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UPOV

TWV/XXI/23
ORIGINAL: English
DATE: November 25, 1988

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY FOR VEGETABLES

Twenty-first Session
Wageningen, Netherlands, June 13 to 15, 1988

REPORT

adopted by the Technical Working Party for Vegetables

Opening of the Session

1. The twenty-first session of the Technical Working Party for Vegetables (hereinafter referred to as "the Working Party") was held in Wageningen, Netherlands, from June 13 to 15, 1988. The list of participants is reproduced in Annex I to this report.

2. Mr. H.J. Baltjes, Acting Deputy Director of the Government Institute for Research on Varieties of Cultivated Plants (RIVRO), welcomed the participants to Wageningen. The session was opened by Mr. R. Brand (France), Chairman of the Working Party.

3. The Chairman especially welcomed Mrs. B. Hoegh (Denmark), Mr. F. Boulineau (France), Dr. S. Visser (South Africa), Mr. B. Wollberg (Sweden), Mr. F.N. Green (United Kingdom), Mr. B. Greengrass and Mr. Y. Hayakawa (Office of UPOV), who were attending a session of the Working Party for the first time.

Adoption of the Agenda

4. The Working Party adopted the agenda for its twenty-first session which is reproduced in document TWV/XXI/1 Rev., after having agreed to discuss item 7 together with subitem 15 (iii) (Pea) and to discuss subitem 15 (viii) (Cauliflower) after subitem 15 (v) (Carrot).

Adoption of the Report on the Twentieth Session

5. The Working Party adopted the report on its twentieth session as reproduced in document TWV/XX/13 Prov., after having agreed to the following points:

(i) to amend paragraphs 3, 4, 6, 7, 18, 19, according to circular U-1257.

(ii) not to amend the paragraphs on Test Guidelines but to discuss the remarks in circular U 1257 at the time of discussing the documents on the species concerned.

(iii) for the maintenance of example varieties which are no more in commerce, the national authorities may contact gene banks and enquire whether they could cooperate in this respect. For the time being there would, however, be no official approach from the Office of UPOV but it was left to the discretion of each national office whether it considered such cooperation to be of help to it.

Short Reports on Special Problems or Difficulties Encountered

6. As proposed by Mr. H. Koster (Netherlands), the Working Party discussed the possibility of indicating, for all example varieties, their states of expression in the grouping characteristics and to add that information to the UPOV Test Guidelines as a special annex in order to facilitate the assessment of distinctness. Although the advantages of such a procedure were seen, the workload and the difficulties involved led the Working Party finally not to adopt the proposal.

7. The Working Party discussed the proposal by Mr. B. Bar-Tel (Israel) that the indication of example varieties in the UPOV Test Guidelines should be separated from the Table of Characteristics and be added to the Test Guidelines as a special annex to be periodically revised because some example varieties might no longer be in trade after a while and would have to be replaced by others. The Working Party agreed to recommend to the Technical Committee that, if necessary, example varieties in the Test Guidelines could be replaced by others if they were no longer available in the trade and that, where a large number of changes occurred in a given Test Guidelines document, a revised list of example varieties should be established. However, this should not be done more frequently than every 3 or 5 years after the latest version of the Test Guidelines. A special annex should not be prepared at the very beginning, but the example varieties should be incorporated in the Table of Characteristics as at present. Proposals for changes of example varieties in adopted Test Guidelines should be made in writing and circulated to the members of the Working Party well ahead of a planned session.

Report on the Twenty-third Session of the Technical Committee and Matters Resulting from that Session

8. Dr. M.-H. Thiele-Wittig reported on the main subjects of interest to the Working Party that were raised during the last session of the Technical Committee, referring to the full report on that session as reproduced in document TC/XXIII/6 for further information.

9. Having noted the importance of new methods for DUS testing of vegetable varieties, the Working Party agreed to discuss new developments for DUS testing of vegetable varieties at its next session. Mr. R. Brand (France) offered to prepare and circulate a questionnaire for collecting information on new methods applied in member States for varieties of vegetable species by the end of September 1988. Results were to be sent to Mr. Brand before the end of January 1989 and a summary of those results to the Office of UPOV by Mr. R. Brand by March 15, 1989.

Recommendations of the Technical Committee

Revision of the UPOV Model for a Report on Technical Examination

10. Mr. H.J. Baltjes (Netherlands) introduced document TWV/XX1/15 on the revision of the UPOV Model for a Report on Technical Examination. The Working Party agreed to recommend to the Technical Committee that it keep the first part of the Model as close as possible to that of the revised Model for the UPOV Variety Description Form and to make the following changes:

(i) General Information: Contrary to the Variety Description Form, the Report on the Technical Examination should include additional information on the agent and the breeder and should not foresee information on the date of the UPOV Test Guidelines document or that of the national Test Guidelines.

(ii) Results of the Technical Examination: Items 7, 8, 9 might be combined with 10(a), 10(b), 10(c), respectively, under the heading "Conclusion" and the heading "Results of the Technical Examination" could be deleted. Subitem 10 could also be more aligned to the wording of the UPOV Convention (e.g. "clearly distinguishable" and not just "distinguishable").

(iii) Layout: The layout of the form should be amended in such a way that (a) one separate line was provided for each item and (b) all items were presented in such a way that the questions were presented in one column, leaving a separate column for the answers.

Harmonization of States of Expression and Notes of Characteristics Listed in the UPOV Test Guidelines

11. The Working Party noted document TC/XXIII/7 on the harmonization of states of expression and Notes of characteristics listed in the UPOV Test Guidelines. Members of the Working Party were requested to check the document and to send any comments to the Office of UPOV.

States of Expression and Notes of Certain Characteristics

12. Dr. M.-H. Thiele-Wittig introduced document TC/XXIII/5 containing a discussion paper on states of expression and notes of certain characteristics. The Working Party discussed the examples in the document and could agree to them with the following exceptions: (i) The Working Party could not agree with the states and/or Notes in Examples 14.3, 16.3, 16.4, (16.3 and 16.4 should have the Notes from 1 to 9); (ii) The Working Party would not use the states and/or Notes in Examples 9.2, 9.4, 9.5, 11.4, 13.1, 14.1; (iii) The states and/or Notes in Examples 8.1, 11.2, 12.4 to 12.7 depended on the species concerned; (iv) The order of states of Example 12.8 was preferred to that of 12.9; (v) The possibility of using the states/or Notes in Example 16.1 should not be excluded.

