Project LH/UvS 01

CENTRUM VOOR LANDBOUWKUNDIG ONDERZOEK

IN SURINAME

EXPLOITATION, NATURAL REGENERATION AND INCREMENT

Experiment Plan and Progress Report on Experiment 78/5

W.B.J. Jonkers
Research Silviculturist

November 1983
Printed 1984

CONTENTS

FOREWORD

The title of the large-scale experiment 78/5 is "Exploitation, Natural Regeneration and Increment". Its main purpose is to study the influence of logging and silvicultural treatments upon the development of the forest. As such it is an important part of the efforts of project LH/UvS 01 to establish an economically feasable and ecologically acceptable regeneration system for the rain forest of Suriname.

In the past years, the experiment was laid out, the treatments were completed and several enumerations were carried out. The data collected until to-date are meant mainly to assess the condition of the forest shortly before and shortly after the treatments.

Unfortunately, the project will be terminated prematurely by the end of 1983 as a result of a political controversy between Suriname and the Netherlands. This means that the enumerations in experiment 78/5 will be discontinued before it is possible to estimate the main treatment effects.

In spite of this, this report is meant mainly as a manual for future enumerations. It is the sincere hope of the members of our team that the University of Suriname or another institution will be able to continue with our research in the near future.

Paramaribo, November 1983

P. Schmidt
Projectleader LH/UvS 01

1 INTRODUCTION

In the late 50's the Suriname Forest Service (LBB) started with experiments to establish a natural regeneration technique for worked-out tropical rainforest. The techniques tried were comparable to the Malayan Uniform System, i.e. virtually all trees were killed in order to stimulate the growth of seedlings and saplings of commercial species. Although these early attempts did not result in an operational method, it became clear that the alleviation of competition in the stand induces a substantial increase in the growth of desirables (see Boerboom, 1965 and Schulz, 1967).

Although plantation forestry seemed more promising, this kind of research was continued, first by LBB and after its establishment in 1965, by CELOS. A large number of different treatments was tried in two relatively small CELOS experiments (Expt. 65/3 and Expt. 67/9A). The results, published by De Graaf and Geerts (1976) pointed to a polycyclic rather than a monocyclic system. They proposed a treatment schedule, which aims at stimulating the growth of desirable trees rather than the increment of seedlings and saplings. This treatment schedule in its present slightly modified form is called the CELOS Silvicultural System (CSS) in this report. It is discussed in detail in section 5.2.

Figures presented by De Graaf and Geerts (1976) suggested a bright future for forestry based on natural regeneration. Plantation forestry, on the other hand, became less and less feasable as a result of rising costs of labour, fuel and machinery and disappointing volume increment figures.

Considering these aspects, it was decided to test the system proposed by De Graaf and Geerts thoroughly in project LH/UvS 01. A large-scale experiment (Expt. 78/5) was established in 1979 for the research into silvicultural aspects. The older experiments, although they provide useful information, were either too small for this purpose (Expt. 67/9A) or not fit for statistical analysis (Expt. 67/9B, a 25 ha trial established in 1975). Ecological, hydrological, pedological and logging aspects are studied in other experiments.

2 OBJECTIVE

The principal objective of experiment 78/5 is to determine which combination of silvicultural treatment and exploitation level is optimal, considering silvicultural and economical aspects.

Furthermore, the experiment will provide information which may result in improvement of the CSS and will allow us to calculate an optimum felling cycle and to construct a model to predict future yields.

3 DURATION AND LOCATION

Experiment 78/5 is located within the Kabo concession of Bruynzeel Suriname Houtexploitatie Maatschappij NV. The CBL (Centraal Bureau Luchtkartering) co-ordinates are 901 km N and 291 km E. The experiment can be reached by car from the Alberga road (see fig. 1).
The duration of the experiment is at least one felling cycle of 20 years or more. An extention beyond this period may prove to be useful, but it is considered premature to decide upon this at this point in time.

4 EXPERIMENTAL DESIGN

The experimental design is a complete factorial one, with two factors at three levels each. These two factors are exploitation and silvicultural treatment. The experiment consists of three 3 x 3 randomized blocks, i.e. three replications of nine treatment plots each (see fig. 1 and 2).
The size of the treatment plots is 4 ha (200 x 200 m). Within each replication, two 25 m wide strips, running in N-S direction are located between the treatment plots. These strips were used as main skid trails and provide an easy access to the assessment plots. A 2.25 ha (150 x 150 m) assessment plot, in which all marketable species of 15 cm dbh. and above are measured, is located centrally in the treatment plot. Smaller individuals (5 cm dbh. and above) of commercial species are assessed in a subsample of 6 circular plots of 0.075 ha each (15.45 m radius, see fig. 3). All these plots were established in 1979. Two years later, three assessment plots of similar design were established in the adjacent virgin forest (see fig. 1).
In 1981, another type of measurement plot was introduced. This one-hectare square plot is located centrally within the 2.25 ha plot and consists of hundred 10 x 10 m quadrats (see fig. 3 and 4). The subplot numbers of these quadrats reflect their geographical position. All trees, regardless of species, of 15 cm dbh. and above are assessed in these subplots. This type of assessment plot is standardized for this kind of experiment in other countries and is advocated in Synnott's Manual for Permanent Plot Procedures (1979).
Seedling and sapling subplots were established in replication I and II in 1982. Saplings of all species are tallied in a systematic sample of sixteen 5 x 5 m quadrats per one-hectare plot. A 2 x 2 m seedling subplot is located within each sapling subplot (see fig. 4).

Appendix I provides details about the demarcation of plots and subplots (see also Betlem, 1983).

5 TREATMENTS

5.1 Logging

The Celos Silvicultural System can be classified as a Stratified Uniform System sensu Dawkins (1958).
Dawkins did not favour such a system for Uganda, arguing that logging damage is too severe, i.e. that not enough trees survive logging to secure a sustained yield in the future.
Although logging damage in Suriname is considerably less than Dawkins' Uganda estimates (see Jonkers, 1983), the effects of exploitation are of paramount importance when testing a polycyclic system. This means that the effects of the silvicultural treatment have to be assessed for various logging intensities.
The experiment was logged in 1979 and 1980, after the first enumeration. Three levels of exploitation were applied, i.e. removing a basal area of 1, 2 or 4 m^2/ha. Expressed in volume terms, the amount of timber extracted was estimated before the harvest at 8, 16 and 32 m^3/ha respectively. These figures are reflected in the original codes for the level of exploitation (E8, E16 and E32). However, the average yields turned out to be as high as 15, 23 and 46 m^3/ha (De Graaf, 1982). The original codes are therefore meaningless and were replaced by the new codes E15, E23 and E46.
The harvest was carried out partly by Celos personnel and partly by a contractor. Trees to be felled were selected by the former research silviculturist of the project, N.R. de Graaf, in such a way that a more or less even distribution over the area was achieved. The felling was done by a Celos labourer, using a chainsaw. The feller was not instructed to apply directional felling or other techniques which are expected to result in less logging damage than the traditional method. The extraction was done by a contractor using a wheeled skidder. The skidder was allowed to enter each treatment plot at six points, i.e. three on the western side and three on the eastern side. The operator was accompanied by an experienced Celos employee and had to follow his instructions. A map on which the approximate locations of the felled trees were indicated was used to find the best way to the logs. The operator had to remove all logs, including the defective ones, from the treatment plots. Except for these restrictions the contractor was free in his extraction technique.

For more information about the harvest in this experiment see De Graaf (1982), Jonkers (1983), Jonkers and Schmidt (1983), De Graaf (1981, in Dutch), Jonkers (1982a, in Dutch) and the treatment schedule (table 1).

5.2 Silviculture

In this section the Celos Silvicultural System (CSS) is described. In its present form, the CSS includes three silvicultural treatments. The first treatment is carried out 1-2 years after logging. This operation, which is called refinement, consists of climber cutting and poison-girdling of all trees without future market potential above a certain diameter limit (usually 20 cm). The refinement should result in a remaining basal area of approximately 15 m^2/ ha, i.e. about half the pre-felling value.

Table 1 Treatment Schedule. Experiment 78/5

Plot	Replication		
No.	I	II	III
1	E 15, SR 14	E 23, SR 14	E 46, SR 18
2	E 46, S 0	E 46, S 0	E 46, S 0
3	E 15, SR 18	E 15, SR 18	E 23, SR 14
4	E 23, S 0	E 46, SR 14	E 15, S 0
5	E 23, SR 18	E 46, SR 18	E 15, SR 18
6	E 46, SR 14	E 23, S 0	E 23, SR 18
7	E 46, SR 18	E 23, SR 18	E 15, SR 14
8	E 23, SR 14	E 15, S 0	E 23, S 0
9	E 15, S 0	E 15, SR 14	E 46, SR 14

Exploitation levels:

E 15 = approx. 15 m^3/ha extracted
E 23 = approx. 23 m^3/ha extracted
E 46 = approx. 46 m^3/ha extracted
Silvicultural treatment levels:
S 0 = no treatment
SR 18 = refinement with 30 cm diameter limit
SR 14 = refinement with 20 cm diameter limit

The second treatment is scheduled at 10 years after the refinement. Such a treatment has been applied only in a few hectares in experiment 67/9A so far. The method applied in that experiment has been described by De Graaf and Staudt (1975, in Dutch). The third treatment hasn't been applied yet. Both treatments include cutting and poison-girdling of unwanted trees. The exact nature of these treatments is still a subject of research. It is possible that the third treatment is not required (Jonkers, 1983).

The refinement was carried out in experiment 78/5 in the period September 1981-June 1982. Three levels of silvicultural treatment were applied, i.e. no treatment (code S 0), a refinement with a diameter limit of 30 cm (code SR18) and a refinement with a diameter limit of 20 cm (code SR14). All trees of sizes below the diameter limit and all commercial trees without very serious defects (no crown, hollow, extensive stem decay) were left. All other trees had to be poison-girdled and all lianas had to be cut.

It is expected that the treatment will result in mean basal areas of approximately 14 m^2/ha (treatment SR14) and 18 m^2/ha (treatment SR18). These basal areas are reflected in the treatment codes.

It is considered premature to define a second or third treatment at this point in time. However, the follow-up treatments of treatment SR18 should be less drastic than the follow-up treatments of treatment SR14. Furthermore, the same list of commercial species (see appendix 6) should be used as during the refinement.

The prescriptions of the refinement were purposely kept simple and were easily understood by unskilled labourers. The treatment was carried out in four steps (see fig. 5). First the trees were identified by a tree spotter. Trees to be eliminated were marked with blue paint. The tree spotter was accompanied by a labourer who cut all lianas with a machete (step 2).

These two men were followed by the poison-girdling gang. Marked trees were frill-girdled with a small axe (step 3). This means, that overlapping cuts are made over the whole circumference of the tree, forming a kind of channel. The cuts should extend just into the sapwood and should make an angle with the vertical of about 45 degrees.

After completion of the frill-girdle, arboricide was administered to the tree (step 4). The frill-girdle was filled with arboricide first and then the bark just above the frill was covered with a film of the solution over a height of 10 cm. The arboricide used was a 5% solution of 2,4,5 Esteron O.S. in diesel oil.

For more information about the silvicultural treatment see Jonkers (1982b, 1983) and Jonkers and Schmidt (1983). Commercial species are listed in appendix 6. Table 1 is the treatment schedule of the experiment.

6 ENUMERATIONS AND OTHER DATA COLLECTED

6.1 Tree enumerations

Tree enumerations have to be carried out relatively frequently in order to make an accurate assessment of the changes in the stand possible. When changes are abrupt (e.g. when a treatment is applied), the trees should be measured annually. When more gradual developments are expected, a frequency of once every two years is adequate.

Until to-date, the 150 x 150 m assessment plots and the circular subplots have been assessed four times (twice in the virgin jungle plots). The one-hectare assessment plots have been enumerated two times (once in the virgin jungle plots).

During the enumeration various characteristics of the trees and subplots are assessed (see appendix 2). Some of these are not supposed to change (species name, co-ordinates) and are therefore recorded twice (the second time for checking). Most of the other parameters are assessed during every enumeration. Just two measurements are to be made at longer intervals, viz. the trunk height and the diameter at crown point.

The enumeration procedure will be discussed briefly in this section. The instructions for the enumeration are included in appendix 2 (in English) and appendix 3 (in Dutch). It may prove useful to add some codes in future enumerations. This is possible. However, under no circumstances should the meaning of existing codes be altered.

First, the field sheets are prepared in the office. Codes which are not supposed to change are filled out (plot number, subplot type, subplot number, treatment code, tree number, species name and, for dead trees, the stem class and silviculture code, see appendix 2).

The enumeration is done by a field crew of 3-4 men. The crew leader fills out the forms and assesses the forest class, the stem class, the crown characteristics and the damage scores (see appendix 2). One of the labourers measures the girth, while the third man carries the stepladder and other equipment. The stepladder is needed for the girth measurement of trees with high buttresses. The fourth man is the tree spotter, who identifies newly recorded trees and checks names given previously where necessary. The tree spotter is not always required as it is not recommended to record ingrowth during each enumeration.

It takes such a crew about one week to enumerate one plot (including all subplots). The men start with the assessment of the 10 x 10 m quadrats. Subsequently the data of the commercial species in these quadrats are copied on the field

sheets of the 150 x 150 m plot and the remaining part of this plot is assessed. Finally, the small commercial trees (5-15 cm dbh.) are enumerated in the circular subplots and the data from the larger individuals within those subplots are copied from the field sheets of the 150 x 150 m plot. It should be noted that this schedule can be followed only if all trees within a plot are enumerated within a short time span.
The enumeration takes more time if trunk heights and diameter at crown point have to be recorded. These parameters have been assessed once for commercial species in the 10 x 10 m quadrats until to-date. It takes about two days for a three men team to carry out these measurements in one 100 x 100 m block.
After completion of the field work in one replication the field sheets have to be sent to the office. In the office, the decimal date, the tree present code and the species codes are filled out. A list of decimal dates and a list of species codes are included in this report (see appendices 5 and 6). Subsequently the data are stored on a magnetic disk and checked by computer (see section 7.1). It is not possible to correct all errors in the office and the field crew will have to spend a few days in a replication which has been enumerated already to do additional measurements.

