.
EN13 to EN10	No treatment with moderate to low adult indexes
EN09 to EN06	1 treatment cycle since December 03 but on a wrong date as the inspection frequency was not right.
EN05 to EN03	No treatment with very high larva and adult indexes.
EN02, EN01	Fluctuation in indexes but no outbreak.

Visited plots:

EN07	:	Defoliation still only slight. Only 1 treatment round carried out in December 2003. Population very low to zero on F17. Some galleries on F9 with a few adults. To be monitored.

EN08	:	Moderate to low defoliation. Only one treatment round carried out in December 2003. One F17 with a very small to nil population. One F9 with numerous larva galleries, of which 70 to 80% have dried out. To be monitored. *The good result in these two plots is unexpected.*
EN16	:	Severe to very severe defoliation. Numerous small larva galleries (beginning of L3) on F9, along with a few adults. To be monitored.
EN17	:	Severe to very severe defoliation. Numerous small larva galleries on F5 or 6, of which 80% have already been dried out by sunlight; and a few adults. To be monitored.
ES2	:	Very slight to slight defoliation. Numerous small larva galleries on F17, with the beginnings of L4. To be monitored very closely to assess whether the fluctuation in populations without an outbreak is actually real in this plot.
ES1	:	Defoliation still only slight. Slightly more L4 on F17. To be monitored very closely to see whether the fluctuation in populations without an outbreak is actually real in this plot.

N.B.: Plots EN11 to EN18 are intended for organic oil production. It is not surprising that there is substantial defoliation. Organic oil production is not compatible with chemical treatments.

The severely to very severely defoliated zones in this block E are currently recovering, so no further treatments are necessary. To be monitored.

Block E also warrants very close monitoring as defoliation is not very marked in some plots (e.g. ES). The production potential can still be saved, but careful thought must be given to the decision to treat. *The adult population must be over 10 on the first round.*

Block D

An analysis of the computer file shows, for example:

DS08, DS07	2 pointless treatments in November and December 03.
DS06	2 treatment rounds only
DS05, DS01, DS02	4 treatment rounds
DS03, DS04	Last treatment in May or June 03 but the population remains stable by self-regulation.

DN01 to DN04	T1 28/11	right treatment date
	T2 13/12	15 days after rather than 14 days after
	T3 02/01	20 days after rather than 14 days after
	T4 22/01	20 days after rather than 14 days after

DN05, DN06	4T + T5 carried out a few days too soon in relation to the previous rounds
DN07, DN08	4T
DN09	3T
DN10 to DN15	4T

Visited plots:

DN07 & DN08, DS01 & DS02:	Defoliation still only slight to very slight. Very small population. Effective treatment in 4 rounds.

Block C

An analysis of the computer file shows, for example:

CS01, CS02	Last treatment in August or September 03
CS03, CS04	3 pointless treatment rounds as the larva indexes were low (16 or 26 larvae on average)
CS05 to CS10	Last treatment in June 03
CS10, CS11 (1982)	No treatment from 2001 to 2003. Good self–regulation.
CN01 to CN04	Intervals between rounds of more than 14 days (16 to 17 days).
CN05 à CN11	4 treatment rounds.

Visited plots:

CS02 :	Defoliation still only slight to very slight. Very small population.
CS09 :	Defoliation still only slight. Large population on F17. Beginnings of pupation.
CS08 :	Defoliation still only slight. Large population on F25. Beginnings of pupation.
CN08 & CN07 :	Defoliation still only slight. Very small population on F17.

N.B.: Block C also warrants very close monitoring as defoliation is not very marked in some plots (e.g. CS07 to CS10e). The production potential can still be saved, but careful thought must be given to the decision to treat. *The adult population must be over 10 on the 1st round.*

Block B

An analysis of the computer file shows, for example:

BN01 to BN04	Last treatment in August 03 in 2 rounds only
BN05	No treatment, though the indexes are high.
BN06	Last treatment in February 03. A rise in the indexes in November 03

BN07	No treatment in 2003. A rise in the indexes in November 03
BN08	Only 1 treatment round in December 03.