List of Reference Books and Documents

13. The Working Party noted document TWV/XXI/3 containing a draft addendum to the list of reference books and documents published in document TC/XXII/4. The Working Party asked its members to send new comments and/or additional information on the list to the Office of UPOV.

Items for the Technical Working Party on Automation and Computer Programs

14. The Working Party noted document TWV/XXI/22 containing a summary of replies to the questionnaire on the layout of trials for DUS testing of onions. Despite a large degree of harmonization it showed that there were still quite considerable differences in the layout and in the testing, the number of plants per plot varied between 200 and 1200, the number of replicates between 3 and 6. Morphological characteristics were observed on the whole plots. Measured characteristics would be observed on at least 10 plants with up to 6 replicates. Whether or not plants should be transplanted also had a great effect on the results because of the equal plant space on the bulb development.

15. Mr. N.P.A. van Marrewijk (Netherlands) introduced a paper on some experience gained with the COY analysis in red beet, which was distributed during the session and is reproduced in Annex II to this report. He noted that, with the COY analysis, at a 1% level, more varieties could be distinguished than with the 2 out of 3 method and that the COY analysis of the results of two years, modified by the Modified Joint Regression Analysis (MJRA), had more discriminative power than the COY analysis. He added, however, that the high discriminative power of the COY analysis modified by MJRA might be due to the low number of varieties used and the minimum number of varieties necessary to use the method should be studied in more detail. The Working Party noted that the COY analysis would require a larger number of varieties in the test.

16. Mr. F. Boulineau (France) introduced a paper on a methodological study for DUS testing on carrot (in French only), which was distributed during the session and is reproduced in Annex III to this report. The study analyses the main characteristics used in the DUS testing of carrots with respect to their reliability and discriminating power.

17. Dr. M.-H. Thiele-Wittig reported briefly on the sixth session of the Technical Working Party on Automation and Computer Programs (hereinafter

referred to as the "TWC") and commented the subjects which were of interest to the Working Party. The Working Party discussed as follows:

(i) Pairwise Comparison of Varieties for Testing Distinctness: The Working Party confirmed that while the TWC had noted that for measured characteristics real pairwise comparisons were very seldom, in the field of vegetables they were very frequent. Pairwise comparisons were considered useful and necessary for testing distinctness of varieties.

(ii) Review of Statistical Practices: The Working Party agreed to the TWC's recommendation that a statistician should be invited by the Working Party to explain which statistical methods could help to solve the problems that the technical experts had encountered in their field of competence.

(iii) Non-parametric Methods: The Working Party noted that the non-parametric statistics, e.g. sign test, are very simple and therefore very useful for DUS testing and were used continuously in practice.

(iv) Similar Varieties: The Working Party agreed to discuss the question of "similar varieties" at its next session. Members of the Working Party were requested to prepare short discussion papers and to send them to the Office of UPOV by the end of December 1988.

(v) Minimum Distances Between Varieties: The Working Party agreed to the conclusion of the TWC that authorities often demanded a minimum distance which was considerably higher for certain characteristics than that required according to the statistical evaluation of the growing test results and that therefore, for certain species, a significant difference between a candidate variety and another variety would not necessarily lead to the candidate variety being accepted as a distinct new variety. The Working Party decided to rediscuss this subject at its next session and asked experts from France to prepare a discussion paper on carrot and experts from the United Kingdom to prepare a discussion paper on faba bean and onion and asked them to send the discussion papers to Mr. J.R. Law (United Kingdom) by the end of September 1988. Mr. Green (United Kingdom) proposed to prepare a contribution on minimum distances in carrot together with Mr. Talbot (United Kingdom).

Bremia lactucae in lettuce

18. The Chairman welcomed Mrs. I. Blok (Netherlands) and Dr. R.H. Priestley (United Kingdom) who were participating in discussions on Bremia lactucae in lettuce and resistance characteristics in melon as technical experts.

19. The Working Party noted document TWV/XXI/14 containing a report on the meeting of the Subgroup on Bremia lactucae held on November 4, 1987, in Cambridge (United Kingdom). Experts from France, the Netherlands and the Federal Republic of Germany introduced papers containing some comments on the report, which were distributed during the session and are reproduced in Annex IV to this report. The Working Party noted that it was meaningful to identify the resistance genes of Bremia lactucae in lettuce varieties, but regretted that agreement on some items, e.g. kinds of useful R genes and Bremia races, could so far not be obtained among member States of the Working Party. It agreed to establish as a minimum position a basic list of R genes and Bremia races which all member States would use. That list should not be exclusive, but could be freely enlarged by each member State. A first draft

of that list would be prepared by experts from the United Kingdom by October 1, 1988, and circulated to experts from France, the Netherlands and the Federal Republic of Germany and thereafter sent to the Office of UPOV by the end of December 1988 for distribution to all member States for comments by March 15, 1989. The Working Party stressed that there should be good cooperation with the competent scientist on Bremia in the member States.

Resistance Characteristics in Melon

20. Dr. R.H. Priestley (United Kingdom) introduced document TWV/XXI/13 on resistance characteristics for varieties of melon. After discussion on resistance, tolerance and hypersensitivity in plant pathology, the Working Party recommend to the Technical Committee that preferably the term "resistance" be used in the UPOV Test Guidelines. It recommended further that the terms "resistance" and "tolerance" be defined as follows:

"Resistance is the ability of a plant to prevent infection or slow down the infection and subsequent development of a pathogen by the use of host defense mechanisms."

"Tolerance is the ability of a plant to endure infection by a pathogen with little or no reaction, as shown by the absence, more or less, of symptoms or by the lack of affect on yield or quality."