6.2 Seedling and sapling enumerations

Until to-date, seedlings and saplings were recorded just once (May-June 1982). This was done shortly after the silvicultural treatment, i.e. before the treatment had become effective. The assessment was carried out only in replications I and II. The enumeration is scheduled to be repeated every two years. In order to avoid seasonal influences it is recommended to do the inventory always in the same time of the year. It takes a very experienced tree spotter assisted by an experienced labourer about 9 days to complete the whole enumeration.
In the seedling and sapling subplots individuals of all trees species are tallied per species and per size class. Seedlings (individuals of less than 2 m total height) are recorded in 2 x 2 m subplots. Larger individuals are counted in 5 x 5 m subplots.
It is not necessary to prepare the field sheets in the office before the enumeration. After the assessment, however, species codes, decimal dates etc. have to be filled-out and a thorough manual check has to be made. The data are to be processed further by computer (see section 7.2).
Field instructions for this type of enumerations are included in this report in appendix 4 (both in English and Dutch). Decimal dates and species codes can be found in appendices 5 and 6.

6.3 Other enumerations

Apart from the enumerations mentioned above three types of assessment have been carried out so far. The total number of trees per size class in the 150 x 150 m plots was tallied before (1979) and after logging (1980-1981), using a tree fork for the trees of 5-50 cm dbh. without buttresses and a Biltmore stick for the larger individuals and buttressed trees.
The purpose of this exercise was to measure the total basal area. As the total basal area can also be calculated from data from the 10 x 10 m quadrats, this type of enumeration was abandoned. The dates are recorded on paper strips. No reliable computer file of the enumeration exists. Results from the survey after logging are published by Jonkers (1981, in Dutch, and 1982b).
During the 1981-1982 tree enumeration, palms of a total height of 2 meters or more were tallied per species in the 10 x 10 m quadrats. The data are recorded on the field sheets of the tree enumeration and no computer file of the data exists. Palms were not counted in the virgin jungle plots. It is scheduled to repeat this exercise every three to four years. Results from the survey are discussed by Jonkers (1982c, in Dutch, and 1983).
In July 1982, after the refinement, a tally was made of the lianas in the three replications. The lianas were counted per diameter class (5-10 cm, 10-15 cm and 15 or more), per category (cut and dead, cut and alive, not cut and alive) and per 10 x 10 m quadrat. The lianas were measured at the point where they reached breast height (1.3 m) for the first time. A liana was recorded in a quadrat only if this point of measurement was within the quadrat boundaries. Just 20 quadrats per plot were included in the survey (quadrat no. 00, 10, 20, ...80, 90 and no. 09, 19, 29, ..., 89, 99, see fig. 4). The data are recorded on field sheets and no computer file of the enumeration exists. This type of assessment should be repeated every three to four years. Results from this survey are discussed by Jonkers (1982c, in Dutch, and 1983).

6.4 Other data collected

During the harvest, the felled logs were measured and their volumes were calculated (see De Graaf, 1981, in Dutch and De Graaf, 1982). The data were recorded on field sheets.
During the 1982-1983 enumeration, some additional data were collected in plots 2, 4 and 8 of replication III. Within the 10 x 10 m quadrats of these plots, the stem height, the total tree height (bh) and the crown radius in the north

(Rn), south (Rz), west (Rw) and east (Ro) directions were measured for each tree. The data were recorded on the field sheets of the quadrats. The stem heights are included in the computer file KABX2 (see also section 7.1).
In 1983 field work necessary for the preparation of a contour map and a soil map was carried out. Unfortunately the soil survey could only be completed partly before the termination of the project. No soil data are available of the SE part of replication II.
Three other experiments are located (partly) within experiment 78/5, i.e. the hydrological experiment 78/34 and the ecological experiments 81/5 and 83/7 (see fig. 1 and Betlem, 1983). In experiment 78/34, the effects of logging and refinement upon the nutrient concentrations in creek water and upon the water balance are studied. In the ecological experiments, the primary production and mineral cycling after logging and after logging and refinement are measured. In order to supplement the data from these experiments, phenological observations were made monthly from August 1982 until September 1983.

7 DATA PROCESSING[1]

7.1 Tree files

When a set of field sheets is ready for computer processing the data are entered into a computer, using the data entry programmes KAB039 or, for the 10 x 10 m quadrats, KABOXY. Separate files are created for each type of subplot. The data from the virgin jungle plots are stored in a separate set of data files.
The name of each data file consists of four or five letters and one integer (e.g. KABI2). The first three letters indicate whether it is a file of the three replications (KAB) or a file of the virgin jungle plots (KAN). The fourth (and fifth) letter identifies the type of subplot (I= 150 x 150 m plots, II= circular subplots, X= 10 x 10 m quadrats) and the integer is the number of the enumeration in the sequence (1= first enumeration, 2= second enumeration etc.).
After the data entry has been completed the data editing procedure begins. Each file is checked for illegal codes and illegal code combinations, using a programme called SILV1. All corrections for which no field check is needed are made before the procedure is continued. The data entry programmes can be used for this purpose.

---

[1] All computer programmes have been written for IBM system 34 and are not necessarily applicable to other computers without modification

Subsequently, programme SILV2 is used to put the new file and the file(s) from the previous enumeration(s) together in a temporary file. This programme also checks for changes in species code (if applicable) and for trees missing in the file of the latest enumeration. Again, as many errors as possible are corrected before the procedure is continued.
The temporary file thus created is subjected to programme SILV3 which checks, among others, for unlikely girth increments and for trees recorded dead or not found previously, which are apparently still alive. At the time of writing SILV3 is not in its final form yet. It reports all "suspected" values, including those which have been found correct during a previous check. Moreover, it results in too many error messages.
After a field check and the correction of errors, the editing procedure is repeated until all errors, detectable through SILV1, SILV2 and SILV3 have been corrected.
Two types of errors occur, i.e. errors made during the enumeration and errors made in the office or when copying data from one field sheet to the other in the forest camp. A field check has to be made to correct errors in the first category, i.e. to record missing data and to verify girth increments which may be faulty.
Errors in girth measurement require special attention. Many of these mistakes do not show up until some years later, when the file of the next enumeration is edited. This rather unfortunate fact means, that one should refrain from changing girth codes unless one is quite sure that the corrected code is substantially closer to the true value than the original figure.
A special case are trees which have been recorded dead or missing previously and which are still alive. The faulty record should be corrected by interpolating the missing girth and by changing the stem class and the stem damage class both into 9 (see appendix 2).
After completion of the data editing, the files are ready for further processing. Adequate computer programmes for this purpose are not available yet.
For more information about data processing see De Vet (1983).

7.2 Seedling and sapling files

Seedlings and saplings have been enumerated once until to-date. The data are stored in a file called ZAAI1. No computer programmes are available for data entry or other purposes.

8 DATA ANALYSIS

The principle aim of the experiment is to test the effect of logging and silvicultural treatment on the diameter growth of marketable species. This is a rather simple statistical procedure, i.e. analysis of variance in combination with linear regression analysis. This technique is explained in many statistical text books (e.g. Cochran and Cox, 1957). In the linear regression analysis, the relations between the increment and the total basal area is studied. Similar analyses can be carried out for basal area growth and volume increment of the commercial species.
The experiment in its present form is fit for many other analyses. It is considered possible to study damage to the stand as a result of logging or refinement, to produce volume tables for the more common commercial species, to detect undesirable local effect of the treatments (if any), to study the effects of the treatments on the populations of seedlings, saplings, palms and lianas, to find relations between the diameter increment on the one hand and characteristics of the tree and its environment on the other hand, to study the succession in gaps, etc..
It may even be possible to develop a model to predict the development of this and similar forests over a long period, based on the data available at the time of writing and about 3 years of measurements after the refinement.

9 ACKNOWLEDGEMENTS

Experiment 78/5 is the result of efforts of many people. I want to express my gratitude to my predecessor, N.R. de Graaf, who initiated the experiment and under whose responsability the exploitation and the first two enumerations were carried out.
Furthermore, I would like to thank R.H. Timpico, foreman at KABO, W. Wolff, crew leader, R. and J. Elburg, tree spotters, C. Wendar, R. Wijngaarde and J. Foewe, labourers, and all other field personnel of the project for their dedication and accurate work. Last but not least I thank J.L. Betlem, management assistent, F. de Vet, expert in data processing, Y. Bab, computer assistent, and all other project staff and Celos personnel for their contribution to the success of experiment 78/5.

10 LITERATURE

Betlem, J.L., 1983. Overzicht van de permanente proefperken van het project LH/UvS01. Celos rapporten nr. 137, Universiteit van Suriname, Paramaribo.

Boerboom, J.H.A., 1965. De natuurlijke regeneratie van het Surinaamse mesofytische bos na uitkap. Landbouwhogeschool, Wageningen.

Cochran, W.G. and G.M. Cox, 1957. Experimental Designs (2nd ed.). John Wiley and Sons, New York.

Dawkins, H.C., 1958. The management of natural tropical high-forest with special reference to Uganda. Institute Paper nr. 34. Imperial Forestry Institute, Oxford.

Dawkins, H.C., 1963. The productivity of tropical high-forest trees and their reaction to controllable environment. University of Oxford (unpublished D.Phil. thesis).

De Graaf, N.R., 1981. Houtteelt. In: Celos kwartaalverslagen nr. 57, p. 8-17. Universiteit van Suriname, Paramaribo.

De Graaf, N.R., 1982. Silviculture. In: project LH/UvS01, Annual Report 1980, p. 12-26. University of Suriname, Paramaribo.

De Graaf, N.R. and J.M.P. Geerts, 1976. Techniek natuurlijke verjonging drooglandbos. Celos rapporten nr. 114, Landbouwhogeschool, Wageningen.

De Graaf, N.R. and F.J. Staudt, 1975. Arbeidstechniek in de bosbouw. In: Celos kwartaalverslagen nr. 33, p. 8-12. Landbouwhogeschool, Wageningen.

De Vet, F.J., 1983. Dataverwerking in het project LH/UvS01, Celos rapporten nr. 142, Anton de Kom Universiteit van Suriname, Paramaribo.

Jonkers, W.B.J., 1982a. Houtteelt. In: Celos kwartaalverslagen nr. 63, p. 9-20. Universiteit van Suriname, Paramaribo.

Jonkers, W.B.J., 1982b. Silviculture. In: Project LH/UvS01, Annual Report 1981, p. 10-14. University of Suriname, Paramaribo.

Jonkers, W.B.J., 1982c. Houtteelt. In: Celos kwartaalverslagen nr. 64, p.10-17. University of Suriname, Paramaribo.

Jonkers, W.B.J., 1983. Silviculture. In: project LH/UvS01, Annual Report 1982, p. 14-29. University of Suriname, Paramaribo.

Jonkers, W.B.J. and P. Schmidt, 1983. Ecology and Timber Production in Rainforest in Suriname. Paper presented at the International Symposium on Amazonia, Belem, July 1983.

Schulz, J.P., 1967. La regeneracion natural de la selva mesofitica tropical de Surinam despues de su aprovechamiento. Celos bulletins nr. 3. Landbouwhogeschool, Wageningen.

Synnott, T.J., 1979. A manual of permanent plot procedures for tropical rainforests. Tropical forestry papers nr. 14. Commonwealth Forestry Institute, Oxford.

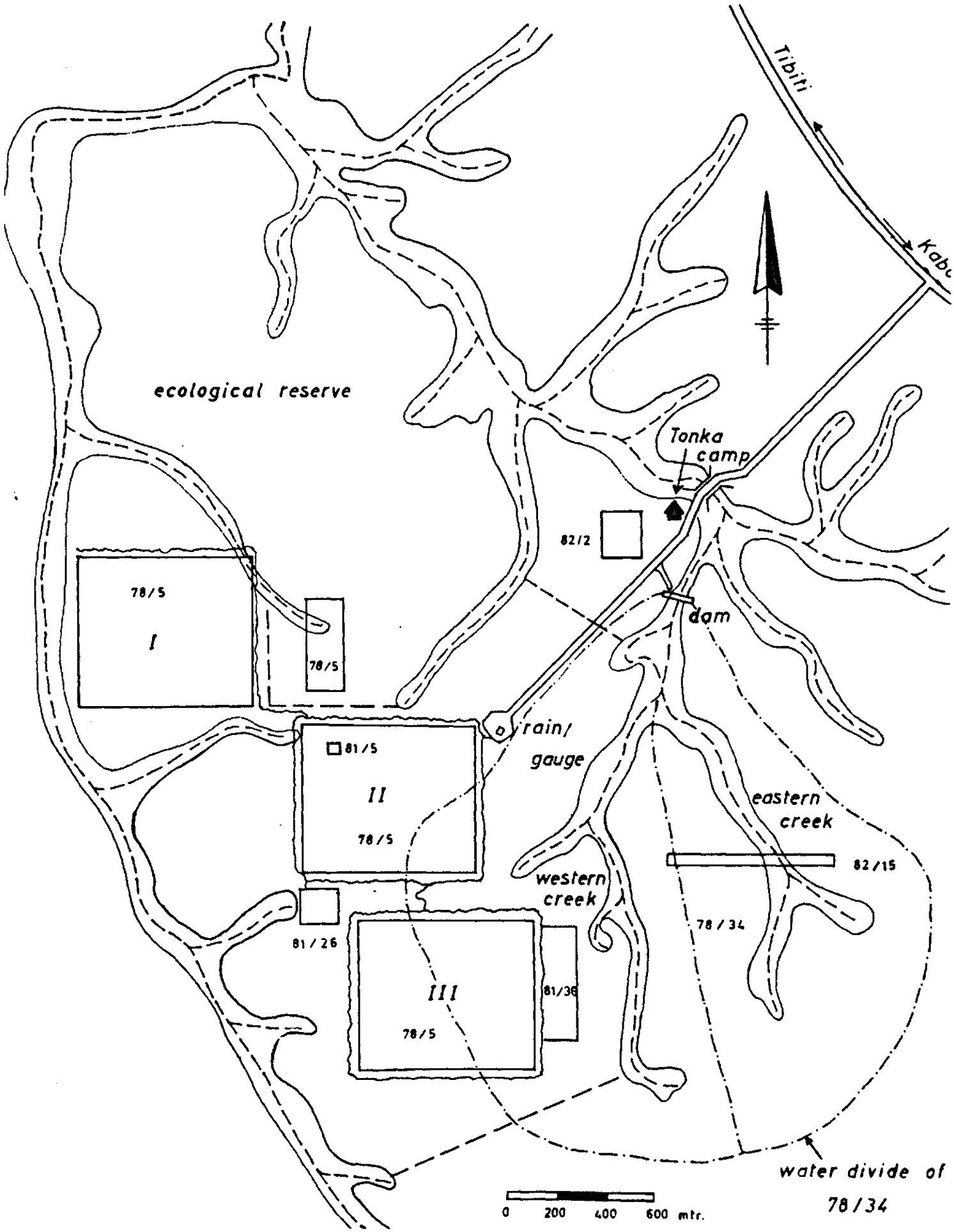


Fig.1. Location of Experiment 78/5 and other experiments in the Tonka area.