BS01	Last treatment in August 03		
BS02	26/11/03	T1	
	13/12/03	T2	
	30/12/03	T3	
	18/01/04	T4	Intervals between rounds too long
BS03, BS04	No treatment in 2003	26/09/03	22 Adults
BS05, BS06, BS07, BS08	25/11/03	T1	
	08/12/03	T2	
	24/12/03	T3	
	10/01/04	T4	Interval between rounds too long
BS06, BS07 (82)	No treatment despite high larva indexes.		
BS09, BS10	No treatment.		
BS09 (82) to BS10 (82)	No treatment in 2003		
BS11 to B13 (82)	No treatment from 2001 to 2004		

Visited plots:

BN06 :	Low to moderate defoliation. 1 F17 with small galleries, some of which have dried out. Some L4. Treatment already carried out a few months earlier.
BN07 :	Moderate localized defoliation. 1 more infested F17 with numerous small larva galleries. To be monitored.
BS02 & BS01 :	Defoliation still only very slight. Small to very small population on F25.

Block A

An analysis of the computer file shows, for example:

A9 to A15	No treatment. Good self-regulation.		
AN01	26/12/02	T1	too soon!
	08/01/03	T2	
	23/01/03	T3	
	27/02/03	T4	1 month after T3 so pointless
	11/08/03	T1	
	27/08/03	T2	
	10/09/03	T3	
	07/10/03	10 Adults but no treatment	
	02/01/03	6.6 Adults but no treatment	
	17/02/04	12 larvae + 2.5 adults	

AN02	08/05/03	T1 dating based on a single inspection 1 month after the previous one.
	22/05/03	T2 14 days after
	05/06/03	T3 14 days after
	22/06/03	T4 17 days after
	05/07/03	T5 13 days after
	13/08/03	T1 New treatment cycle too soon after the previous one, suggesting that the previous set of treatments was ineffectual.
	27/08/03	T2 14 days after T3 not carried out despite indexes of 13 adults.
AN03, AN04	11/03/03	
	04/08/03	It is curious that records for April, May, June and July 03 are nonexistent.
	07/08/03	T1
	23/08/03	T2 T3 not done
AS01	13/08/03	T1
	26/08/03	T2
	10/09/03	T3
AS02	Treatments continually throughout the year. It is difficult to follow and understand the treatment decisions.	
AS03, AS04, AS05	Treatments halted in August 2003 Treatments resumed in November 03	
	25/11/03	T1
	08/12/03	T2
	23/12/03	T3
	05/01/03	T4 not done
AS05 (85), AS06 (85)	Treatment throughout 2003	
	15/08/03	T1
	19/08/03	T1
	31/08/03	T2 T3 not done
AS07 (85)	26/08/03	Only 1 treatment round
AS08 (85)	No treatment in 2003	
AS09 (85)	Last treatment in March 2003	
AS10 to AS15 (85)	No treatment in 2003	

Visited plots:

AS09 :	Very severe defoliation. Some pupae on F9, and numerous galleries. Organic plot, being converted, so no treatment authorized so far.

AS08	:	Very severe defoliation, 1 very dry F9. 1 F5 with the beginnings of pupation and numerous larva galleries. Organic plot, being converted, so no treatment authorized so far.
AN02	:	Slight to very slight defoliation. A small population of larva galleries on F25, a larger one on F17. To be monitored as this plot has already been treated.
AN01	:	Slight to very slight defoliation. Small to very small pest population on F17 and F25
N.B.:		Block A warrants very close monitoring as defoliation is not very marked in some plots (e.g. A12, A11, AN02, AN01). The production potential can still be saved, but careful thought must be given to the decision to treat. *The adult population must be over 10 on the 1st round.* ***The severely to very severely defoliated zones in this block A (AS09, AS08...) are currently at the end of the outbreak, so no further treatments are necessary. To be monitored.***

VISIT TO OKUMANING

Visited plots: A3 and A5 (2002), a private plantation next to plot A8.

In A3, there are still plenty of Coelaeno adults (indexes 4 to 5). There is damage by adults but it is not a threat to the plants. Existence of *Zonocerus variegatus*.

In A5 and A8, there is less damage by Coelaeno adults.

In the smallholding next to the commercial plantation, there is no defoliation and the pest is at a very low level. It is therefore difficult to determine the origin of the adults in the commercial plantation.

A few attacks by *Oryctes* adults were reported in plots C2, C3 and C4 due to some old palms that had been felled in those plots. A Karate solution can be sprayed (3 ml of Karate per litre of water) or sawdust impregnated with the same insecticide can be used (10 ml of Karate per litre of water). This product has an excellent repellent effect. In the event of severe attacks, the new physical control method will be used: inserting rolled up nylon fishing nets with a 1.7 x 1.7 cm mesh.

For the young variegated grasshoppers, spot spraying with Decis or Karate will succeed in preventing damage, which is not extensive yet. Spraying should be carried out very early in the morning or very late in the evening as variegated grasshoppers then congregate in colonies on a few plants.