21. The Working Party further agreed to present document TWV/XXI/13 to the Technical Committee for approval and publication as addendum to Test Guidelines for Melon, after having agreed to make the following main changes:

(i) Table of Characteristics:

Characteristics

57 to 59 insert the example variety "Jador (9)"

63 insert the example variety "Cantor (1)"

(ii) Explanations on the Table of Characteristics:

Characteristics

63 Maintenance of strain: amend to read "premultiplication of the virus on non-wilting melon (Vedrantais) prior to testing"

64 + 65 Remarks: delete the words "(hypersensitivity)" and "(Generalized hypersensitivity)"

Report on the Subgroup Meeting on Turnip and Turnip Rape

22. Mr. H.J. Baltjes (Netherlands) introduced document TWA/XVII/3, containing a report on the meeting of the Subgroup on Turnip, Turnip Rape, held on October 19 and 20, 1987, in Estrées en Chaussée, France, and document TWA/XVII/4, a working paper on revised Test Guidelines for Turnip, Turnip Rape. He explained that document TWA/XVII/3 had been prepared in order to

harmonize the UPOV Test Guidelines and the comparable guidelines in the EC and that document TWA/XVII/4 was prepared by the Office of UPOV, based on document TWA/XVII/3. The Working Party agreed to leave the final discussions and changes to the Test Guidelines for Turnip, Turnip Rape to the Working Party for Agricultural Crops, after having agreed to make the following main changes in document TWA/XVII/4:

(i) Table of Characteristics: Characteristics 3, 4, 5, 7, 11, 12, 13, 15, 16, 17, 18, 24, 25, 26, 28, 29, 34, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52 to apply to Turnip and to receive the symbol "(T)." Characteristics 3, 4, 5, 6, 7, 11, 12, 13, 15, 16, 17, 37, 38, 40, 42, 43, 44, 46, 47, 48, 50, 51, 52 to apply to Turnip Rape and to receive the symbol "(TR)."

(ii) Explanations on the Table of Characteristics: For characteristics 35 and 36, there would be no drawings for state 1.

Disease Resistance Characteristics

23. The Working Party noted document TWV/XXI/21 containing results of the inventory of diseases and races of disease for which obligatory testing for resistant varieties was required in individual member States but postponed discussions until its next session.

Final Discussion on Draft Test Guidelines

24. The Chairman welcomed Mr. H. Holland (United Kingdom) who was participating in the discussion on Test Guidelines as technical experts nominated by professional organizations.

Test Guidelines for Vegetable Marrow, Squash

25. The Working Party noted document TG/119/1(proj.) and TWV/XXI/16 and agreed to send Test Guidelines for Vegetable Marrow, Squash to the Technical Committee for final adoption, after having agreed to make the following main changes in document TG/119/1(proj.):

(i) Subject of these Guidelines: The phrase "which include Vegetable Marrow, Pumpkin and Squash covered by those species" should be inserted after "Cucurbita pepo L."

(ii) Methods and Observations: In paragraph 1, the phrase "determined by measurement or counting" should be inserted after "observations."

(iii) Table of Characteristics:

Characteristics

2	the states to read: "bush (Greyzini) (1), semi-trailing (Twiekers) (2), trailing (Long Green Trailing) (3)"
41	insert the example varieties "Benning's Yellow Tint (3), Ambassador (7)"

55 replace the example variety "PI-N-NIC" by "Goldneck"

67, 68, 69 delete the asterisk

Test Guidelines for Endive

26. The Working Party noted documents TG/118/1(proj.) and TWV/XXI/16 and agreed to send the Test Guidelines for Endive to the Technical Committee for final adoption, after having agreed to make the following main changes in document TG/118/1(proj.):

(i) Methods and Observations: In paragraph 1, the phrase "determined by measurement or counting" should be inserted after "observations."

(ii) Table of Characteristics:

Characteristic

8 delete the words "relative to midrib"

27 replace the word "spreading" by "semi-erect"

Test Guidelines for Egg Plant

27. The Working Party noted document TG/117/1(proj.) and TWV/XXI/16 and agreed to send Test Guidelines for Egg Plant to the Technical Committee for final adoption, after having agreed to make the following main changes in document TG/117/1(proj.):

(i) Methods and Observations: In paragraph 1, the phrase "determined by measurement or counting" should be inserted after "observations."

(ii) Table of Characteristics:

Characteristics

25 insert the example variety "Aomaru (3)"

37, 38 combine these characteristics into one characteristic as follows: "Fruit: spinyness of calyx" with the states "absent or very weak (1), weak (Bonica) (3), medium (Baluroi) (5), strong (7), very strong (9)"

Some example varieties have still to be indicated by French experts for characteristics 24 and 25.

Test Guidelines for Runner Bean

28. The Working Party noted documents TG/9/2(proj.) and TWV/XXI/16 and agreed to send the Test Guidelines for Runner Bean to the Technical Committee for final adoption, after having agreed to make the following main changes in document TG/9/2(proj.):

(i) Material Required: The recommended quantity of seed to be delivered should be 1,000 g.

(ii) Methods and Observations: Paragraph 1 should be deleted. In paragraph 2, the phrase "determined by measurement or counting" should be inserted after "observations."

(iii) Table of Characteristics: In characteristic 9 the example variety "Ivanhoe (4)" should be inserted.

Test Guidelines for Black Salsify

29. The Working Party noted document TG/116/1(proj.) and agreed to send Test Guidelines for Black Salsify to the Technical Committee for final adoption, after having agreed to delete in document TG/116/1(proj.) under the heading: Methods and Observations, paragraph 1, and to insert in paragraph 2 the phrase "determined by measurement or counting" after "observations."

Discussion on Working Papers on Test Guidelines for Peas

30. Mr. F.N. Green (United Kingdom) introduced document TWV/XXI/19 containing a report on the second meeting of the Subgroup on Peas, held on November 5 and 6, 1987, in Cambridge, United Kingdom. He reported that in the Subgroup, the following three topics were discussed: (a) the results of the 1986 UPOV pea trial (Comparison of recording pea varieties at different centers in 1986), (b) the proposal to set up a Subgroup for the standardization of the testing of pea disease, starting with Fusarium oxysporum f. sp. pisi Race 1 (pea wilt), (c) the revision of the UPOV Test Guidelines for Peas. The Working Party agreed to establish a Pathology Subgroup on Pea Diseases, which should comprise experts from France, the Federal Republic of Germany, the Netherlands and the United Kingdom, and which should hold its first session in November 1989 at Wageningen, Netherlands. Mr. H. Koster (Netherlands) was requested to coordinate that Subgroup.

31. The discussion on Test Guidelines for Peas was based on document TWV/XXI/18, which was prepared by experts from the United Kingdom according to the results of the discussion in the Subgroup on Peas. The Working Party agreed to send the draft Test Guidelines for Peas to the professional organizations, after having agreed to make the following main changes in document TWV/XXI/18:

(i) Material Required: The recommended quantity of seed to be delivered should be 1,000 g per year.