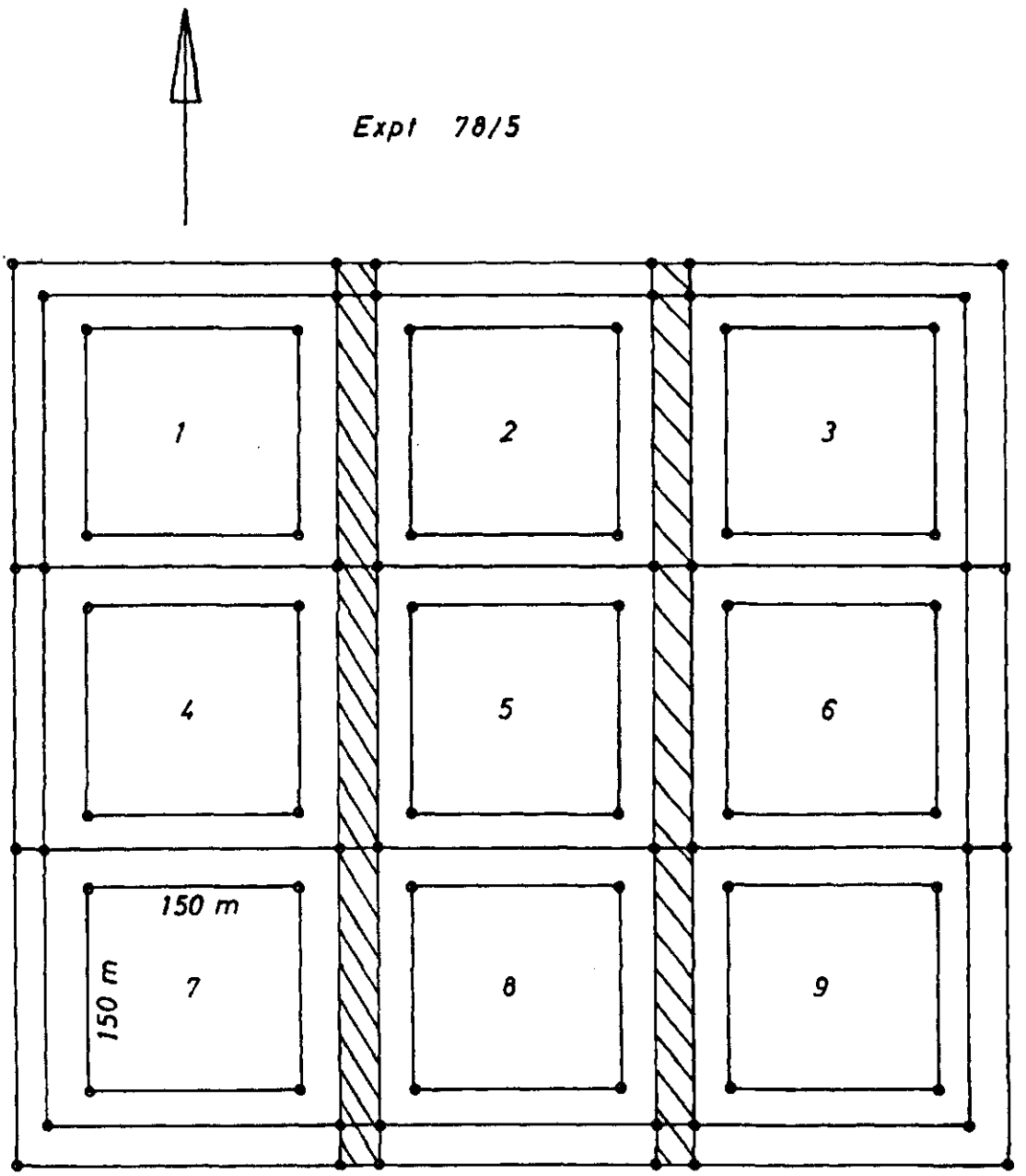


Fig.2. Lay-out of a replication.

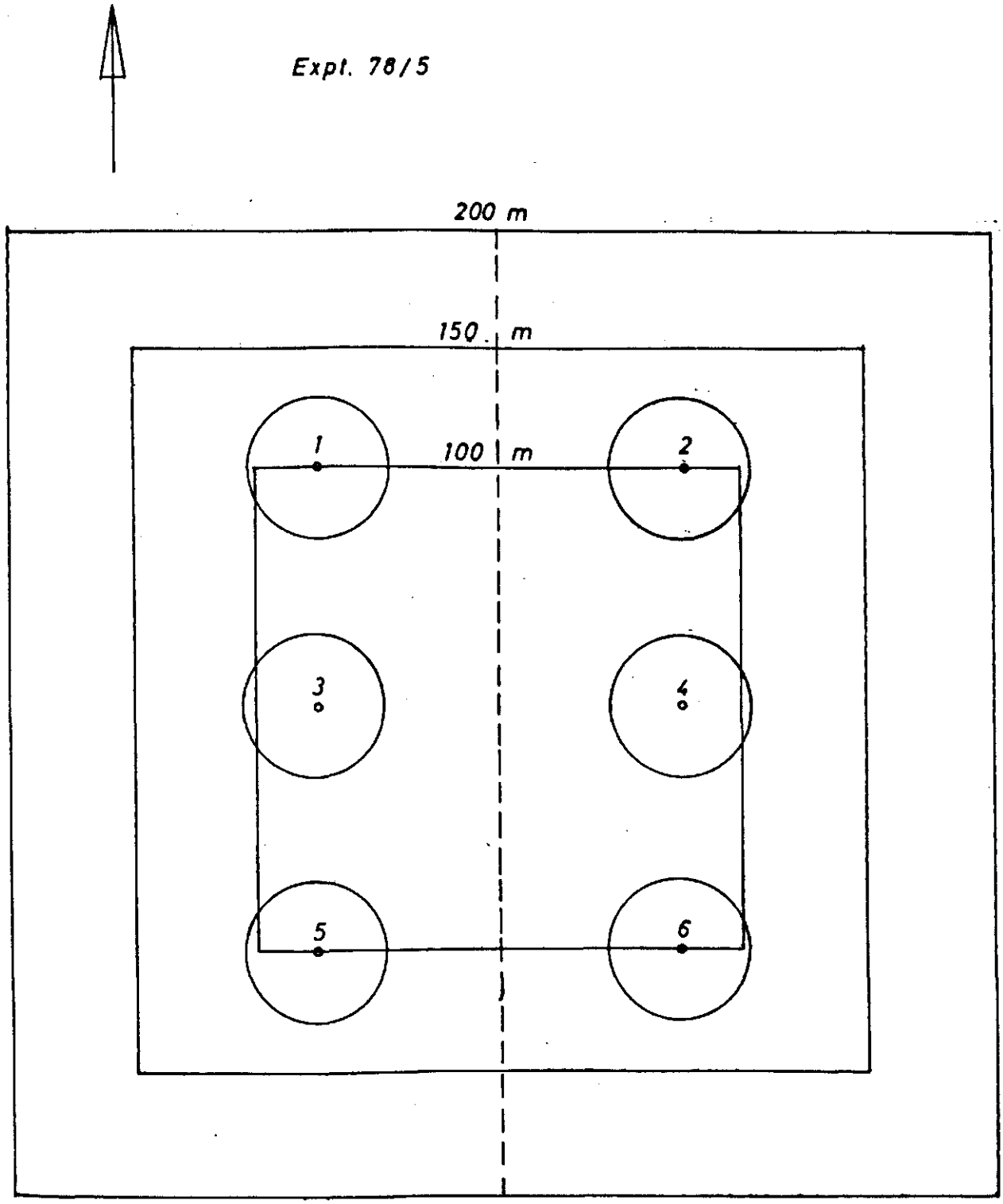
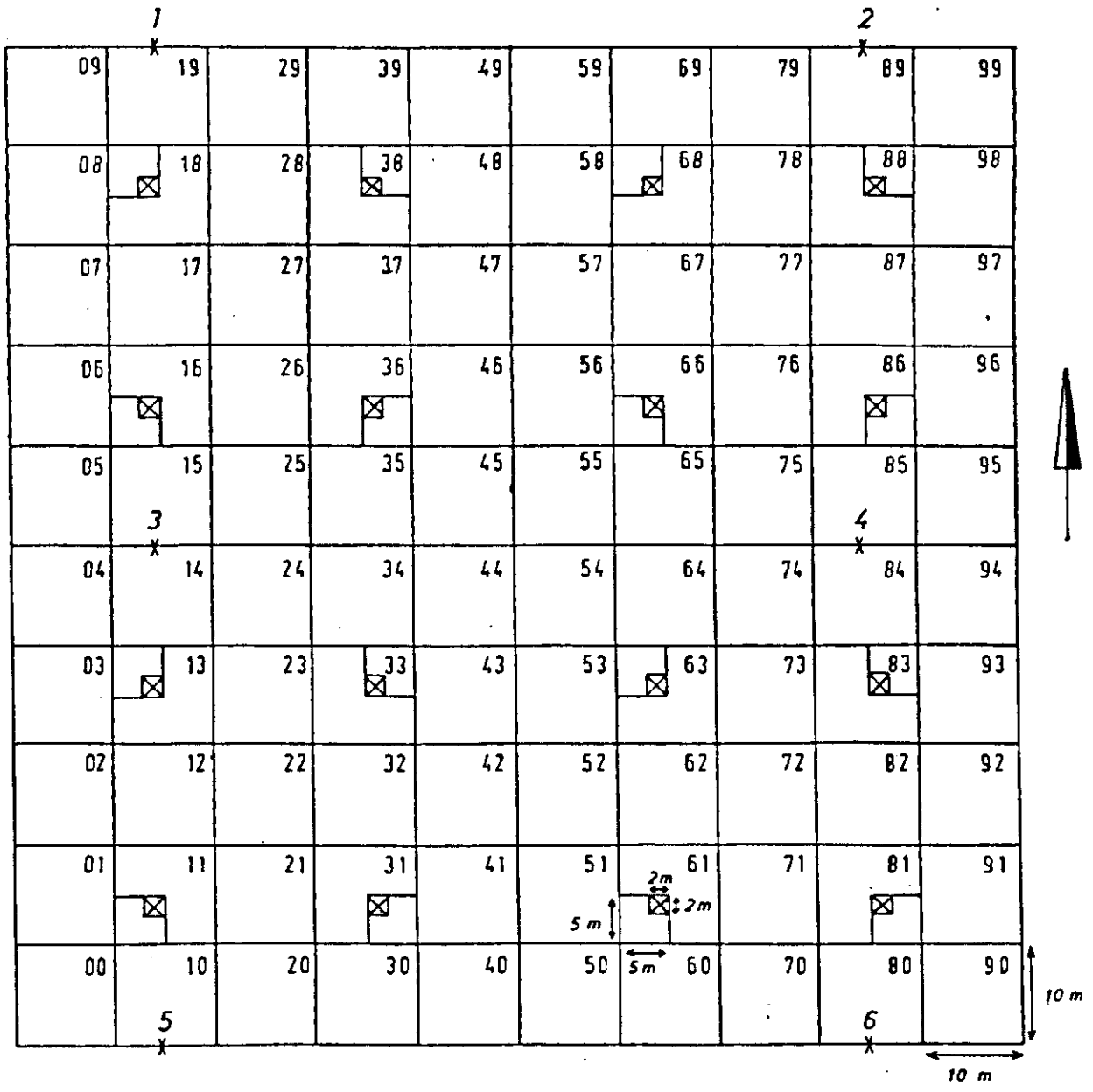


Fig.3. Lay-out of a treatment plot.