VISIT TO THE SMALLHOLDERS

The Smallholder plot inspection sheets were not supplied prior to the visit for lack of time.

In any case, it can easily be seen that the outbreak in the Smallholders is the direct consequence of the very severe defoliation in the Nucleus Estate. This has led to massive migration of *C. lameensis* adults in all directions.

The approximately 1 000 hectares of Smallholders are entirely infested by this pest.

A felling programme is under way in the Smallholders (see map).

It would be wise to refer to this programme to manage this outbreak, in order to avoid pointless spending on insecticides. The section shaded in green (1979 plantings) on the said map, amounting to 223 ha, is being felled.

The 1980 plantings (blue X on the map) are to be felled in 2005 and the 1981 plantings (in grey on the map) in 2006. Given their severe to very severe defoliation and the future yield losses (50% over two years), it will be more reasonable to bring forward their felling after this year's production peak, and once the 1979 plantings have been felled.

The second reason the balance should be tipped in that direction is as follows: this zone must absolutely be cleared of the pest as soon as possible, prior to planting, otherwise the young palms planted risk massive infestation by adults.

Thus, once the young plantings have been set up, a sanitary cordon will have to be established by eliminating a maximum number of adults in the old defoliated plots. It would also be advisable to fell palms as much as possible during the small larva period (L1 to L3); that gives us around a month. If felling is carried out when new adults are emerging, there is a risk of massive migration which will have to be stopped by hot-fogging.

It will then be necessary to clear the pest from the 1982 plantings (194 ha), which will not be felled until 2007. Over the same period, it will also be necessary to clear the pest from the 1998 plantings (349 ha), which are currently being severely attacked by adults everywhere. The knapsack power sprayers could be used with an aqueous solution of Evisect S if the palms are still within the range of the spray lances, otherwise the Pulsfogs will have to be used. If the sprayers can be used, treatment could be carried out right in the middle of the larva cycle, as Evisect in an aqueous solution has a larvicide effect being systemic via the leaves.

Consequently, a programme of special checks needs to be drawn up to date treatments in these 1982 and 1998 plantings. Extreme care is recommended during planting, so as not to subject seedlings to massive adult attacks.

To prevent any *Oryctes* outbreaks, it would be wise to encourage dense *Pueraria* development after windrowing the oil palm stems. We also hope that palm wine extraction has been properly carried out, which will limit the proliferation of that pest.

VISIT TO OUTGROWERS

The area of the Smallholders is around 3 times larger than that of the Nucleus Estate: more than 12 000 ha primarily occupying bottomlands, which are highly suitable sites for *Coelaenomenodera* (see map of Outgrower distribution).

We have introduced a simplified form of Outgrower monitoring so as to manage the phytosanitary situation with the help of farmers and Outgrower Officers, and just one team of inspectors.

A few plots were treated at the end of 2000. Despite that date, no news of any infestation of Outgrowers was received up to the time of this current visit.

Prior to the visit, Mr Keme Mensah estimated that the infested area in the Outgrowers amounted to around 1 500 ha. Given the time available, we did not have the special record sheets for the infested Outgrowers. Consequently, a general idea of infestation could not be gained at the outset, as for the NES.

On the morning of 27/02/04, the Outgrowers were visited along the southern edge of the Nucleus Estate near the village of Otumi, then on up to Asuom, and Amanfrom.

A few plots were visited:

86/0T/040 plot bordering on the Nucleus Estate (NES). Palm defoliation is severe to very severe, especially on the edge of the NES. A certain number of adults remain after two treatment rounds in December 03, with few or no larva galleries. Defoliation is less inside the plot: moderate to severe. This clearly proves that contamination is coming from the NES.

Along the track following the southern edge of the NES, 5 Outgrowers were treated in December 03.

86/0T/008 same situation as the previous plot.

86/0T/ ? near plot 008. Larva population very small to nil on F25 and F17. 30 old adults remain on F17. It is pointless treating.

86/AS/002 Very severe defoliation. Plot near IN17 (NES) which is also very severely defoliated. 1 very dry F17. 1 F9 with 3 adults but no larvae.

86/AS/ ? Very severely defoliated

88/AS/ ? Moderate to severe defoliation. Numerous adult attacks with few larvae on 1 F17. On 1 F9, small galleries are being dried out by the sun.