(ii) Conduct of Tests: In the third sentence of paragraph 3, the words "40 plants" should be replaced by "100 plants."

(iii) Grouping of Varieties: After subparagraph (viii), characteristic 24 should be included.

(iv) Table of Characteristics:

Characteristics

4	add the words "(as for 3)" at the end and replace the states "slight" and "intense" by "weak" and "strong" respectively
7, 8	combine these characteristics into one characteristic as follows: "Dry seed: violet spots on testa (for varieties with anthocyanin)" with the states "absent [without violet spots] (Nadja, Tombola (1)), faint [with faint violet spots] (2), intense [with intense violet spots] (Arvika, Livia (3))"
9	replace the words "hilum melanin pigment" by "black hilum color"
14	replace the wording by "Plant: height (at 30% of flowering)" and the states "long" and "very long" by "tall" and "very tall" respectively
16	insert the words "nodes with" before "scale"
20	insert the words "intensity of" before "green color" and delete the word "green" in the states
22 to 36, 38	replace the word "Foliage" by "Leaf," "Leaflet," "Petiole" or "Stipule" depending on the case
23	insert the additional example variety "Progreta (2)"
25	amend to read: "Leaf: average maximum number of leaflets" with the states "four (1), six (2), eight (3)," and explanations to be prepared by the expert from the United Kingdom
36, 37	replace the word "Foliage" by "Stipule"
40	amend to read: "Plant: maximum number of flowers per node (calculated mean for non-fasciated types)" with the states "mono-flor (1), mono-flor to bi-flor (2), bi-flor (3), bi-flor to tri-flor (4), tri-flor (5), tri-flor to multi-flor (6), multi-flor (7)"
41	to read: "anthocyanin color of wing"
42	replace the words "wing colour" by "anthocyanin coloration of wing"
43	replace the Notes "3, 5, 7" by "1, 2, 3"
45	insert the state "strongly raised (1)"
47, 48	delete
50	add explanations
54	place before characteristic 53
55	divide into two characteristics, the first with the states "absent, present" and the second with the states from "very weak" to "very strong"

56 delete the bracketed content

57 amend to read: "Pod: shape of distal part"

59 amend the states to read: "pale (Perfection) (3), medium (5), dark (Dark Skin Perfection) (7)"

61 insert the word "coloration" before the bracket

62 replace the words "anthocyanin spotting on wall" by "spots of anthocyanin pigment on outer wall"

65 to 68 replace the word "reaction" by "resistance" and replace the states "susceptible" and "resistant" by "absent" and "present" respectively

The expert from the United Kingdom will indicate for each characteristic the key from the "Key for Growth Stages of Peas" to be included in the Table of Characteristics.

(v) Explanations on the Table of Characteristics: In the "Key for the Growth Stages of Peas", the keys from 01 to 15 were deleted.

(vi) Technical Questionnaire, Characteristics of the Variety to be Given: The expert from the United Kingdom will prepare for paragraph 5 a grouping of the characteristics.

Status of Test Guidelines

32. The Working Party agreed that the draft Test Guidelines for Vegetable Marrow, Squash, for Endive, for Egg Plant, for Runner Bean (revision) and for Black Salsify should be sent to the Technical Committee for final adoption.

33. The Working Party agreed that the draft Test Guidelines for Turnip, Turnip Rape (revision) and for Peas (revision) should be transmitted to the Technical Working Party for Agricultural Crops which would meet from July 5 to 8, 1988. Depending on the outcome of the discussions in that session the draft Test Guidelines for Peas could be sent to the professional organizations for comments, those for Turnip, Turnip Rape to the Technical Committee for final adoption.

34. Lack of time did not permit discussion of the working papers on Test Guidelines for further species foreseen under item 15 of the Agenda.

Future Program, Date and Place of Next Session

35. The Working Party discussed the possibility of holding its twenty-second session in Japan in 1989, based on circular U-1317 containing a letter from the Japanese Government. Some experts from the Working Party noted that the possibility depended on the travelling budget and would have liked to have more time to consider it further. The Working Party finally agreed to hold its next session preferably in Japan, starting on August 21, 1989, however, to inform the Japanese authorities that if the session could be postponed to 1990 more experts might be able to attend. If the Japanese authorities could extend an invitation for 1990, the next session would take place at Angers,

France, from September 19 to 22, 1989, and would close at 1 p.m. on September 22. During its next session, the Working Party plans to discuss the following items:

(i) Short reports on special problems or difficulties encountered;

(ii) Report on the twenty-fourth session of the Technical Committee;

(iii) Recommendations of the Technical Committee;

(iv) List of reference books and documents;

(v) Items for the Technical Working Party on Automation and Computer Programs;

(vi) Minimum Distances;

(vii) Testing of Bremia lactucae in lettuce;

(viii) Disease resistance characteristics;

(ix) New developments in the testing of vegetable varieties;

(x) Final discussion on draft Test Guidelines for Peas;

(xi) Discussion on working papers on Test Guidelines for:

- Parsley (TWV/XXI/4)
- Tomato (revision) (TG/44/3, TWV/XIX/16, TWV/XXI/5)
- Cauliflower (revision) (TG/45/3, TWV/XXI/10)
- Asparagus (TWV/XXI/6, TWV/XXI/20)
- Carrot (revision) (TG/49/3, TWV/XX/11, TWV/XXI/7)
- Brussels Sprouts (revision) (TG/54/3, TWV/XXI/8)
- Cabbage (revision) (TG/48/3, TG/48/3 Corr., TWV/XXI/9)
- Spinach (revision) (TG/55/3, TWV/XXI/11)
- Cucumber, Gherkin (revision) (TG/61/3, TWV/XXI/12)
- Broccoli (Italy to prepare a working paper)
- Lettuce (revision) (TG/13/4, Netherlands to prepare a working paper)
- Watermelon (Israel to prepare a working paper)
- Chick Pea (France to prepare a working paper)
- Onion (revision) (TG/46/3, United Kingdom to prepare a working paper)
- Shallot (France to prepare a working paper)
- Garlic (France to prepare a working paper)
- Cucurbita maxima (United Kingdom to prepare a working paper)
- French Bean (Federal Republic of Germany to prepare a working paper)
- Witlof (Netherlands to prepare a working paper)

36. The Working Party agreed that the subgroups should meet as follows:

(i) Subgroup on Carrot, at Angers, France, on November 7, 1988, coordinator Mr. F. Boulineau, FR;

(ii) Subgroup on Brassica, at Roelofarendsveen, Netherlands, on November 10 and 11, 1988, coordinator Mr. J.L. Evans, GB;

(iii) Pathology Subgroup on Pea Diseases, at Wageningen, Netherlands, in November 1989.