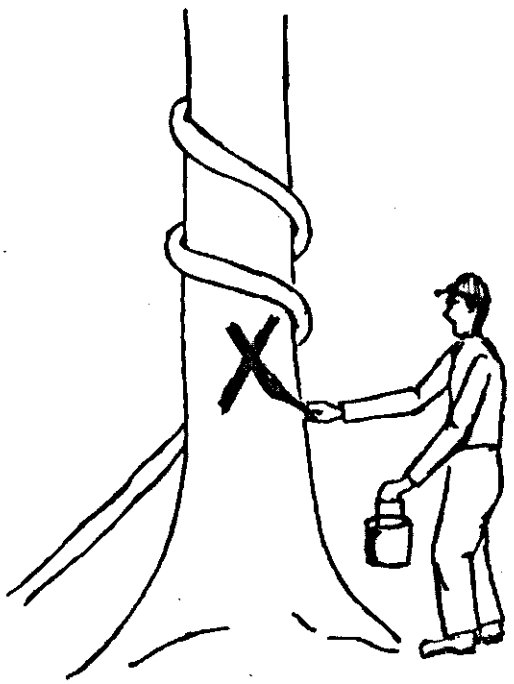
1
x - Centre of circular subplot with subplot number

22 - Subplot number 10 x 10 m quadrat

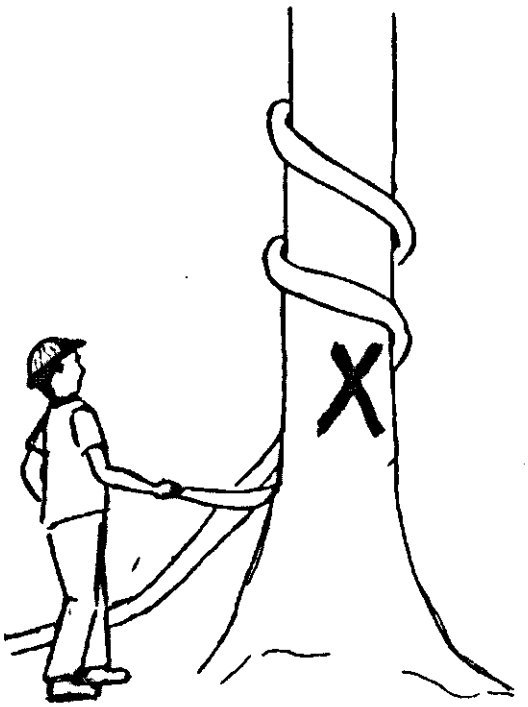
- Sapling plot

⊠ - Seedling plot

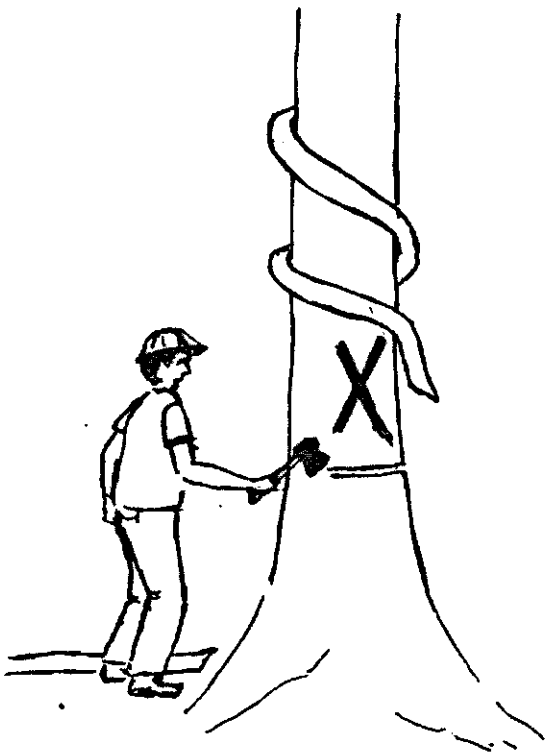
Fig.4. Lay-out of a one-hectare plot.



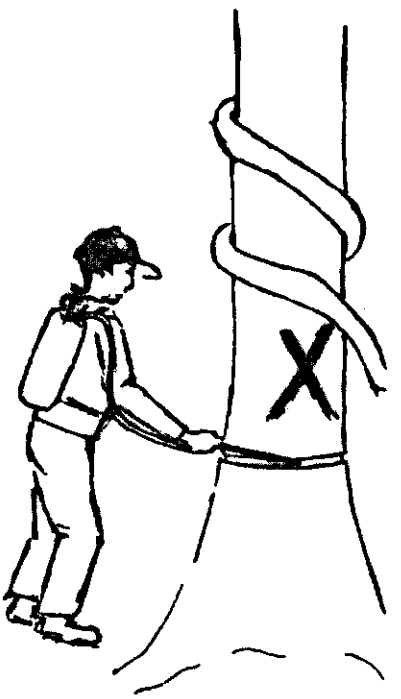
Step 1 : The trees to be poison-girdled are marked



Step 2 : Lianas are cut



Step 3 : The frill-girdle is made



Step 4 : The arboricide is administered

Fig.5. Poison-girdling technique.

APPENDIX 1

DEMARCATION OF PLOTS AND SUBPLOTS

1 Introduction

Experiment 78/5 consists of three replications of nine treatment plots each and three virgin jungle plots. The total number of subplots is about 4000. Approximately 6000 plastic poles mark the plot and subplot boundaries. As just 270 of these can be identified by an identification label, this large number of unmarked poles is a bit confusing for somebody who is not familiar with the experiment. This appendix is meant to explain the way plots and subplots are demarcated.

2 Types of pickets and benchmarks

Four different types of pickets and benchmarks are used, viz.

- concrete benchmarks are located in the corners of the replications.
- blueish-gray plastic poles of about 1 m height and 4 cm diameter were placed in the corners of the treatment plots, the 150 x 150 m assessment plots, the one hectare assessment plots and in the centre of the circular subplots.
  Within the replications (not in the virgin jungle plots), the poles on the corners of the 150 x 150 m plot and the poles in the circular subplots are marked with an aluminium label, indicating the plot number (1,2,....8,9) of the 150 x 150 m plot or the subplot number (1,2,.....5,6) of the circular subplot.
- white plastic poles of about 80 cm height and 2 cm diameter were placed in the corners of the 10 x 10 m quadrats. These poles do not carry an identification label.
- white plastic poles of about 15 cm height and 2 cm diameter werd placed in the corners of the seedling subplots and the sapling subplots in replications I and II.

APPENDIX 2

CODES USED IN TREE ENUMERATIONS AND IN COMPUTER FILES DERIVED FROM THESE ENUMERATIONS

1 Introduction

In this appendix the meaning of codes and abbrevations used in the field sheets and computer files of the tree enumerations are listed. An example of a filled-out field sheet is included in appendix 3.
Since the experiment was established in 1979, the method of enumeration has been altered considerably. The present field sheet was introduced in May 1981. In the previous assessments another field sheet was used which was not fit for the enumeration of 10x10 m in quadrats. Some new parameters were introduced and some code numbers changed, but the meaning of the old codes was not altered (except for the stem damage classification). The computer files of the old enumerations have been adapted to the new format.
All changes in methodology are listed below. The Dutch version of this appendix (appendix 3) is just a field instruction for future assessments and does not contain this information.

2 Characteristics of the (sub)plots

2.1 Plot number (plotnummer)

This code consists of two digits. The first digit is the replication number, the second one the number of the plot (see fig. 1 and 2).
The virgin jungle plots are numbered 41, 42 and 43. Plot 41 is the southernmost plot and plot 43 the northernmost one.

2.2 Subplot type (subplottype)

This code defines the type of subplot. In experiment 78/5, the following codes are used in the tree enumerations:
code 1 - for the 150 x 150 m assessment plot.
code 2 - for the circular subplots.
code 3 - for the 10 x10 m quadrats.
This code is not included in the old-type field sheet.

2.3 Subplot number (Subplotnummer)

This two-digit code is the subplot number as indicated in fig. 3 (circular subplots) and fig. 4 (10x10 m quadrats).
The subplot number of the 150 x 150 m assessment plot is always 00.

2.4 Treatment (Behandeling)

This two-digit code indicates the level of exploitation (first digit) and the silvicultural treatment (second digit) of the plot. The codes for the level of exploitations are 1 (= level E15), 2 (= level E23) and 3 (= level E46). The codes for the level of refinement are 1 (=treatment SO), 2 (= treatment SR18) and 3 (= treatment SR14). The code for virgin forest is 00. See also table 1.
The treatment code was not included in the old-type field sheet.

2.5 Date and decimal date (Datum, Dec. datum)

The date is filled-out in the field. The decimal date is filled out in the office, using appendix 5. The decimal date was not included in the old-type field sheet.

2.6 Crew leader and tree spotter (Ploegleider en boomkenner)

The crew leader fills out his name and the name of the tree spotter.

2.7 Forest class (Bosklasse)

This code is used only for the 10 x 10 m quadrats. Its main purpose is to provide estimates of the area damaged or disturbed as a result of logging, silvicultural treatment or natural causes.
There are four forest classes, viz.
class 1 - standing forest with less than 3 individuals of secondary species of 2 meters height or more within the quadrat.
class 2 - gaps created by fallen stems or tree crowns.
class 3 - skid trails.

class 4 - disturbed forest with at least 3 trees of secondary species of 2 meters height or more within the quadrat.

If the vegetation is at least 2 meters high over more than 50% of the quadrat, the quadrat is classified as standing forest or disturbed forest (class 1 or 4). If the vegetation does not meet this requirement, the quadrat is classified as a gap (class 2) or, if the area under skid trails is larger than the area under gaps, as forest class 3 (skid trails).

The forest class concept was introduced together with the new-type field sheet. Forest class 4, however, was added in October 1982.

2.8 Tree present? (Plot bezet?)

This code is included to facilitate editing of the data by computer. Code 1 means that the subplot contains at least one tree (dead or alive). Code 2 means that no tree has ever been recorded in the subplot. The tree present code was not included in the old-type field sheet.

3 Tree chararteristics

3.1 Tree number (Boomnummer)

Every tree which has been measured previously is marked with an aluminium label and/or a number painted in red on the tree.

In the 150 x 150 m assessment plots, all trees of commercial species of a diameter of 15 cm or more are enumerated. These trees are numbered consecutively in each plot, starting with number 1.

In the circular subplots, all trees of commercial species of 5 cm diameter and more are assessed. These trees are numbered consecutively in each subplot, starting with number 1.

The consequence is that commercial species in the circular plots have two numbers if they are of a diameter of at least 15 cm, one of the circular subplots and one of the 150 x 150 m plot. In order to avoid confusion, both numbers are recorded on the field sheets. The number which is not applicable is written after the species name (see tree no. 279 in the example).

In the 10 x 10 m quadrats, trees of all species of at least 15 cm diameter are enumerated. Trees of commercial species already had a number of the 150 x 150 m plot when these quadrats were established. This number is also used in the field sheets of these subplots (e.g. tree no. 279 in the example). Trees of other spe-

cies are numbered consecutively in each quadrat, starting with number 1. However,a tree number should not show up twice in one quadrat. So, if a commercial tree with a low number is present in the quadrat, this number should not be used again for a non-commercial tree.

3.2 Species name and species code (Soortnaam, soortcode)

The species name is filled out in the field. For commercial species, a three-letter code may be used (see appendix 6). The species code is an eight-digit number which is filled out in the office using appendix 6. The eight-digit code was not used in the old-type field sheet. The three-letter code was used instead.

3.3 Stem class (Stamklasse)

This one digit code is a parameter for the stem quality of living trees and an indication of the way a tree has died for dead trees.
The following codes are used:

code 1 - The tree is alive, standing and has a crown. The stem is reasonably straight and long, it may be very slightly leaning at the most and should be without other defects which make the log less valuable.

code 2 - the tree is alive, standing and has a crown. The stem is either slightly leaning or slightly decayed or somewhat crooked or with other minor defects which make the log less valuable.

code 3 - the tree is alive, standing and has a crown. The tree is leaning heavily, very crooked or decayed and cannot produce a commercial log in the future.

code 4 - the tree is alive, standing and the stem has broken below the crown point, but above the point of measurement.

code 5 - the tree is dead, standing and the stem has broken below the crown point or
the tree is alive, standing and the stem has broken below the point of measurement.

code 6 - The tree is dead, standing and has a crown.

code 7 - the tree has fallen on the ground and is either dead or alive.

code 8 - the tree has been felled.

code 9 - the tree was not found.

When a tree has been classified once rightly as stem class 5, 6, 7 or 8, it is considered dead and the stem class remains the same in all future enumerations. It is possible that such a tree develops a coppice stem. When such a coppice reaches the diameter limit, it is recorded as ingrowth.
The stem classification has been changed considerably when the new-type field sheet was introduced. Only three stem classes were recorded on the old-type field sheet, stem class 1 being the present stem classes 3 and 4, stem class 2 being the present class 2 and class 3 being the present class 1.

3.4 Silviculture (Houtteelt)

This code indicates whether a tree has been poison-girdled or not and how a girdled tree responds to the treatment. The following codes are used:

code 1 - the tree has not been girdled.

code 2 - The tree has been girdled, but the treatment has no or very little effect (yet).

code 3 - The tree has been girdled and the bark has died over the whole circumference of the stem. The treatment has little or no effect upon the crown (yet).

code 4 - the tree has been girdled and has lost at least half of its leaves as a result of the treatment. However, the tree is still alive and is not bare.

code 5 - the tree has been girdled and is dead or has no living leaves left.

The silviculture code is recorded on the field sheet for all living and dead trees. This code was not included in the old type field sheet.

3.5 Girth b.h. (omtrek b.h.)

The girth of each tree of stem classes 1, 2, 3 and 4 is measured at a specified height (point of measurement), using a steel tape. The point of measurement is usually at breast height (1.30 m) or one meter above the buttresses. However, when the stem is of irregular shape, the point of measurement is selected at a more or less round stem section. If a tree of stem class 9 turns out to be alive during a following enumeration, the missing girth is estimated by interpolation (see also section 3.8 of this appendix).

3.6 Height and diameter crown point (Hoogte, diameter kroonpunt)

Measurements of stem height and the diameter at crown point are not part of the standard procedure and are carried out only when a special instruction is given. Until to-date, these parameters have been assessed once for the commercial species in the 10 x 10 m quadrats.

Stem heights are measured with an optical instrument (e.g. a Blume-Leiss) and reduced to the nearest meter. The height is the distance from the tree base to the crown point. The crown point is the point of origin of the lowest crown forming branch.