From, Akenkaase gate moving away from the NES:

86/AK/061 0.4 km from the NES – Severe to very severe defoliation – 1 very dry F17– 1 F9 with numerous small galleries. An outbreak developing – Little mortality – To be monitored.

92/AK/028 Plot bordering on the previous one – 1 F9 with numerous dried out galleries and another F9 with numerous live galleries – 1 very dry F17– Severe to very severe defoliation – To be monitored.

1.2 km from the NES, other very severely defoliated Outgrowers
2.3 km from the NES, other very severely defoliated Outgrowers
2.7 km from the NES, other very severely defoliated Outgrowers
3 km from the NES, other very severely defoliated Outgrowers
4.1 km from the NES, other very severely defoliated Outgrowers
5.2 km from the NES, other very severely defoliated Outgrowers
6.2 km from the NES, other very severely defoliated Outgrowers
A left turn was then taken (no GPS to indicate the direction).

7.2 km from the NES, the Quarshie Steven plot shows severe infestation with moderate defoliation on the whole - 1 very dry F17 – 1 F9 with numerous small galleries surrounded by a yellow halo which could block their evolution (plant reaction?) – To be monitored.

These yellow halos suggest the existence of tannins, which are harmful to the larvae of this leaf miner, as observed during a study of Coelaeno development on the interspecific hybrid. Recently in 2003, we found the existence of resistance genes in some oil palm origins planted at Pobé (Benin).

9.1 km from the NES, other very severely defoliated Outgrowers

11 km from the NES, Amanfrom village (collection centre)
12.8 km from the NES, last Outgrower on this road.

From Asuom centre, the surrounding Outgrowers are severely defoliated
1.4 km from Asuom, very severely defoliated Outgrowers
1.8 km from Asuom, very severely defoliated Outgrowers
2.1 km from Asuom, very severely defoliated Outgrowers
2.4 km from Asuom, very severely defoliated Outgrowers

3.6 km from Asuom, 1 Outgrower with defoliation that is still slight: 92/AS/ ? = 1 F9 with numerous small active galleries, and on 1 F17 – No yellow halo around the small larva galleries – To be monitored.

At 4.2 km, 1 private plantation with a very interesting case: existence of a large number of Pisifera and few Tenera. Obviously some Coelaeno on F17: numerous larva galleries, of which more than half are already dried out, with the existence of small yellow halos around the small larva galleries. 1 F9 with a lot of adult damage but the existence of a small number of small larva galleries. There is therefore a plant reaction that seems to regulate the pest population. The origin of the planting material in that plantation remains to be determined.

In the afternoon, departure from Kwae gate towards James Town, Old Abirem and New Abirem:

86/KA/018 Treatment in December 03 in 2 rounds: 1 F17 with few small larva galleries.

86/KA/049 Treatment in December 03 in 2 rounds: 1 F17 with few small larva galleries.

86/NA/108) These three plantations were treated in January 04. Defoliation is
81/NA/040) moderate to severe - 1 F9 with few larva galleries and 9 old
92/NA/064) adults – another F9 without small larva galleries – 1 F17 without small larva galleries
92/NA/061)
89/NA/065) 1 treatment was enough to eradicate the Coelaeno population. That means that the expense of that treatment round could have been avoided by very closely monitoring the development of the insect's populations in this plot. Indeed, numerous adult attacks can be seen on 1 F17, without small larva galleries.

87/AF/11 This plot has not been treated yet, but it has a large population of small larva galleries (L1 & L2) on lower fronds. Yellow halos were seen around the small larva galleries on the lower fronds. To be monitored –
Do not treat at the end of the larva cycle and carefully analyse the adult population.
The decision to treat will be taken at the end of the next pest cycle. This will enable us to assess any self-regulation. The phytosanitary records should be sent to us by e-mail so that we can evaluate the population dynamics. It will not be too late at the end of the next cycle. Defoliation will only be just about perceptible throughout the plot.

5 other plots are in the same situation:
87/AF/10 + 92/AF/21 + 92/AF/62 + 88/AF/01 + 88/AF/15 6 - Monitor with twice–monthly checks.