Visits

37. On June 13, 1988, the Working Party visited the trial fields and facilities of RIVRO and on June 14, 1988, the Royal Sluis Company's Breeding Station and the Institute for Horticultural Plant Breeding near Wageningen.

38. This report has been adopted by correspondence.

[Four Annexes follow]

ANNEX I

LIST OF PARTICIPANTS AT THE TWENTY-FIRST SESSION OF THE TECHNICAL WORKING PARTY FOR VEGETABLES, WAGENINGEN, NETHERLANDS, JUNE 13 TO 15, 1988

I. MEMBER STATES

DENMARK

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[Annex II follows]

ANNEX II

UPOV - TWV XXI, Wageningen 1988

Some experiences with COY-analysis in red beet

During the last 3 years we had red beet trials. In the first scheme (1) (see Annex I) the included varieties and the years in trial (1, 2 or 3 times "x") are presented. Only for those varieties that were included all 3 years we initially applied the COY-analysis.
These varieties are:
Mobile
Monotop
Monopoly
KRT 40 (= SG 144)
Monorondo

The following 3 tables (2, 3, 4) show the means per year for 8 characteristics:

1 Petiole length (cm)
2 Length of leaf blade (cm)
3 Width of leaf blade (cm)
4 Root diameter (mm)
5 Root length or heighth (mm)
6 Total leaf length (cm) [1 + 2]
7 Ratio root heighth/root diameter
8 Ratio root diameter/root heighth

and the 'within standard error', LSD-values and the 'degrees of freedom (DF)'.

The next table (5) shows the variety means over years and the 'year mean square', 'variety mean square', 'variety * year mean square', F1-ratio, 'variety * repetition mean square', F2-ratio, 'between standard error' and 'within standard error'.

Tables 6 to 15 show the 'significance levels', the 'combined analysis', the 'T-values' and the 'F3-values'.
Characteristics as explained before.

D = distinct, ND = not distinct } ----> for the 2/3 method and F3-value
NS = not significant ----> for COY-analysis

Further details might be clear, because most explanatory texts are in English.
Under significance levels:
"1" means 'significant at 1%'
"5" means 'significant at 5%'

We also studied the applicability of Modified Joint Regression Analysis (= MJRA) and its effect on the number of positive decisions. The effect of this technique is not the same for all characteristics (see tables 16 to 25 ~~of Annex I and Annex II~~).

Because only 5 cultivars were included during all three years, the COY-analysis was also applied for the results of "85 + 86" and of "86 + 87". This resulted in larger numbers of comparisons between pairs; 24 and 21 respectively (see tables 26 to 31 of Annex I, as examples). MJRA was applied for these data too (see II and III of the summary; Annex II).

A summary of the number of positive decisions for 2 out-of-3 years (2/3) or 2 out-of 2 years (2/2) and for COY-analysis is included (at the 1% level) together with the effect of the application of MJRA (see Annex II).

Comments:
- 'KRT 40' is a recently reported application;

- 'KRT 40' cannot be distinguished from 'Monopoly' by one of the measured characteristics, but only by small morphological differences;

- Although this example for 3-year results is of a small size, we think that there might be good prospects for the use of the COY-technique;

- A consequence of the application of this analysis is that we need to include more varieties in our tests during subsequent years than we did. This results in bigger trials than we normally have.

- COY-analysis has more discriminative power than the 2/3-method;

- Adjustment for high F3-values does not charge the outcome of COY-analysis itself;

- Some charateristics show to be somewhat "jumping" for particular variety-pairs, despite their low F2-value. In this respect, a decision at 5% probability level seems to be somewhat premature.
  Therefore more triplets of years with more varieties included should be studied. However, such triplets are not available for this crop.

- The application of MJRA tends to be more discriminative although not for all characteristics;

- COY-analysis combined with MJRA applied for two years-results increases the discriminative power very much at the 1% level. We should wonder if this level isn't too high in the case we apply COY on two year results only. Maybe the level should be 0.1% or 0.5%.
  The high discriminative power might be due to the low number of varieties used. The minimum number of varieties necessary to use MJRA should be studied more detailed.

Wageningen, 31 May 1988
RIVRO; HB/GH/NvM

KROOT 1987 20-MAY-88

(4) Geerhoek Vak: G 4

	1 BLADSTEE LLENGTE	2 BLADSCHI JFLENGTE	3 BLADSCHI JFBREEDT	4 KNOLDIAM ETER IN	5 KNOLHOOG TE IN MM	6 BLD.STL. +BLD.SCH	7 KNOLH/KN OLDIAM	8 KNOLDIAM /KNOLH
1 MOBILE	22.510	18.400	13.180	58.110	56.330	40.910	0.990	1.050
2 MONOTOP	18.390	16.500	13.620	60.000	57.000	34.890	0.970	1.070
3 MONOPOLY	21.110	17.820	13.320	61.670	57.670	38.590	0.950	1.090
4 KRT 40	20.690	17.690	13.530	62.560	56.890	38.160	0.930	1.120
5 MONORONDO	24.340	18.640	14.740	55.560	58.330	42.990	1.060	0.970
WITHIN SE	0.711	0.356	0.304	2.654	2.551	0.882	0.016	0.017
LSD AT 5%	2.155	1.079	0.922	8.051	7.740	2.674	0.049	0.050
LSD AT 1%	2.991	1.497	1.280	11.174	10.742	3.711	0.068	0.069
D.F.	14	14	14	14	14	14	14	14