The diameter at crown point is measured in millimeters with a Wheeler Pentaprism Optical Caliper. Sometimes the stem is swollen at the crown point. In such a case, the diameter is assessed directly below the swelling.

Sometimes it is not quite clear where the trunk ends and the crown begins. When this is the case, the point where the first living thick branch (at least 2 cm diameter) originates is to be considered as the crown point.

3.7 Crown form and crown position (Kroonvorm, KV; Kroonpositie, KP)

These codes are meant as indices for the quality of the crown and its position relative to adjacent crowns. These codes were first published by Dawkins (1963) and are used in many countries. For more information see Synnott (1979).

The crown form codes are the following.

code 0 - no crown or a small coppice crown. This code is given only to trees of stem class 4 of higher.

code 1 - very poor, definitely degenerating or suppressed or badly damaged, and probably incapable of increasing its growth rate or responding to liberation.

code 2 - poor, distinctly unsatisfactory with extensive die-back, strong a-symmetry and few branches, but probably capable of surviving.

code 3 - tolerable, just silviculturally satisfactory, distinctly asymmetrical or thin, but apparently capable of improvement if given more room.

code 4 - good, very nearly ideal, silviculturally satisfactory, but with some slight defect or asymmetry or some dead branch tips.

code 5 - perfect, the best size and development generally seen, wide, circular in plan, symmetrical.

The crown position codes are as follows:

code 0 - no crown or a small coppice crown. The tree is of stem class 4 or higher.

code 1 - no direct light. The crown is entirely shaded vertically and laterally.

code 2 - some side light. The crown is entirely shaded vertically but exposed to some direct side light due to a gap or edge of overhead canopy.

code 3 - some overhead light. The crown is partly exposed vertically but partly vertically shaded by other crowns.

code 4 - full overhead light. The crown is fully exposed vertically but is partly shaded by adjacent trees of similar or greater height.

code 5 - fully exposed to light. The crown is fully exposed vertically and free from lateral competition at least within the 90° inverted cone subtended by the crown base.

Crown form and crown position have been assessed in all enumerations.

3.8 Stem damage (Stamschade, SS)

This code indicates whether the stem has been damaged as a result of logging, silvicultural treatment and natural causes and provides information about the nature of the damage. The following codes are used.

code 1 - no stem damage.

code 2 - some bark damage. The trunk or buttresses are slightly damaged as a result of a physical force. A relatively small piece of bark has been ripped off.

code 3 - severe bark damage. The bark has been ripped off as a result of a physical force over at least one third of the circumference of the stem or over at least 20 cm of the circumference of the stem or over a length of at least 2 meters.

code 4 - the stem has split.

code 5 - the tree is unstable, i.e. it is supported by another tree and would fall down without this support.

code 6 - the stem is visibly hollow or severely decayed.

code 9 - this code indicates that the tree was recorded dead or not found originally, but turned out to be alive during a more recent enumeration.

It is possible that more than one stem damage category is applicable to a tree. In such a case, the highest code number is filled out. A stem damage code 4, 5

or 6 means that the tree belongs to stem class 3 or 4. Stem damage is not assessed for tree of stem class 5 or higher[1].
This stem damage classification was introduced with the new-type field sheet. Codes 4, 5 and 6 were, however, not used in the 1981-1982 enumeration. On the old-type field sheet, three stem damage classes were distinguished. The old class 3 is identical to the new code 6. Class 2 meant that the stem was broken and the old-type class 1 is more or less comparable to the new code 3, but not as well defined.

3.9 Crown damage (Kroonschade, KS)

This code is an index for the damage to the crown, caused by a physical force. The following code numbers are used:
code 1 - no crown damage.
code 2 - some crown damage, less than half of the crown has broken off.
code 3 - severe crown damage, more than half of the crown has broken off.
code 4 - the whole crown has broken off. The tree may have a small coppice crown.
The crown damage has been assessed in all enumerations. On the old-type field sheets a slightly different code system was used. The old code 1 is identical to the new code 2, the old code 2 is identical to the new code 3 and both the old code 3 and the old stem damage class 2 are identical to the new code 4.

3.10 Co-ordinates (Coördinaten)

The x- and y-co-ordinates indicate the location of the tree within a 10 x 10 m quadrat. They are filled out only on the field sheets of plot type 3 and have been assessed once until to-date in the 1982-1983 enumeration.
The co-ordinates are measured in meters. The x-co-ordinate is the distance from the heart of the stem to the west boundary of the quadrat, reduced to the nearest meter. The y-co-ordinate is the distance to the south boundary of the subplot. It is measured in the same way as the x-co-ordinate.

---

[1] except for code 9, which is only used in combination with stem class 9.

APPENDIX 3

INSTRUCTIES VOOR DE OPNAME VAN 150 x 150 m MEETVAKKEN, CIRKELPLOTS EN 10 x 10 m VAKKEN IN EXPT. 78/5

Op de veldstaat dienen de volgende gegeven te worden vermeld (zie ook voorbeeld):

1 Plotnummer (kolommen 1 en 2)
Deze code bestaat uit twee cijfers. Het eerste cijfer geeft de herhaling aan, het tweede cijfer het vaknummer. Code 32 betekent dus herhaling 3, vak 2. Voor de nummering, zie fig. 1 en fig. 2. Bij de nulplots is het eerste cijfer een 4 en het tweede het vaknummer. Het meest zuidelijke nulplot heeft vaknummer 1, het middelste vak heeft nummer 2 en het noordelijkste nulplot heeft vaknummer 3.

2 Subplottype (kolom 3)
Deze code geeft aan welk type subplot met het betreffende formulier is opgenomen. De volgende codes worden gebruikt:
code 1 - gehele meetvak van 150 x 150 m.
code 2 - cirkelsubplots.
code 3 - 10 x 10 m meetvakje.

3 Subplotnummer (kolommen 4 en 5)
In het geval van subplottype 1 (gehele meetvak) is dit nummer altijd 00. In geval van subplottype 2 of 3 is dit het nummer wat aan het subplot is toegekend (zie fig. 3 en fig. 4). Het subplotnummer moet altijd uit twee cijfers bestaan. Dat wil zeggen subplotnummer 1 wordt genoteerd als 01, nummer 2 als 02 etc.

4 Behandeling (kolommen 6 en 7)
Dit is een code van twee cijfers, die aangeeft wat de kapintensiteit (eerste cijfer) en wat de houtteeltkundige behandeling (tweede cijfer) geweest is. Zie ook tabel 1.
De codes voor de kapintensiteit kunnen 1 (= E15), 2 (= E23) of 3(= E46) zijn. De houtteeltkundige behandelingscodes zijn 1 (geen behandeling, S0), 2 (= SR18) en 3(= SR14). Een behandelingscode 23 betekent dus een kapniveau E23 (ongeveer 23m^3/ha geveld) en een behandeling SR14 (zuivering met een diameterondergrens van 20 cm). Ongestoord bos heeft code 00.

5 Datum (kolommen 8 t/m 11)

De datum dient in het veld te worden ingevuld. Op kantoor wordt deze dan omgezet in de zg. decimale datum met behulp van een tabel (zie appendix 5).

6 Ploegleider en boomkenner

De ploegleider vult zijn naam in en de naam van de boomkenner.

7 Bosklasse (kolom 12)

Deze code dient hoofdzakelijk om de schade als gevolg van exploitatie, zuivering of natuurlijke oorzaken te schatten.

Er zijn vier klassen:

code 1 - staand bos met ten hoogste twee kapoewerie bomen van meer dan 2 meter hoog binnen het 10 x 10 m vakje.

code 2 - openingen onstaan door gevallen stammen of kronen.

code 3 - sleeppaden.

code 4 - staand bos met drie of meer kapoewerie bomen van meer dan 2 meter hoog binnen het 10 x 10 m vakje.

De bosklasse wordt alleen bepaald voor de 10 x 10 m vakjes. Bestaat een meetvakje voor meer dan de helft uit een bomenvegetatie van meer dan 2 meter hoog, dan krijgt het vakje code 1 of code 4. Bestaat het vakje voor meer dan de helft uit sleeppad en/of openingen ontstaan door gevallen bomen, dan krijgt het vakje code 2 of code 3. Code 3 wordt toegekend als het oppervlak aan sleeppaden het opppervlak aan andere openingen overtreft. Is het omgekeerde het geval, dan wordt code 2 ingevuld.

8 Plot bezet? (kolom 13)

Deze code dient om de computerverwerking te vereenvoudigen. Code 1 betekent dat één of meer bomen (dood of levend) zijn opgenomen in het subplot. Code 2 betekent dat er geen bomen (ook geen reeds jaren dode exemplaren) op de veldstaat staan vermeld. Deze code wordt op kantoor ingevuld.

9 Boomnummer (kolommen 14 t/m 16)

Alle bomen die bij de vorige opname zijn gemeten, zijn gemerkt met een rood verfnummer en/of een nummer op een aluminium label.

In de 150 x 150 m meetvakken worden alleen waardehoutsoorten opgenomen met een omtrek van 471 mm of meer. In elk meetvak begint de nummering bij nummer 1. De boom met dit nummer bevindt zich als regel nabij het NO of NW piket van het meetvak. Bij de eerste opname werd eerst de oost (of west) helft van het vak

opgenomen, zigzag gaande van noord naar zuid. De opeenvolgende boomnummering volgt hetzelfde patroon. Daarna werd de andere helft opgenomen, zigzag gaande van zuid naar noord. Hier lopen de nummers dus op in zuid-noord richting. De bij de volgende opnames genoteerde inwas staat verspreid over het gehele vak. In de cirkelplots worden alle waardehoutsoorten met een omtrek van 157 mm of meer gemeten. Ook in deze plots wordt een opeenvolgende nummering aangehouden, die onafhankelijk is van de nummering in het 150 x 150 m vak. In elk subplot begint de nummering bij 1. Een waardehoutsoort van meer dan 471 mm omtrek draagt dus twee nummers als hij binnen een cirkelplot staat, namelijk één nummer van het 150 x 150 m vak en één van het cirkelplot. Om verwarring te voorkomen worden beide nummers vermeld op de veldstaten. Het voor het subplottype niet geldende nummer staat vermeld achter de soortnaam (zie bij HBA in het voorbeeld). In de 10 x 10 m vakjes zijn zowel de waardehoutsoorten als niet-waardehoutsoorten opgenomen (minimum omtrek 471 mm). Toen deze vakjes voor het eerst werden gemeten hadden de waardehoutsoorten al een nummer behorend bij het 150 x 150 m meetvak. Dit nummer wordt ook gebruikt in de 10 x 10 m vakjes. De niet-waardehoutsoorten zijn opeenvolgend genummerd. In elk 10 x 10 m vakje begint de nummering bij 1. Een boommnummer mag echter nooit tweemaal voorkomen in één 10 x 10 vakje. Staat er bijvoorbeeld een waardehoutsoort met nummer 2 in een 10 x 10 m vakje, dan moet nummer 2 bij de nummering van de niet-waardebomen worden overgeslagen.

10 Soortnaam en soortcode (kolommen 17 t/m 24)
De soort wordt in het veld aangegeven met de volle naam of de drielettercode voor waardesoorten (zie appendix 6). Dit wordt ingevuld onder het hoofdje soortnaam. De soortcode is een getal van acht cijfers dat op kantoor wordt ingevuld (zie appendix 6).

11 Stamklasse (kolom 25)
Code van één cijfer die aangeeft of de boom levend is of dood en die voorts bij levende bomen informatie geeft over de stamkwaliteit en bij dode bomen over de wijze waarop de boom is gestorven.

code 1 - de boom is levend, staat overeind en heeft een kroon. De stam is redelijk recht en lang, eventueel slechts weinig overhangend en zonder verdere gebreken die het blok minder waard zullen maken.

code 2 - de boom is levend, staat overeind en heeft een kroon. De stam hangt licht over of is enigszins verrot of krom of heeft andere kleine gebreken die het blok minder waard zullen maken.

code 3 - de boom is levend, staat overeind en heeft een kroon. De stam is zwaar overhangend, erg krom of erg rot en kan niet uitgroeien tot een verkoopbaar blok.

code 4 - de boom is levend, staat overeind en is afgebroken onder het kroonpunt, maar boven het meetpunt.

code 5 - de boom is dood, staat overeind en is afgebroken onder het kroonpunt, óf de boom is levend, staat overeind en is afgebroken onder het meetpunt.

code 6 - de boom is dood, staat overeind en heeft een kroon.

code 7 - de boom is omgevallen (dood of levend).

code 8 - de boom is geveld.

code 9 - de boom is bij de opname niet gevonden.

Bij het vaststellen van de stamklasse dient geen rekening gehouden te worden met de soort, d.w.z. een mooie stam van een soort die niet tot marktwaardige afmetingen uit kan groeien behoort in stamklasse 1.

Als een boom éénmaal is ingedeeld in één van de stamklassen 5 t/m 8 wordt de boom als dood beschouwd. Tenzij blijkt dat deze stamklasse bij vergissing aan de boom is toegekend, verandert de stamklasse van een dergelijke boom niet bij volgende opnames. Deze bomen behoeven bij volgende opnames niet te worden opgenomen en de gegevens van deze bomen (boomnummer, soortnaam, stamklasse en houtteeltcode) moeten vóór de opname op kantoor worden ingevuld. Het is mogelijk dat een dergelijke boom stronkuitlopers vormt. Mocht zo'n stronkuitloper uitgroeien tot een stam met een diameter boven de diametergrens, dan wordt die nieuwe stam genoteerd als inwas en blijft de stamklasse van de oorspronkelijke afgebroken, omgevallen of gevelde stam ongewijzigd.

12 Houtteelt (kolom 26)

De houtteelt code geeft aan of een boom is vergiftigd en zo ja, hoe deze boom op de behandeling reageert.

code 1 - de boom is niet behandeld.

code 2 - de boom is gefrild, maar deze behandeling heeft (nog) geen of weinig effect.

code 3 - de boom is gefrild en de bast is ter hoogte van de fril dood over de gehele omtrek van de boom. De behandeling heeft (nog) weinig of geen effect op de kroon.

code 4 - de boom is gefrild en heeft meer dan de helft van zijn blad verloren. De boom staat echter niet kaal en is niet dood.

code 5 - de boom is gefrild en is dood of heeft geen levend blad meer.