DISCUSSION and CONCLUSION

The current phytosanitary situation at the Kwae plantation and its surrounding area is catastrophic: more than 2 000 ha of the Nucleus Estate are infested by *Coelaenomenodera* which finds highly suitable conditions at Kwae for its massive and rapid multiplication. With insecticide stocks (Unden) running out, it was not possible to eradicate the pest foci rapidly. Then, the absence of treatments in some plots reserved for organic oil production did not facilitate chemical interventions, which fell behind. Remember that a plot treated with synthetic insecticide is irrevocably quarantined for 3 years. This deterioration in the situation means that the phytosanitary inspection teams are overloaded with work. This has occasionally led to some errors in estimating the treatment dates. In such a crisis period, it would have been preferable to manage the situation as tightly as possible, by not putting the finishing touches to treatments and carrying out T4s and T5s on the entire area delimited for the first round. In that way, insecticide savings could have been made for intervention in other severely infested plots. Of course, the number of treatment teams has been wisely doubled, but the number of phytosanitary inspection teams ought to have been increased at the same time.

The gradual increase in the defoliation of the Nucleus Estate caused massive migration of adults to the Smallholders (around 1 000 ha), which are now completely infested with severe to very severe defoliation. The situation has to be managed in line with the current felling programme, to avoid wasting Evisect S insecticide, which is expensive, and to eliminate a maximum number of this pest's adults and limit the contamination of young palms that will soon be planted in the Smallholders.

Massive migration of *Coelaenomenodera* adults to the bordering Outgrowers has also occurred. This then spread very rapidly to neighbouring Outgrowers over a large distance (more than 20 km from the NES). A very rough estimation of Outgrower infestation gives a severely to very severely defoliated area of 1 000 ha at least to the South of the NES (Villages of Asuom and Otumi) and to the Northeast (Village of Amanfrom). Some chemical treatments have been carried out with good results, but the potential for intervention in the Outgrowers is very limited with a single Pulsfog. It is also too late to intervene in the severely defoliated plots, as only two or three still green fronds will be saved per palm, and the drop in yields will not be avoided for all that. Effort should therefore be focused on plots that are still green, where infestation is irremediably beginning. The Outgrowers have not been fertilized for at least three years. The potassium level is very low. If this leads to a notable drop in production, it ought to adversely affect build-ups of this pest. In the absence of any contamination, the Outgrowers should remain healthy except under certain very particular conditions, as in six plots between the villages of Afosu and New Abirem, where the situation needs to be closely monitored and managed accordingly.

RECOMMENDATIONS

- The phytosanitary inspection teams should be increased as and when needed, be it for the NES, Smallholders or the Outgrowers. Requirements should be formulated without delay, as it takes time to train the inspectors and obtain conscientious and reliable teams.

- Computer file keeping needs to be improved, by specifying the larva and adult indexes inside foci before and after treatment. Any untoward events that might occur during treatment cycles should also be recorded, so that the reasons can be found for treatments failing.
  The change in the phytosanitary data management software should prevent any chronological mix-ups in data sheet classifications and also prevent the creation of false dates.
  The special check sheets should be classed by alphabetical and chronological order, to facilitate data consultation.

- A sufficient reserve stock of Evisect S should be built up to deal with any outbreak, be it in the NES or in the Smallholders. We feel that a permanent stock of 1 000 kg would easily be enough. As soon as that stock is started on, an urgent order should be placed immediately in accordance with the area to be treated. This quantity of Evisect would be sufficient to treat a total of 2 000 ha, i.e. 667 ha in 3 rounds.

- We advise placing severely to very severely defoliated plots on stand-by, and observing them monthly up to complete recovery of their canopy. However, plots that are still green should be protected, taking into account the fluctuations in the pest populations in those plots, so as to use insecticide more sparingly. This applies as much for the Nucleus Estate as for the Smallholders and Outgrowers.

- When marking out foci, it is preferable to delimit infested zones as widely as possible for the first treatment round and then reduce if possible during subsequent rounds (see October 2002 mission report).

- It is preferable to specialise the inspection teams, as is done for the treatment teams. It is useful to set up some teams for an ordinary census and other teams for special checks (monthly and fortnightly or weekly).

- The T4 or T5 should be carried out more discerningly, when there are irregularities in treatments, and only in clearly defined zones.

- There is a good stock of spare parts, but it must be regularly updated. Even so, a few important spares are missing, such as carburettor diaphragms, insecticide tanks. An order should therefore be placed as soon as possible.

- We recommend acquiring 5 new Pulsfogs for the NES and the Smallholders, along with two others for the Outgrowers.

- We advise SIAT to appoint a full-time agent (a field entomologist to be precise) to manage oil palm protection matters at close hand. This proposal is supported by several reasons:

  - The Kwae site is highly suitable for *Coelaenomenodera,* the main pest on mature palms in West Africa. All in all, outbreaks of this pest are quite frequent and unpredictable. Good, very close management could facilitate the control of this leaf miner: monitoring of this insect's populations, marking out of infested zones, decision-making for chemical treatments, management of insecticide and spare parts stocks. The agent will be responsible for the Nucleus Estate (around 4 000 ha), Smallholders (around 1 000 ha) and Outgrowers (around 14 000 ha), i.e. a total of around 19 000 ha. The agent will also be in charge of crop protection at the other SIAT plantations.