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(5) Geerhoek Vak: G 4

VARIETY MEANS OVER YEARS

	1 BLADSTEE LLENGTE	2 BLADSCHI JFLENGTE	3 BLADSCHI JFBREEDT	4 KNOLDIAM ETER IN	5 KNOLHOOG TE IN MM	6 BLD.STL. +BLD.SCH	7 KNOLH/KN OLDIAM	8 KNOLDIAM /KNOLH
1 MOBILE	22.163	19.177	12.263	69.563	65.553	41.340	0.953	1.080
2 MONOTOP	18.963	17.340	12.857	67.200	62.943	36.303	0.947	1.080
3 MONOPOLY	22.397	18.367	12.693	69.437	68.630	40.653	0.993	1.033
4 KRT 40	21.823	18.430	13.020	68.043	64.497	40.180	0.957	1.073
5 MONORONDO	25.760	19.857	13.930	61.160	63.383	45.620	1.043	0.980
YEAR MS	7.995	8.124	14.998	633.634	689.679	35.012	0.005	0.003
VARIETY MS	52.491	8.048	3.401	106.614	46.305	99.333	0.015	0.017
VAR.YEAR MS	3.461	0.576	0.163	28.320	39.030	5.064	0.005	0.007
F1 RATIO	15.166	13.970	20.801	3.772	1.186	19.614	2.790	2.297
VAR.REP MS	3.204	0.827	0.447	15.012	21.917	5.149	0.004	0.005
F2 RATIO	1.080	0.697	0.365	1.886	1.781	0.984	1.350	1.435
BETWEEN SE	0.620	0.253	0.135	1.774	2.082	0.750	0.024	0.029
WITHIN SE	0.597	0.303	0.223	1.292	1.561	0.756	0.021	0.024

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(6) Geerhoek Vak: G 4

COMPARISONS BETWEEN 1 MOBILE AND 2 MONOTOP
T VALUES POSITIVE IF MOBILE LARGER THAN MONOTOP

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	+	+1	+1	D	3.65	0.007	**	0.30	3.86	4.10	2.35	0.16	D
2 BLADSCHIJFLENGTE	+	+1	+1	D	5.13	0.001	***	1.21	3.23	3.78	1.65	0.25	D
3 BLADSCHIJFBREEDT	-	-	-	ND	-3.11	0.014	*	-1.92	-0.45	-1.02	1.49	0.28	D
4 KNOLDIAMETER IN	+	+5	-	ND	0.94	0.374	NS	0.57	2.41	-0.50	1.17	0.36	ND
5 KNOLHOOGTE IN MM	+	+	-	ND	0.89	0.401	NS	0.88	1.20	-0.19	0.38	0.70	ND
6 BLD.STL.+BLD.SCH	+	+1	+1	D	4.75	0.001	**	0.66	4.96	4.83	2.85	0.12	D
7 KNOLH/KNOLDIAM	+	-	+	ND	0.19	0.851	NS	0.36	-0.31	0.87	0.15	0.86	ND
8 KNOLDIAM/KNOLH	-	+	-	ND	0.00	1.000	NS	-0.41	0.45	-0.84	0.24	0.79	ND

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(7) Geerhoek Vak: G 4

COMPARISONS BETWEEN 1 MOBILE AND 3 MONOPOLY
T VALUES POSITIVE IF MOBILE LARGER THAN MONOPOLY

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-	+	+	ND	-0.27	0.797	NS	-1.20	0.06	1.39	1.42	0.30	ND
2 BLADSCHIJFLENGTE	+	+	+	ND	2.26	0.053	NS	0.96	1.30	1.15	0.14	0.87	ND
3 BLADSCHIJFBREEDT	-	-	-	ND	-2.26	0.054	NS	-1.28	-0.70	-0.33	0.72	0.52	ND
4 KNOLDIAMETER IN	+	-	-	ND	0.05	0.961	NS	1.83	-0.35	-0.95	1.04	0.40	ND
5 KNOLHOOGTE IN MM	+	-	-	ND	-1.04	0.327	NS	0.51	-2.07	-0.37	1.31	0.32	ND
6 BLD.STL.+BLD.SCH	-	+	+	ND	0.65	0.536	NS	-0.59	0.74	1.86	1.06	0.39	ND
7 KNOLH/KNOLDIAM	-	-	+	ND	-1.17	0.277	NS	-0.91	-1.72	1.75	1.62	0.26	ND
8 KNOLDIAM/KNOLH	+	+	-	ND	1.15	0.282	NS	0.82	1.59	-1.69	1.66	0.25	ND

(8) Geerhoek Vak: G 4

COMPARISONS BETWEEN 1 MOBILE AND 6 KRT 40
T VALUES POSITIVE IF MOBILE LARGER THAN KRT 40

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-	+	+	ND	0.39	0.708	NS	-1.20	1.08	1.81	2.09	0.19	ND
2 BLADSCHIJFLENGTE	+	+	+	ND	2.09	0.070	NS	0.82	1.06	1.41	0.02	0.98	ND
3 BLADSCHIJFBREEDT	-	-	-	ND	-3.97	0.004	**	-1.96	-1.32	-0.81	1.25	0.34	D
4 KNOLDIAMETER IN	+	+	-	ND	0.61	0.561	NS	1.07	1.98	-1.19	1.55	0.27	ND
5 KNOLHOOGTE IN MM	+	+	-	ND	0.36	0.729	NS	0.95	0.13	-0.16	0.14	0.87	ND
6 BLD.STL.+BLD.SCH	-	+	+5	ND	1.09	0.306	NS	-0.64	1.47	2.21	1.59	0.26	ND
7 KNOLH/KNOLDIAM	+	-	+5	ND	-0.10	0.925	NS	0.00	-1.09	2.62	1.20	0.35	ND
8 KNOLDIAM/KNOLH	-	+	-1	ND	0.16	0.873	NS	-0.20	1.14	-2.96	1.51	0.28	ND

(9) Geerhoek Vak: G 4

COMPARISONS BETWEEN 1 MOBILE AND 4 MONORONDO
T VALUES POSITIVE IF MOBILE LARGER THAN MONORONDO

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-1	-	-	ND	-4.10	0.003	**	-3.52	-2.03	-1.82	2.56	0.14	D
2 BLADSCHIJFLENGTE	-	-	-	ND	-1.90	0.094	NS	-0.61	-1.40	-0.48	0.52	0.62	ND
3 BLADSCHIJFBREEDT	-1	-5	-1	D	-8.74	0.000	***	-2.91	-2.88	-3.63	0.23	0.80	D
4 KNOLDIAMETER IN	+1	+1	+	D	3.34	0.010	*	3.74	4.01	0.68	1.41	0.30	D
5 KNOLHOOGTE IN MM	+5	-	-	ND	0.74	0.482	NS	2.63	-0.04	-0.55	1.25	0.34	ND
6 BLD.STL.+BLD.SCH	-1	-5	-	ND	-4.03	0.004	**	-2.99	-2.45	-1.67	1.89	0.21	D
7 KNOLH/KNOLDIAM	-	-5	-1	ND	-2.63	0.030	*	-0.36	-2.81	-3.06	1.90	0.21	D
8 KNOLDIAM/KNOLH	+	+5	+1	ND	2.47	0.039	*	0.20	2.39	3.38	2.10	0.18	D