13 Omtrek b.h. (kolommen 27 t/m 30)

De omtrek wordt gemeten bij alle bomen met stamklassen 1 t/m 4. Deze meting is tot op millimeters nauwkeurig en wordt uitgevoerd met een stalen meetband. Meestal ligt het meetpunt op borsthoogte (b.h.). Bij bomen met plankwortels (sporen) ligt het meetpunt echter 1 meter boven de plankwortelaanzet en bij onregelmatig gevormde stammen op een min of meer rond stamstuk.
Het meetpunt is op twee manieren aangegeven. Ten eerste door een meetstreep van rode verf en ten tweede door het aluminium label dat op precies 30 cm onder het meetpunt is aangebracht.

14 Hoogte (kolommen 31 en 32)

Deze code geeft de hoogte in meters vanaf de grond tot het kroonpunt.
De hoogte wordt alleen gemeten als daartoe speciale opdracht wordt gegeven.
Het kroonpunt is het punt waar de stam overgaat in de kroon. Indien de boom een vork vertoont boven het meetpunt ligt het kroonpunt direct onder die vork.
Soms is het niet duidelijk waar het kroonpunt ligt. In zo'n geval neemt men het aanhechtingspunt van de eerste dikke levende tak (minstens 2 cm diameter) boven het meetpunt als kroonpunt.
De metingen worden uitgevoerd met een boomhoogtemeter (bv. een Blume-Leiss).
De metingen worden naar beneden toe afgerond op hele meters.

15 Diameter kroonpunt (kolommen 33 t/m 35)

Deze code geeft de topdiameter van de stam. De diameter kroonpunt wordt alleen opgenomen bij bomen waarvan de hoogte is gemeten. De diameter op het kroonpunt wordt in millimeters nauwkeurig bepaald met een Wheeler Pentaprism Optical Caliper. Voor definitie van het kroonpunt, zie onder 14. Soms treedt op het kroonpunt een verdikking van de stam op. In een dergelijk geval wordt de diameter onder die verdikking gemeten.

16 Kroonvorm (kolom 36)

Deze code geeft een indicatie van de kwaliteit van de kroon.

Code 1 - zeer slecht, beslist gedegenereerd of onderdrukt, of ernstig beschadigd en waarschijnlijk niet in staat tot verbetering, ook niet na vrijstelling.

Code 2 - Slecht, beslist niet bevredigend met een sterke onevenwichtigheid of uitgebreide taksterfte. Waarschijnlijk in staat tot overleven, maar reageert waarschijnlijk weinig op vrijstelling.

Code 3 - voldoende, houtteeltkundig gezien nog net bevredigend, maar met duidelijke onevenwichtigheid of magere opbouw, maar kennelijk tot verbetering in staat bij vrijstelling.

Code 4 - goed, bijna perfect en houtteeltkundig gezien bevredigend, maar met kleine gebreken in evenwichtigheid of met taksterfte.

Code 5 - Perfect, zo groot en zo goed ontwikkeld als de soort maar kan presteren, breed en rondom evenwichtig.

Als de stamklasse 4 of hoger is, is de kroonvorm 0.

17 Kroonpositie (kolom 37)

Deze code geeft een indicatie van de positie van de kroon in het kronendak.

Code 1 - geen direct licht, de kroon is geheel beschaduwd van boven zowel als van opzij.

Code 2 - enig licht van opzij, de kroon is geheel afgeschermd tegen licht van boven, maar ontvangt wel enig licht van opzij.

Code 3 - enig licht van boven, de kroon is slechts gedeeltelijk belicht van boven en gedeeltelijk afgedekt tegen dit licht door andere kronen.

Code 4 - vol licht van boven, de kroon is volledig belicht van boven maar met zijdruk van bomen van ongeveer gelijke of grotere hoogte.

Code 5 - vrijstaand, kroon volledig belicht van boven en vrij van zijdruk.

Als de stamklasse 4 of hoger is, is de kroonpositie 0.

18 Stamschade (kolom 38)

Deze code geeft aan of de stam beschadigd is als gevolg van exploitatie, zuivering of natuurlijke oorzaken en waar deze schade uit bestaat.

Code 1 - geen stamschade.

Code 2 - lichte bastschade, enige schade aan de boombast of de plankwortels. De bast is verdwenen over een klein oppervlak.

Code 3 - uitgebreide bastschade. Bij bomen met een omtrek van 600 mm of minder: de bast is verdwenen over tenminste één derde van de omtrek of over 2 meter of meer in de lengterichting van de stam. Bij dikkere bomen: de bast is verdwenen over tenminste 20 cm van de omtrek of over tenminste 2 meter in de lengterichting van de stam.

code 4 - de stam is gespleten.

code 5 - de boom hangt, d.w.z. bij rust op een andere stam en zou zonder de steun van die andere stam op de grond vallen.

code 6 - De stam is zichtbaar hol of vermolmd.

Stamschadecodes 2 en 3 hebben uitsluitend betrekking op schade veroorzaakt door vallend hout of door de exploitatie. Bij afstervende bomen is het mogelijk dat een deel van de afgestorven bast is verdwenen. Dit verschijnsel, dat vrijwel uitsluitend voorkomt bij met arboricide behandelde bomen, wordt dus niet geklassificeerd als stamschade.

Het is mogelijk, dat meer dan één stamschadecode op de boom van toepassing is. In zo'n geval wordt de hoogste van die codes ingevuld.
Stammen met code 4, 5 of 6 behoren altijd tot stamklasse 3.

19 Kroonschade (kolom 39)
Deze code geeft de mate van schade aan de kroon aan.
Code 1 - geen kroonschade.
Code 2 - lichte kroonschade, minder dan de helft van de kroon is afgebroken.
Code 3 - zware kroonschade, meer dan de helft van de kroon is afgebroken.
Code 4 - de gehele kroon is afgebroken.
Kroonschadecodes 2 t/m 4 worden alleen toegekend als de schade veroorzaakt is door vallend hout en als de kroon zich nog niet hersteld heeft van de schade.

20 Coördinaten (kolommen 40 en 41)
Deze codes geven de plaats aan waar de boom staat. Ze worden alleen bepaald voor de inwas in de 10 x 10 meter vakjes (plottype 3).
De coördinaten worden tot op de meter nauwkeurig gemeten met de meetband. De x-coördinaat (kolom 40) is de afstand in west-oost richting vanaf het hart van de boom tot het piket in de zuid-westhoek van het 10 x 10 m vak. Bedraagt die afstand minder dan 1 meter, dan is de coördinaat 0. Is de afstand groter dan 1 meter, maar minder dan 2 meter, dan is de coördinaat 1 etc. De y-coördinaat (kolom 41) is de afstand van zuid-noord richting vanaf het hart van de boom tot het piket in de ZW hoek en wordt op dezelfde manier gemeten als de x-coördinaat.

21 Opmerkingen
Deze kolom dient voor waarnemingen waarvoor geen code is opgenomen op de veldstaat. Hier kan bijvoorbeeld worden vermeld of er een ladder nodig is bij het meten, of de boom voor het eerst wordt opgenomen en of de boom bloeit of vrucht draagt.

VELDSTAAT

VOOR

EXPT. 78/5

Plotnummer (1 2): 2 3

Subplottype (3): 3

Subplotnummer (4 5): 1 0

In te vullen op kantoor

Behandeling (6 7): 1 2

Datum: 18-3-1984

Dec. datum (8 9 10 11): 8 4 2 1

Ploegleider en Boomkenner: Wolff / J.ELBURG

Boskklasse (12): 4

Plot bezet ? (13): 1

Boom nummer	Soortnaam	Soortcode (kantoor)	Stam klasse	Hout-teelt	Omtrek b.h.	Hoogte	Diameter kroonpunt	Kroon		Schade		Coörd.		Opm.
								vorm	pos.	stam	kroon	X	Y	
14 - 16		17 - 24	25	26	27 - 30	31 - 32	33 - 35	36	37	38	39	40	41	
x x x		xx oo xx oo	x	o	x x x x	o o	x x x	o	x	o	x	o	x	
1	Rode bst Jakanta		6	5										
2	Rode bst Jakanta		1	1	1023			4	2	1	1			
101	BOL		2	1	754	10	230	4	2	1	1			
3	Ingi pipa	03340201	3	1	480			3	3	1	2	9	0	inwas
279	HBA 12	11430201	2	1	473	7	136	3	4	1	1	2	8	inwas

APPENDIX 4

CODES USED IN THE SEEDLING AND SAPLING ENUMERATIONS

1 Introduction

In this appendix, the meanings of codes used in the field sheets and computer files of the seedling and sapling enumerations are explained both in English and Dutch. An example of a filled-out field sheet (in Dutch) is included. Most of the codes used are identical or very similar to the ones used in the tree enumerations. Whenever this is the case, a reference is made to appendix 2 or 3.

2 English version

2.1 Plot number (Plotnummer)

See appendix 2, section 2.1.

2.2 Subplot type (Subplottype)

This code defines the type of subplot and is always 4 in the seedling and sapling enumerations.

2.3 Subplot number (Subplotnummer)

The subplot numbers of the seedling and sapling subplots are identical to the ones of the 10 x 10 m quadrats in which they are located (see fig. 4).

2.4 Treatment (Behandeling)

See appendix 2, section 2.4.

2.5 Date and decimal date (Datum, Decimale datum)

See appendix 2, section 2.5 and appendix 5.

2.6 Crew leader and tree spotter (Ploegleider en Boomkenner)

The crew leader fills out his name and the name of the tree spotter.

2.7 Forest class (Bosklasse)

The forest class is assessed for the 5 x 5 m quadrats, using the rules explained in appendix 2, section 2.7. However, code 4 is not to be used.

2.8 Tree species present? (Plot bezet?)

This code is the equivalent of the tree present code in the tree enumerations. Code 1 means that at least one seedling, sapling or tree is recorded on the field sheet. Code 2 means that this is not the case.

2.9 Species name and species code (Soortnaam, Soortcode)

See appendix 2, section 3.2 and appendix 6.

2.10 Numbers per size class (Aantallen per grootteklasse)

During the seedling and sapling enumeration, trees and saplings (total height 2 m or more) are recorded in sixteen 5 x 5 m quadrats per plot (see fig. 4). They are tallied per species and per size class (2 m height - 5 cm dbh., 5 cm - 10 cm dbh, 10 - 15 cm dbh. and 15 cm dbh. and above).
The size class is estimated as a rule. A steel tape is used to measure the girth or height in case of doubt.
A 2 x 2 m quadrat, in which the frequency of seedlings (total height 0.2 - 2 m) is assessed, is located within each 5 x 5 m quadrat. The numbers of seedlings per tree species are recorded on the field sheet of the sapling subplot.

3 Instructies voor de opname van zaailingen- en stakenplots in expt. 78/5 (Dutch version)

3.1 Inleiding

In deze instructies wordt de betekenis van de codes uitgelegd, die gebruikt worden bij de opname van zaailingen en staken. Veel van deze codes worden ook gebruikt bij de opname van 10 x 10 m vakjes. Waar dit het geval is wordt verwezen naar appendix 3 (Instructies voor de opname van 150 x 150 m meetvakken, cirkelplots en 10 x 10 m vakken in expt. 78/5). Bij deze instructies behoort een voorbeeld.

3.2 Plotnummer (kolommen 1 en 2)

Zie appendix 3, sub 1.

3.3 Subplottype (kolom 3)

Deze code geeft het type subplot aan. Bij deze opname is de juiste code altijd 4.

3.4 Subplotnummer (kolommen 4 en 5)

Het subplotnummer van de zaailingen- en stakensubplots is hetzelfde als het nummer van het 10 x 10 m vakje, waarin het subplot ligt (zie fig. 4).

3.5 Behandeling (kolommen 6 en 7)

Zie appendix 3, sub 4.

3.6 Datum (kolommen 8 t/m 11)

Zie appendix 3, sub 5.

3.7 Ploegleider en Boomkenner

Zie appendix 3, sub 6.

3.8 Bosklasse (kolom 12)

De bosklasse wordt vastgesteld voor elk 5 x 5 m subplot. Hierbij wordt gebruik gemaakt van de regels vermeld in appendix 3 sub 7. Code 4 wordt echter niet gebruikt, m.a.w. staand bos krijgt altijd code 1.

3.9 Plot bezet? (kolom 13)

Deze code dient om de verwerking per computer te vereenvoudigen. Code 1 betekent dat er tenminste één zaailing, staak of boom op de veldstaat is vermeld.
Code 2 betekent dat dit niet het geval is.

3.10 Soortnaam en soortcode (kolommen 14 t/m 21)

Zie appendix 3, sub 10.

3.11 Aantallen per grootteklasse (kolommen 22 t/m 31)

Bij de opname van de zaailingen- en stakenplots worden bomen en staken (totale hoogte 2 m of meer) opgenomen in zestien 5 x 5 m vakjes per plot (zie fig. 4). Zij worden per soort en per grootteklasse geteld (zie voorbeeld). De grootteklassen zijn: 2 m hoog - 5 cm diameter, 5-10 cm diameter, 10 - 15 cm diameter en 15 cm diameter en groter.
De grootteklasse mag worden geschat. Bij de minste twijfel moet de omtrek (of de hoogte) echter worden gemeten (let op! 5 cm diameter = 157 mm omtrek, 10 cm diameter = 314 mm omtrek en 15 cm diameter = 471 mm omtrek).

Binnen het 5 x 5 m vakje ligt een vakje van 2 x 2 meter, waarin het aantal zaailingen van elke boomsoort wordt geteld. Zaailingen zijn tenminste 20 cm en ten hoogste 2 meter hoog. De aantallen worden vermeld op de veldstaat van het stakenplot in de kolommen 22 en 23 (zie voorbeeld).