  - The agent will be responsible for testing new insecticides against this insect. In fact, at the moment, with problems in procuring supplies of Unden, the first effective insecticide against this leaf miner, that only leaves Evisect S, a second very effective insecticide obtained through new direct supplies from Japan.
  - Other insecticides, of biological origin or not, need to be found.
  - It would also be wise to explore the field of entomopathogens again, to find a possible fungus that might induce good adult mortality.
  - It also seems that SIAT/GOPDC is moving towards cooperation with the Pobé Station and Cirad to set up a seed garden at Okumaning. This will make it possible in the near future (around 2010) to launch the famous study on *Coelaenomenodera* development depending on the planting material. In fact, during a mission to Pobé in November 2002, the existence of resistance genes was discovered in certain oil palm origins at the Pobé Station at the end of 2002. This agent could successfully conduct this lengthy experiment.

  - If requested by SIAT, this agent could be trained and supported for a while by Dr René PHILIPPE, the Tree Crop Department's senior entomologist and specialist in leaf miner problems.

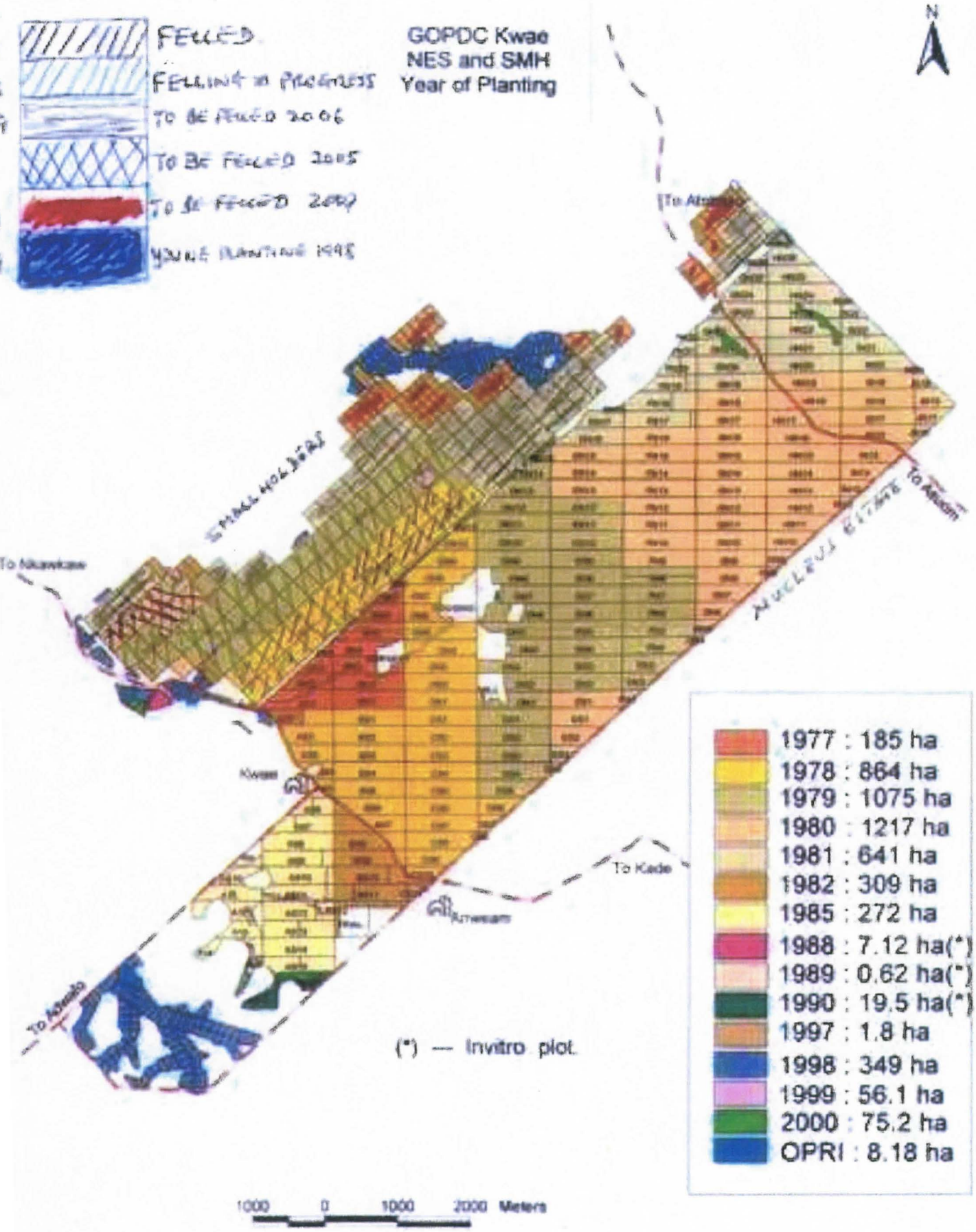
  - If the same trials are conducted at Pobé, it would be necessary to train a Beninese agent to carry out the biological observations, under Dr René PHILIPPE's supervision.