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(10) Geerhoek Vak: G 4

COMPARISONS BETWEEN 2 MONOTOP AND 3 MONOPOLY
T VALUES POSITIVE IF MONOTOP LARGER THAN MONOPOLY

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-	-1	-5	ND	-3.91	0.004	**	-1.51	-3.79	-2.71	0.65	0.55	D
2 BLADSCHIJFLENGTE	-	-	-5	ND	-2.87	0.021	*	-0.25	-1.93	-2.62	1.34	0.32	D
3 BLADSCHIJFBREEDT	+	-	+	ND	0.86	0.416	NS	0.64	-0.25	0.70	0.73	0.52	ND
4 KNOLDIAMETER IN	+	-5	-	ND	-0.89	0.399	NS	1.26	-2.77	-0.44	1.91	0.21	ND
5 KNOLHOOGTE IN MM	-	-1	-	ND	-1.93	0.090	NS	-0.37	-3.27	-0.19	2.60	0.13	ND
6 BLD.STL.+BLD.SCH	-	-1	-5	ND	-4.10	0.003	**	-1.25	-4.22	-2.97	0.98	0.58	D
7 KNOLH/KNOLDIAM	-	-	+	ND	-1.36	0.210	NS	-1.27	-1.41	0.87	0.98	0.58	ND
8 KNOLDIAM/KNOLH	+	+	-	ND	1.15	0.282	NS	1.22	1.14	-0.84	0.76	0.50	ND

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(11) Geerhoek Vak: G 4

COMPARISONS BETWEEN 2 MONOTOP AND 6 KRT 40
T VALUES POSITIVE IF MONOTOP LARGER THAN KRT 40

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-	-5	-5	ND	-3.26	0.012	*	-1.51	-2.78	-2.29	0.17	0.84	D
2 BLADSCHIJFLENGTE	-	-5	-5	ND	-3.05	0.016	*	-0.40	-2.17	-2.37	1.33	0.32	D
3 BLADSCHIJFBREEDT	-	-	+	ND	-0.86	0.416	NS	-0.04	-0.87	0.21	1.11	0.38	ND
4 KNOLDIAMETER IN	+	-	-	ND	-0.34	0.745	NS	0.49	-0.43	-0.68	0.21	0.81	ND
5 KNOLHOOGTE IN MM	+	-	+	ND	-0.53	0.612	NS	0.07	-1.08	0.03	0.34	0.72	ND
6 BLD.STL.+BLD.SCH	-	-1	-5	ND	-3.65	0.006	**	-1.30	-3.49	-2.62	0.45	0.65	D
7 KNOLH/KNOLDIAM	-	-	+	ND	-0.29	0.778	NS	-0.96	-0.78	1.75	0.60	0.58	ND
8 KNOLDIAM/KNOLH	+	+	-	ND	0.16	0.873	NS	0.20	0.68	-2.11	0.62	0.57	ND

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(12) Geerhoek Vak: G 4

COMPARISONS BETWEEN 3 MONOPOLY AND 4 MONORONDO
T VALUES POSITIVE IF MONOPOLY LARGER THAN MONORONDO

	SIGNIFICANCE LEVELS YEARS				COMBINED ANALYSIS			T VALUES YEARS			F3	P(F3)	
	85	86	87		T	PROB	SIG	85	86	87			
1 BLADSTEELLENGTE	-5	-	-1	ND	-3.84	0.005	**	-2.31	-2.09	-3.21	0.26	0.78	D
2 BLADSCHIJFLENGTE	-	-5	-	ND	-4.16	0.003	**	-1.77	-2.71	-1.63	1.20	0.35	D
3 BLADSCHIJFBREEDT	-	-5	-1	ND	-6.49	0.000	***	-1.63	-2.18	-3.31	0.83	0.53	D
4 KNOLDIAMETER IN	+	+1	+	ND	3.29	0.011	*	1.91	4.37	1.63	1.07	0.39	D
5 KNOLHOOGTE IN MM	+5	+	-	ND	1.78	0.113	NS	2.11	2.03	-0.18	1.06	0.39	ND
6 BLD.STL.+BLD.SCH	-5	-1	-1	D	-4.68	0.002	**	-2.40	-3.19	-3.53	0.12	0.89	D
7 KNOLH/KNOLDIAM	+	-	-1	ND	-1.46	0.182	NS	0.55	-1.09	-4.81	1.48	0.28	ND
8 KNOLDIAM/KNOLH	-	+	+1	ND	1.32	0.224	NS	-0.61	0.80	5.07	1.19	0.35	ND

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(13) Geerhoek Vak: G 4

COMPARISONS BETWEEN 6 KRT 40 AND 4 MONORONDO
T VALUES POSITIVE IF KRT 40 LARGER THAN MONORONDO

	SIGNIFICANCE LEVELS YEARS				COMBINED ANALYSIS			T VALUES YEARS			F3	P(F3)	
	85	86	87		T	PROB	SIG	85	86	87			
1 BLADSTEELLENGTE	-5	-1	-1	D	-4.49	0.002	**	-2.31	-3.11	-3.63	0.03	0.97	D
2 BLADSCHIJFLENGTE	-	-5	-	ND	-3.99	0.004	**	-1.62	-2.46	-1.89	0.70	0.53	D
3 BLADSCHIJFBREEDT	-	-	-5	ND	-4.77	0.001	**	-0.95	-1.56	-2.82	1.15	0.37	D
4 KNOLDIAMETER IN	+5	+	+	ND	2.74	0.026	*	2.67	2.03	1.86	0.02	0.98	D
5 KNOLHOOGTE IN MM	+	-	-	ND	0.38	0.715	NS	1.67	-0.16	-0.40	0.57	0.59	ND
6 BLD.STL.+BLD.SCH	-5	-1	-1	D	-5.13	0.001	***	-2.35	-3.92	-3.87	0.10	0.91	D
7 KNOLH/KNOLDIAM	-	-	-1	ND	-2.53	0.035	*	-0.36	-1.72	-5.69	0.98	0.58	D
8 KNOLDIAM/KNOLH	+	+	+1	ND	2.31	0.050	*	0.41	1.25	6.33	0.90	0.55	D