Veldstaat voor
Expt. 78/5
zaailingen / staken

Plotnummer [1 2] = 2 3 | Subplottype [3] = 4 | Subplotnummer [4 5] = 1 .1

Behandeling [6 7] = 1 2 | Datum ...18-3-... 19.84....

Ploegleider en Boomkenner : ....Wolff / Elburg.....

Beesklasse [12] = 1

In te vullen op kantoor

Dec. datum [8 9 10 11] = 8 4 2 1

Plot bezet ? [13] = 1

Soortnaam	Soortcode (kantoor)	Aantallen per Grootte klasse					Opmerkingen
		0,2 — 2 m.h.	2 m.h. — 5 cm ϕ	5 — 10 cm ϕ	10 — 15 cm ϕ	15 cm ϕ +	
	14 - 21	22 - 23	24 - 25	26 - 27	28 - 29	30 - 31	
	XX 00 XX 00	XX	00	XX	00	XX	
R. bst. Jakanta	00 310101	2		1			
Ingipipa	03 340201					1	
Boskoffie	00 550401	3					
Hgl. Baboen	11 430201	5			1		
Hgl. Panta	00 250501	1					
Swietboontje	04 350201	1					

APPENDIX 5

DECIMAL DATES [1]

The decimal date is a four digit code. The first two digits indicate the year, the last two digits are derived from the table below. For example, the decimal date for the 2nd February 1983 is 8309.

Day	Month												Day
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1	.00	.09	.16	.25	.33	.42	.50	.58	.67	.75	.84	.92	1
2	.00	.09	.17	.25	.33	.42	.50	.59	.67	.75	.84	.92	2
3	.01	.09	.17	.25	.34	.42	.50	.59	.67	.76	.84	.92	3
4	.01	.10	.17	.26	.34	.42	.51	.59	.68	.76	.84	.93	4
5	.01	.10	.18	.26	.34	.43	.51	.59	.68	.76	.85	.93	5
6	.02	.10	.18	.26	.35	.43	.51	.60	.68	.76	.85	.93	6
7	.02	.10	.18	.27	.35	.43	.51	.60	.68	.77	.85	.93	7
8	.02	.11	.18	.27	.35	.44	.52	.60	.69	.77	.85	.94	8
9	.02	.11	.19	.27	.35	.44	.52	.61	.69	.77	.86	.94	9
10	.03	.11	.19	.27	.36	.44	.52	.61	.69	.78	.86	.94	10
11	.03	.12	.19	.28	.36	.44	.53	.61	.70	.78	.86	.95	11
12	.03	.12	.19	.28	.36	.45	.53	.61	.70	.78	.87	.95	12
13	.04	.12	.20	.28	.36	.45	.53	.62	.70	.78	.87	.95	13
14	.04	.12	.20	.28	.37	.45	.53	.62	.70	.79	.87	.95	14
15	.04	.13	.20	.29	.37	.45	.54	.62	.71	.79	.87	.96	15
16	.04	.13	.21	.29	.37	.46	.54	.62	.71	.79	.88	.96	16
17	.05	.13	.21	.29	.38	.46	.54	.63	.71	.79	.88	.96	17
18	.05	.13	.21	.30	.38	.46	.55	.63	.72	.80	.88	.96	18
19	.05	.14	.21	.30	.38	.47	.55	.63	.72	.80	.88	.97	19
20	.05	.14	.22	.30	.38	.47	.55	.64	.72	.80	.89	.97	20
21	.06	.14	.22	.30	.39	.47	.55	.64	.72	.81	.89	.97	21
22	.06	.15	.22	.31	.39	.47	.56	.64	.73	.81	.89	.98	22
23	.06	.15	.22	.31	.39	.48	.56	.64	.73	.81	.90	.98	23
24	.07	.15	.23	.31	.39	.48	.56	.65	.73	.81	.90	.98	24
25	.07	.15	.23	.32	.40	.48	.56	.65	.73	.82	.90	.98	25
26	.07	.16	.23	.32	.40	.48	.57	.65	.74	.82	.90	.99	26
27	.07	.16	.24	.32	.40	.49	.57	.65	.74	.82	.91	.99	27
28	.08	.16	.24	.32	.41	.49	.57	.66	.74	.82	.91	.99	28
29	.08	.16	.24	.33	.41	.49	.58	.66	.75	.83	.91	.99	29
30	.08		.24	.33	.41	.50	.58	.66	.75	.83	.92	.99	30
31	.08		.25		.41		.58	.67		.83		+1	31

[1] Source: Synnott, 1979

APPENDIX 6

CELOS SPECIES CODE LIST (SHORT LIST)

This list includes the species codes used in experiment 78/5. Each code refers to a vernacular species name and consists of eight digits. The first two digits indicate the quality of the timber. If the first digit = 1, the species is included in the Celos List of Commercial Species. If the species is not considered commercial, the first digit = 0. The second digit is a quality index introduced by the FAO project FO: SF/SUR/71/506. These indices have not been checked and are therefore not discussed any further in this report. The other digits indicate the botanical identity of the vernacular name. The third and fourth digit indicate the family, the fifth and sixth digit the genus and the last two digits the species. If a vernacular name refers to more than one botanical species, the words "et al" are written behind the scientific name.
Often, the same species code is used for two or three vernacular names, which are more or less synonymous. This is indicated as follows,

- "Pegrekoe,, (hoogland)", means pegrekoe and hoogland pegrekoe
- "Sokososo mappa; Mappa, witte", means sokosoko mappa and witte mappa
- "Tite oedoe, rode bast, harde bast" means rode bast tite oedoe and harde bast tite oedoe.

In the vernacular names, "zw" means zwart, "kl" means klein, "gr" means groot, "bl" means blad, "hgl" means hoogland and "lgl" means laagland.

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
	Anacardiaceae		
04020103	Anacardium spruceanum	Boskasjoe	
11020201	Loxopterygium sagotii	Slangenhout	SLA
01020202	Loxopterygium spec	Slangenhout, hgl.	
04020301	Spondias mombin	Mope	
04020401	Tapirira guianensis	Weti oedoe	
04020402	Tapirira guianensis var. ellipt.	Weti oedoe, hgl.	
	Annonaceae		
04030101	Annona montana et al	Boszuurzak	
00030104	Annona glabra	Zwamp zuurzak	
11030301	Xylopia aromatica et al	Pegrekoe pisi	PEP
01030302	Xylopia longifolia	Pegrekoe, (hoogland)	
00030401	Anaxagorea mutica	Jari jari	
	Apocynaceae		
04040101	Ambelania acida	Batbati	
01040201	Aspidosperma album et al	Kromanti kopi	
00040202	Aspidosperma exelsum et al	Parelhout, zwarte	
06040203	Aspidosperma marcgravianum	Parelhout, witte	

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
03040401	Couma guianensis	Pera; Mapa	
04040501	Geissospermum sericeum	Bergibita; Boskinine	
04040601	Himatanthus articulata	Savanne bolletri	
00040701	Lacmellea aculeata	Pritjari, zwarte	
03040801	Macoubea guianensis	Sokosoko Mapa; Mapa, witte	
00040901	Parahancornia amapa	Mapa, zwarte; Mapa, kl. bl.	
00041001	Bonafousia undulata	Merki tiki	
00041505	Stenosolen heterophyllus	Merki tiki, kleine	
	Araliaceae		
13060101	Didymopanax morototoni	Kasaba oedoe; Kasavehout	KAS
11060201	Schefflera paraensis	Morototo	MOR
	Bignoniaceae		
11080101	Jacaranda copaia	Goebaja	GOE
00080102	Jacaranda rhombifolia	Jaifi; Morokobita	
02080201	Tabebuia aquatilis et al	Zwamppanta	
04080202	Tabebuia capitata	Makagrin	
11080204	Tabebuia serratifolia	Groenhart	GRO
	Bixaceae		
00090101	Bixa orellana	Boskoeswe (gewone)	
	Bombacaceae		
00100101	Bombax aquaticum	Watra kakaw	
04100102	Bombax crassum et al	Boskatoen	
05100103	Bombax flaviflorum	Sabana katoen	
03100201	Catostemmia fragrans	Barmanie	
05100301	Ceiba pentandra	Kankantri	
	Boraginaceae		
00110102	Cordia nodosa	Knooptafelboom	
00110103	Cordia panicularis et al	Bostafelboom	
00110107	Cordia laevifrons	Tafelboom, hgl.	
	Burseraceae		
02120101	Hemicrepidospermum rhoifolium	Tingimoni, getande	
02120202	Protium aracouchini et al	Tingimoni	
02120204	Protium heptaphyllum	Tingimoni, kl. bl.	
11120206	Protium insigne	Tingimoni, gr.bl.	GTI
11120207	Protium neglectum	Tingimoni, harde bast	HTI
02120208	Protium polybotryum	Tingimoni, rode bast	
11120301	Tetragastris altissima	Rode sali	SAL
11120302	Tetragastris hostmannii	Tingimoni sali	TIS
11120401	Trattinickia burserifolia et al	Ajawa tingimoni; Awaloe pisi	ATI
	Caricaceae		
05150201	Jacaratia spinosa	Awara oedoe	
	Caryocaraceae		
00160101	Caryocar glabrum	Sopo oedoe, (gladde)	
00160102	Caryocar microcarpum	Sopo oedoe, ruwe	
05160103	Caryocar nuciferum	Sawari	
05160104	Caryocar sp	Sawari, hgl.	

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
	Celastraceae		
11170101	Goupia glabra	Kopi	KOP
04170201	Maytenus myrsinoides	Sowtmeti oedoe; Zoutmeti oedoe	
	Combretaceae		
03190101	Buchenavia capitata	Djiendja oedoe; Gemberhout	
04190301	Terminalia amazonia et al	Kalebashout; Krasabi oedoe	
04190303	Terminalia dichotoma et al	Bosamandel	
	Dichapetalaceae		
00200101	Tapura guianensis	Pakira tiki	
00200102	Tapura capitulifera	Pakira tiki, bergi	
	Ebenaceae		
05220101	Diospyros guianensis	Blaka oema	
04220103	Diospyros species	Pikapika	
	Elaeocarpaceae		
05230101	Sloanea eichleri	Rafroe njanjan	
05230102	Sloanea grandiflora	Boskoeswe, kl. bl.	
00230103	Sloanea trichosticha	Ravenjang	
	Euphorbiaceae		
00250201	Alchorneopsis trimera	Manbebe	
03250401	Chaetocarpus schomburgkianus	Fomang	
00250402	Chaetocarpus sp	Fomang, gele bast	
00250501	Conceveiba guianensis et al	Man sali; Basra sali; Panta, hgl.	
04250601	Croton matourensis	Tabakabron	
03250701	Drypetes variabilis	Foengoe, witte	
04250801	Hevea guianensis	Hevea	
00250901	Hura crepitans	Possentri	
04251001	Hyeronima laxiflora	Ajo ajo, (hgl.)	
04251101	Maprounea guianensis	Pikin tiki; Dagoe hati	
04251201	Pera bicolor et al	Pepre oedoe	
04251601	Sapium aubletianum	Gom oedoe; Gomhout	
04251602	Sapium klotzschgianum et al	Merki oedoe	
00251801	Mabea piriri	Koto tiki	
00251905	Pogonophera schomburgkiana	Geri oedoe	
	Flacourtiaceae		
05260101	Casearea arborea	Redi oedoe	
05260102	Casearea javitensis	Oema oedoe	
00260201	Homalium guianense	Bita oedoe	
04260301	Laetia procera	Pinto kopi; Kaaiman oedoe	
04260302	Laetia sp	Pinto kopi, hgl.	
	Guttiferae		
05270101	Calophyllum brasiliense et al	Koerara; Koerali	
00270201	Caraipa densifolia et al	Laksiri	
05270301	Clusia fockeana et al	Sabana mangro	
11270401	Platonia insignis et al	Pakoeli; Geelhart	GEE
00270502	Rheedia kappleri	Zwampakoeli	

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
01270503	Rheedia macrophylla	Pakoeli, hgl.	
11270601	Symphonia globulifera	Mataki, hgl.; Egron mataki	MAT
04270701	Tovomita choisyana et al	Bosmangro	
00270801	Vismia angusta	Manpinja	
00270802	Vismia cayennensis et al	Pinja	
00270803	Vismia guianensis	Oema pinja	
00270806	Vismia spec	Pinja, witte	
	Hernandiaceae		
00280101	Hernandia sonora	Popolika; Ajowo	
	Humiriaceae		
11290101	Humiria balsamifera	Blakberi; Meri; Swit'meri	MER
04290201	Sagoglottis cydonioides et al	Bofroe oedoe	
	Icacinaceae		
00310101	Dendrobangia boliviana	Jakanta, (rode bast)	
03310301	Poraqueiba guianensis	Jakanta, witte bast	
	Lauraceae		
01330101	Aniba hostmanniana	Waikara pisi	
00330102	Aniba mas	Manrozenhout	
05330103	Aniba rosaeodora	Rozenhout	
00330104	Aniba taubertiana et al	Pisi	
11330302	Licaria cayennensis	Kaneelhart; Kaneri oedoe	KAN
01330303	Licaria guianensis	Kaneel pisi, (kl.bl.)	
11330401	Nectandra grandis	Pisi, zw.gr.bl.	ZPG
00330403	Nectandra pisi	Pisi, zw.	
11330502	Ocotea globifera	Wanapisi; Pisi, harde	WAP
11330503	Ocotea glomerata	Pisi, zw.kl.bl.	ZPK
01330504	Ocotea guianensis	Zilverpisi	
11330506	Ocotea petalanthera	Pisi, witte	WIP
00330507	Ocotea puberula	Papaja pisi	
00330508	Ocotea spec	Kras pisi	
11330509	Ocotea rubra	Wana	WAN
01330510	Ocotea schomburgkiana	Savanne pisi	
	Lecythidaceae		
05340101	Betholletia excelsa	Braz. noot; Paranoot	
03340201	Couratari fagifolia et al	Ingipipa	
04340301	Couroupita guianensis	Boskalebas	
02340401	Eschweilera amara	Berg oemanbarklak	
04340402	Eschweilera chartacea	Tite oedoe, rode bast, harde bast	
02340403	Eschweilera corrugata	Oemabarklak, hgl.	
02340404	Eschweilera longipes	Berg manbarklak	
02340405	Eschweilera odora	Hoogland manbarklak	
04340406	Eschweilera poiteaui	Tite oedoe, gele bast	
04340407	Eschweilera simiorum	Tite oedoe (witte bast)	
02340408	Eschweilera subglandulosa	Manbarklak	
00340409	Eschweilera labriculata	Dwerg oemarbarklak	
05340501	Gustavia augusta	Konkoni oedoe (lgl.)	
05340502	Gustavia hexapetala	Konkoni oedoe, hgl.; Watramamabobi	
11340601	Lecythis davisii	Kwatta patoe	KWA