CARTE N°1

SMALL HOLDERS

MAP N° 1

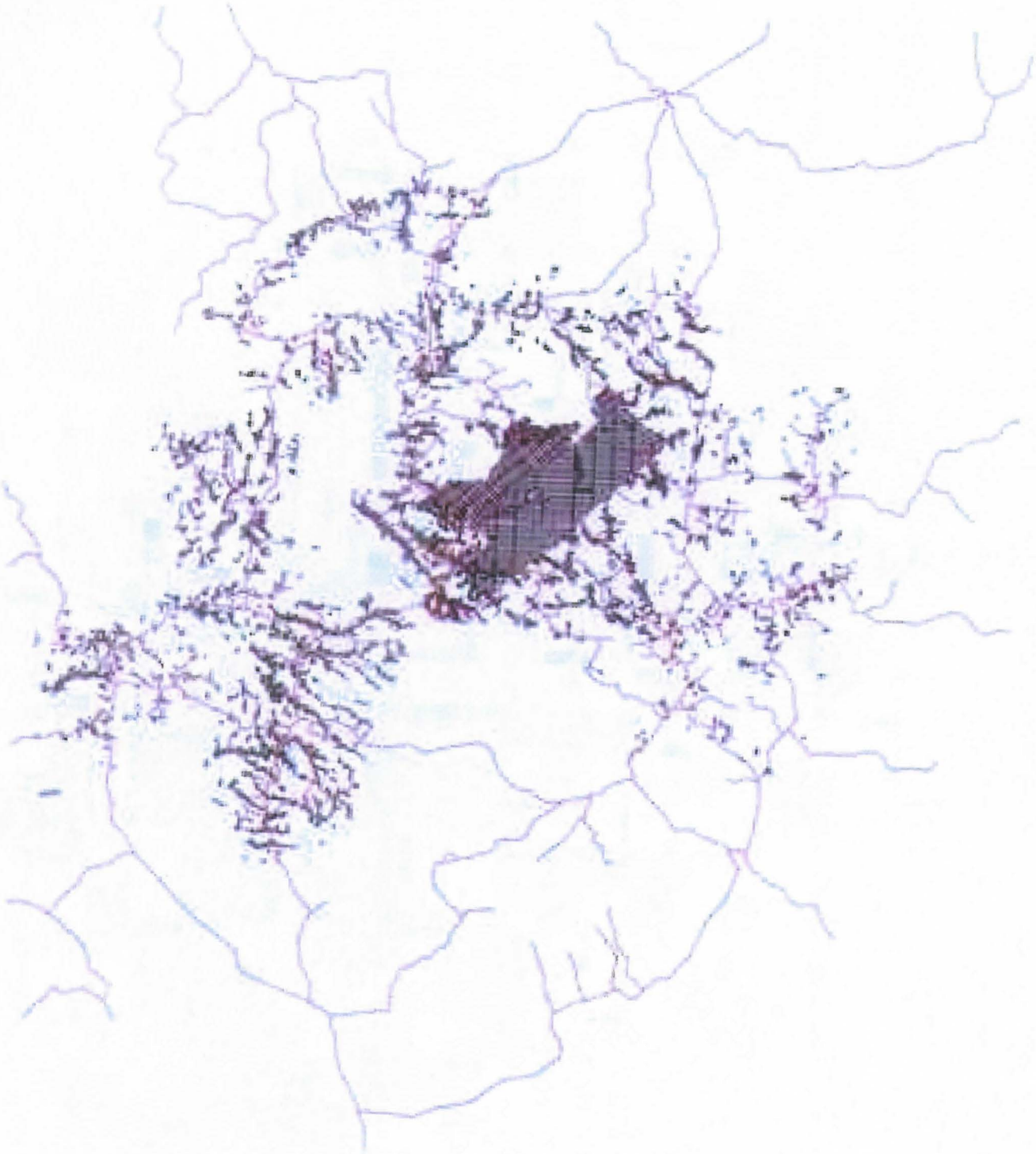
GOPDC Kwae
NES and SMH
Year of Planting

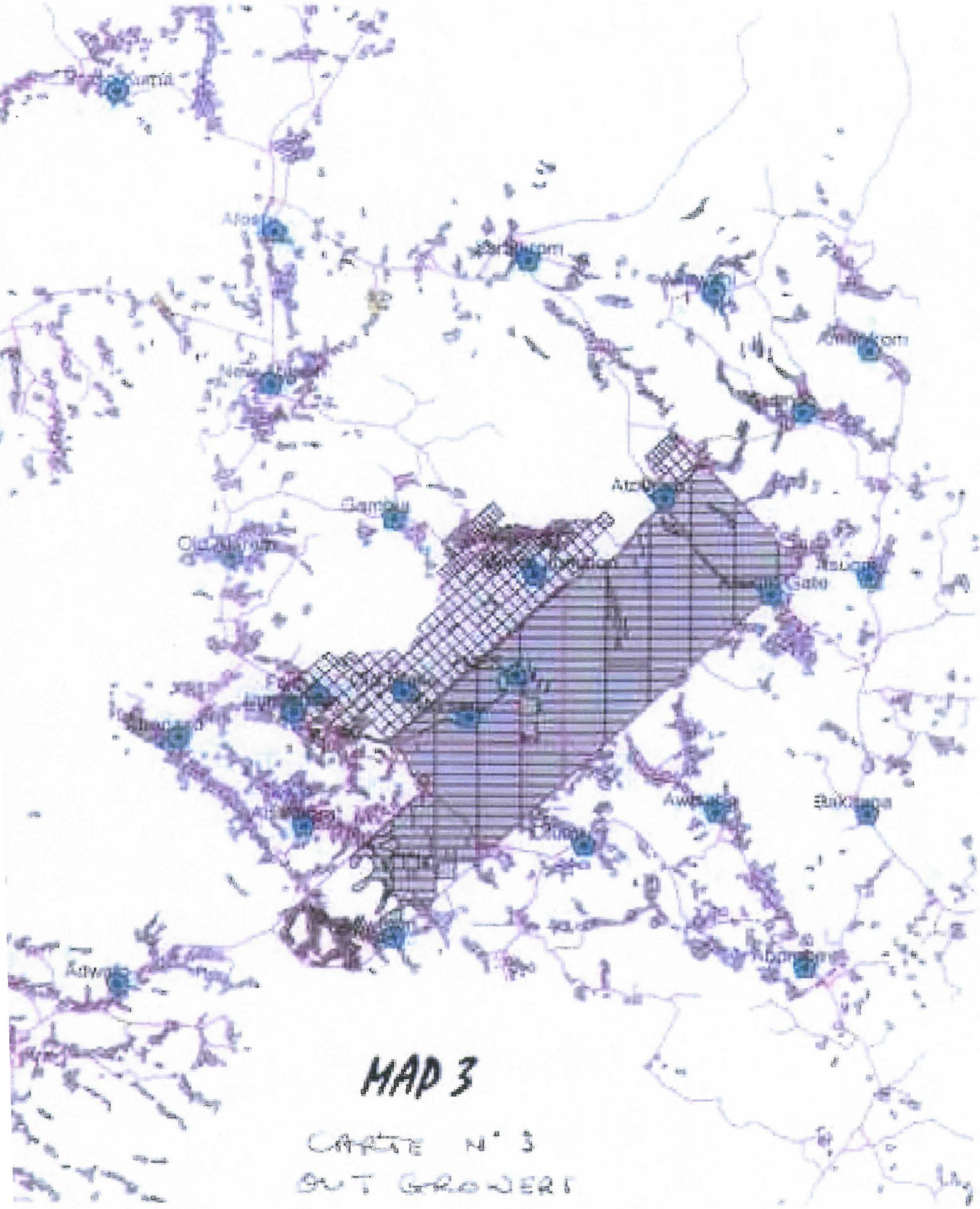


CARTE N° 2

MAP 2

OUT GROWERS





position plan : Plots visited on 27/02/04

1000 0 1000 2000 Meters

- 3 MAI 2004