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
	Leguminosae		
03350101	Enterolobium schomburgkii	Tamaren prokoni	
00350201	Inga alba	Prokoni	
04350202	Inga bourgoni et al	Swietiboontje	
00350206	Inga heterophylla	Swietiboontje, kl.bl.	
00350211	Inga pezizifera	Swietiboontje, rode bast	
04350216	Inga spec. 1	Swietiboontje, gele bast	
00350217	Inga spec. 2	Swietiboontje, witte bast	
11350301	Parkia nitida	Agrobigi	AGR
04350302	Parkia pendula et al	Kwatakama	
00350401	Pentaclethra macroloba	Kroebara	
03350501	Piptadenia suaveolens	Pikin misiki	
06350601	Pithecellobium adiantifolium	Zwamptamarinde	
01350602	Pithecellobium corymbosum	Bostamarinde	
01350604	Pithecellobium jupunda	Fijnbladige sopo oedoe	
03350606	Pithecellobium pedicellare et al	Tamaren prokoni	
01350607	Pithecellobium racemosum	Rode kabbes, fijnbl., wana bast	
00350801	Zygia spec.	Moeserki	
04350901	Alexa wachenheimii et al	Nekoe oedoe	
11351001	Andira coriacea et al	Rode kabbes	RKA
00351101	Clathrotropis brachypetala	Aroemata	
04351201	Copaifera guianensis	Hoepel hout; Oeproe oedoe	
00351301	Crudia glaberrima	Watra biri; Walatapa	
05351401	Cynometra hostmanniana et al	Makraka	
11351601	Dicorynia guianensis	Basralokus	BAS
00351703	Dimorphandra pullei	Pesi oedoe	
11351801	Diplotropis purpurea	Zwarte kabbes	ZKA
11351901	Dipteryx odorata et al	Tonka	TON
02352101	Eperua falcata	Walaba; Beri oedoe	
00352102	Eperua grandiflora	Baboen walaba	
00352103	Eperua rubiginosa	Oeverwalaba	
11352301	Hymenaea courbaril	Rode lokus; Loksi	RLO
04352401	Hymenolobium flavum	Maka kabbes	
02352501	Lonchocarpus hedyosmus	Sindjaple; Nickerie basralokus	
04352701	Macrolobium angustifolium et al	Watrabiri; Walatapa	
00352801	Martiusia parviflora	Bosmahonie	
12352901	Mora exselsa	Mora	MRA
02352902	Mora gongrijpii	Moraboekea	
04353001	Ormosia coccinea	Hoogland Kokriki	
04353002	Ormosia costulata	Sabana kokriki	
04353004	Ormosia paraensis	Kokriki	
11353101	Peltogyne pubescens et al	Purperhart; Alastan; Popo ati	PUR
11353201	Platymiscium trinitatis et al	Koenatepi	KOE
02353401	Pterocarpus officinalis	Watra bebe	
05353402	Pterocarpus rohrii et al	Bebe; hgl.; Egron bebe	
02353501	Sclerolobium albiflorum	Djedoe, rode	
00353502	Sclerolobium guianense	Savanne djedoe	

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
02353503	Sclerolobium melinonii	Djadidja	
02353504	Sclerolobium micropetalum	Djedoe, zwarte	
00353505	Sclerolobium paniculatum	Djedoe, witte	
00353601	Swartzia arborescens	Oranje hout; Alanja oedoe	
05353602	Swartzia bannia	Savanne ijzerhart	
02353603	Swartzia benthamiana	Bergi bebe	
00353605	Swartzia remigifer et al	Boegoeboegoe	
04353607	Swartzia tomentosa	Gandoe	
00353610	Swartzia amshoffiana	Mangandoe	
05353701	Sweetia nitens	Watra grin	
05353801	Tachigalia paniculata	Djedoe	
02353905	Bocoa prouacensis	Ijzerhart	
04354001	Vatairea guianensis	Kabbes, gele	
04354101	Vataireopsis speciosa	Jongo kabbes	
11354201	Voucapoua americana	Bruinhart	BRU
00355101	Martiodendron parviflorum	Pintolocus, witte	
	Linaceae		
05360101	Hebepetalum humiriifolium	Pakira oedoe; Jakanta, gele bast	
	Loganiaceae		
05370101	Antonia ovata	Lika oedoe	
	Malpighiaceae		
00380101	Byrsonima aerugo	Bojo oedoe	
05380102	Byrsonima coriacea et al	Lontoe kasi	
	Melastomataceae		
00390101	Miconia spec. 1	Mispel	
00390104	Miconia surinamensis	Loto oedoe	
00390105	Miconia tomentosa	Mispel, harde bast	
00390107	Miconia spec. 2	Mispel, hgl.	
04390201	Mouriri acutiflora et al	Spikri oedoe	
04390204	Mouriri princeps	Spikri oedoe, lgl.	
00390301	Bellucia grossularioides	Mispel, gewone	
	Meliaceae		
02400101	Carapa guianensis	Krapa, rode	
11400102	Carapa procera	Krapa	KRA
11400201	Cedrela odorata	Ceder	CED
04400301	Guarea guarea	Doifisiri, (rode)	
04400302	Guarea kunthiana	Doifisiri, zwarte	
05400401	Trichilia roraimana et al	Soro sali	
00400403	Trichilia propinque	Melisali	
	Moraceae		
05420101	Bagassa tiliaefolia	Kaw oedoe	
11420201	Brosimum paraense	Satijnhout	SAT
04420202	Brosimum parinarioides	Doekali	
04420301	Cecropia obtusa et al	Bospapaja	
04420302	Cecropia sciadophylla	Manbospapaja	
04420304	Cecropia peltata	Boroma	
00420401	Ficus spp.	Ficus	
01420601	Perebea laurifolia	Manletterhout	
11420701	Piratinera guianensis et al	Letterhout	LET
04420801	Pourouma aspera et al	Granboesi papaja	
00421001	Trymatococcus amazonicus	Olie oedoe	

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
	Myristicaceae		
05430101	Iryanthera hostmannii et al	Srebebe	
04430103	Iryanthera sagotiana	Broedoe oedoe	
11430201	Virola melinonii	Baboen, hgl.	HBA
01430202	Virola sebifera	pintri baboen	
11430203	Virola surinamensis	Laagland baboen	LBA
	Myrtaceae		
00450101	Aulomyrcia hostmanniana	Bosgujave, rode.	
00450201	Calycolpus revolutus et al	Bosgujave, grijze	
00450301	Calypthrantes speciosa	Labawala	
04450401	Eugenia coffeifolia et al	Boskers	
00450501	Marlierea montana	Kwakoe	
00450601	Myrcia sylvatica	Savannegujave; Bosgujave, kl.bl.	
00450602	Myrcia section armeriela	Kronmoko, hgl.	
00450702	Calycorectes bergii	Bosgujave, (gewone)	
	Nyctaginaceae		
05460101	Torrubia olfersiana	Njamsi oedoe, (kleine)	
05460102	Torrubia spec.	Prasara oedoe; Njamsi oedoe, gr.bl.	
	Olacaceae		
04480101	Chaunochiton kappleri	Patakoe wana; Patakwama	
04480201	Minquartia guianensis	Alata oedoe	
00480301	Heisteria cauliflora	Bosdruif	
	Opiliaceae		
01490101	Agonandra silvatica	Kromanti kopi, kl.bl.	
	Polygonaceae		
05500101	Coccoloba latifolia et al	Bradilifi	
02500202	Triplaris surinamensis	Mierenhout, Mira oedoe	
	Chrysobalanaceae		
02540101	Couepia caryophylloides et al	Anaura, hgl.	
00540102	Couepia cognata	Sabana kwepi	
04540301	Licania apetala	Kwepi	
03540302	Licania canescens et al	Foengoe	
00540303	Licania divaricata	Sabana anaura	
00540304	Licania heteromorpha	Zwamp anaura	
03540306	Licania incana et al	Sabana foengoe	
05540308	Licania macrophylla	Sponshout; anaura, lgl.	
03540309	Licania micrantha	Foengoe, zwarte	
04540310	Licania ovalifolia	Santi oedoe	
03540312	Licania stricta	Foengoe, kl.bl. zw.	
00540313	Licania obidensis	Kwepi, kleine	
03540401	Parinari campestris	Foengoe, rode	
03540402	Parinari excelsa	Foengoe, kl.bl. rode	
04540501	Prunus myrtifolia	Amandelhout	
00540601	Excellodendron barbatum	Kwepi, rode	
00540704	Hirtella racemosa	Kwepi, behaard	
	Rubiaceae		
05550101	Amajoua guianensis et al	Marmeldoos; marmadosoe	
05550201	Capirona surinamensis	Dede oedoe	
00550301	Chimarrhis turbinata	Sinja oedoe	
00550401	Coussarea paniculata et al	Boskoffie	

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
00550501	Duroia aquatica	Marmados sinja oedoe	
05550601	Genipa americana	Tapoeripa	
00550801	Isertia coccinea	Kandra oedoe; Panga panga, hgl.	
00550901	Palicourea guianensis	Panga-panga; Penpen; Penpen oedoe	
00551001	Posoqueria latifolia	Pipa oedoe	
00551002	Posoqueria longiflora	Dagoeston	
	Rutaceae		
11560101	Fagara pentandra	Pritjari	PRI
	Sapindaceae		
04570201	Cupania hirsuta et al	Gawetri, (behaarde)	
04570501	Talisia megaphylla	Bosknippa	
00570502	Talisia pedicellaris	Pintolocus, zwarte; Bosknippa	
00570503	Talisia spec. 1	Jan Krappa	
00570504	Talisia spec. 2	Mankrappa	
	Sapotaceae		
04580101	Chrysophyllum auratum	Bosappel	
00580102	Chrysophyllum cainito	Sterappel	
00580103	Chrysophyllum prieurii	Djoe bolletrie, (hgl)	
00580201	Ecclinusa cuneifolium	Kwatta-bobbi	
04580202	Ecclinusa guianensis	Batambali	
04580203	Ecclinusa prieurii	Pepre botri	
00580204	Ecclinusa sanguinolenta	Switi anini	
11580301	Manilkara bidentata	Bolletri	BOL
11580401	Micropholis guyanensis var. guy.	Riemhout, wit	RIW
11580402	Micropholis guyanensis var. com.	Riemhout, zwart	RIZ
00580403	Micropholis venulosa	Riemhout	
04580501	Pouteria cladantha et al	Jamboka, zwarte	
04580503	Pouteria gonggrijpii et al	Apra oedoe	
03580504	Pouteria guianensis	Jan snijder; Jamboka (rode)	
04580506	Pouteria ptychandra	Kimboto, (hgl)	
04580507	Pouteria robusta	Pintobolletri	
04580512	Pouteria spec 1	Jamboka, witte	
04580513	Pouteria spec 2	Kwasiba	
04580514	Pouteria spec 3	Pintobolletrie, zwarte	
00581001	Achrouteria pomifera	Laurierkers	
	Simaroubaceae		
06590302	Simaba cuspidata et al	Kanaboeli	
11590401	Simarouba amara	Soemaroeba	SOE
	Sterculiaceae		
11600101	Sterculia excelsa et al	Okro oedoe	OKR
	Theaceae		
04620101	Laplacea fructicosa	Swa oedoe	
	Monimiaceae		
00630101	Siparuna guianensis	Jarakopi; Fajapaw	

SPECIES CODE	SCIENTIFIC NAME	VERNACULAR NAME	ABBREVATION
	Tiliaceae		
04640101	Apeiba echinata	Kankan oedoe	
04640102	Apeiba tibourbou	Fokofoko oedoe	
04640201	Lueheopsis flavescens et al	Katoen oedoe	
	Ulmaceae		
04650101	Ampelocera edentula	Kwaskwas oedoe; Kwaskwasi	
06650201	Trema micrantha	Kop kopi	
	Violaceae		
00670101	Paypayrola confectiflora	Asisi oedoe	
00670102	Paypayrola guianensis	Taja oedoe	
00670201	Rinorea spp.	Lele tiki	
00670202	Rinorea passoura	Manari tiki	
	Vochysiaceae		
00680101	Erisma uncinatum	Singri kwari	
11680201	Qualea albiflora	Gronfoeloe, hgl.	HGR
11680202	Qualea coerulea	Gronfoeloe, lgl.	LGR
04680203	Qualea dinizii	Gujavekwari	
11680204	Qualea rosea	Gronfoeloe, bergi	BGR
00680301	Vochysia densiflora	Appelkwari	
11680302	Vochysia guianensis	Wiswiskwari	WIS
00680303	Vochysia surinamensis	Kwari	
06680304	Vochysia tetraphylla	Watrakwari	
11680305	Vochysia tomentosa	Wanakwari	WAK
	Ochnaceae		
00690101	Duratea castaneifolia	Hei oedoe	