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(14) Geerhoek Vak: G 4

COMPARISONS BETWEEN 2 MONOTOP AND 4 MONORONDO
T VALUES POSITIVE IF MONOTOP LARGER THAN MONORONDO

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-1	-1	-1	D	-7.75	0.000	***	-3.82	-5.88	-5.92	0.27	0.77	D
2 BLADSCHIJFLENGTE	-	-1	-1	D	-7.03	0.000	***	-2.02	-4.63	-4.25	3.01	0.11	D
3 BLADSCHIJFBREEDT	-	-5	-5	ND	-5.63	0.000	***	-0.99	-2.43	-2.61	2.40	0.15	D
4 KNOLDIAMETER IN	+1	+	+	ND	2.40	0.043	*	3.17	1.60	1.18	0.29	0.76	D
5 KNOLHOOGTE IN MM	+	-	-	ND	-0.15	0.885	NS	1.74	-1.24	-0.37	1.30	0.33	ND
6 BLD.STL.+BLD.SCH	-1	-1	-1	D	-8.78	0.000	***	-3.65	-7.41	-6.50	0.85	0.53	D
7 KNOLH/KNOLDIAM	-	-5	-1	ND	-2.82	0.022	*	-0.73	-2.50	-3.94	1.03	0.40	D
8 KNOLDIAM/KNOLH	+	+	+1	ND	2.47	0.039	*	0.61	1.93	4.22	1.00	0.59	D

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(15) Geerhoek Vak: G 4

COMPARISONS BETWEEN 3 MONOPOLY AND 6 KRT 40
T VALUES POSITIVE IF MONOPOLY LARGER THAN KRT 40

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	+	+	+	ND	0.65	0.532	NS	0.00	1.02	0.42	0.19	0.83	ND
2 BLADSCHIJFLENGTE	-	-	+	ND	-0.18	0.864	NS	-0.14	-0.25	0.26	0.08	0.93	ND
3 BLADSCHIJFBREEDT	-	-	-	ND	-1.71	0.125	NS	-0.68	-0.62	-0.49	0.10	0.91	ND
4 KNOLDIAMETER IN	-	+5	-	ND	0.56	0.594	NS	-0.76	2.33	-0.24	1.35	0.31	ND
5 KNOLHOOGTE IN MM	+	+5	+	ND	1.40	0.198	NS	0.44	2.19	0.22	1.05	0.39	ND
6 BLD.STL.+BLD.SCH	-	+	+	ND	0.45	0.667	NS	-0.05	0.72	0.34	0.11	0.90	ND
7 KNOLH/KNOLDIAM	+	+	+	ND	1.07	0.316	NS	0.91	0.62	0.87	0.07	0.94	ND
8 KNOLDIAM/KNOLH	-	-	-	ND	-0.99	0.352	NS	-1.02	-0.45	-1.27	0.02	0.98	ND

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(16) Geerhoek Vak: G 4

	1 BLADSTEE LLENGTE	2 BLADSCHI JFLENGTE	3 BLADSCHI JFBREEDT	4 KNOLDIAM ETER IN	5 KNOLHOOG TE IN MM	6 BLD.STL. +BLD.SCH	7 KNOLH/KN OLDIAM	8 KNOLDIAM /KNOLH
1 MOBILE	20.400	19.230	10.930	74.750	71.250	39.630	0.950	1.060
2 MONOTOP	19.850	18.220	11.980	73.180	68.330	38.070	0.930	1.080
3 MONOPOLY	22.580	18.430	11.630	69.720	69.550	41.020	1.000	1.020
4 KRT 40	22.580	18.550	12.000	71.820	68.100	41.130	0.950	1.070
5 MONORONDO	26.770	19.900	12.520	64.480	62.570	46.670	0.970	1.050
WITHIN SE	1.280	0.588	0.386	1.943	2.336	1.664	0.039	0.035
LSD AT 5%	3.775	1.736	1.139	5.732	6.890	4.908	0.115	0.103
LSD AT 1%	5.149	2.368	1.554	7.817	9.397	6.694	0.157	0.140
D.F.	20	20	20	20	20	20	20	20

Results of the Mod. Joined Regression Analysis

MJRA SLOPE	1.022	0.693	0.889	0.965	0.752	0.898	0.407	0.291
SLOPE SE	0.275	0.133	0.200	0.367	0.708	0.222	0.295	0.256

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(17) Geerhoek Vak: G 4

	1 BLADSTEE LLENGTE	2 BLADSCH1 JFLENGTE	3 BLADSCHI JFBREEDT	4 KNOLDIAM ETER IN	5 KNOLHOOG TE IN MM	6 BLD.STL. +BLD.SCH	7 KNOLH/KN OLDIAM	8 KNOLDIAM /KNOLH
1 MOBILE	23.580	19.900	12.680	75.830	69.080	43.480	0.920	1.130
2 MONOTOP	18.650	17.300	12.970	68.420	63.500	35.950	0.940	1.090
3 MONOPOLY	23.500	18.850	13.130	76.920	78.670	42.350	1.030	0.990
4 KRT 40	22.200	19.050	13.530	69.750	68.500	41.250	0.990	1.030
5 MONORONDO	26.170	21.030	14.530	63.500	69.250	47.200	1.100	0.920
WITHIN SE	0.904	0.569	0.454	2.172	3.278	1.073	0.045	0.062
LSD AT 5%	2.740	1.727	1.377	6.589	9.944	3.256	0.138	0.188
LSD AT 1%	3.803	2.397	1.910	9.145	13.801	4.518	0.191	0.261
D.F.	14	14	14	14	14	14	14	14

Results of the Mod. Joined Regression Analysis

MJRA SLOPE	1.104	1.454	1.139	1.447	2.250	1.211	1.691	1.752
SLOPE SE	0.151	0.053	0.153	0.405	0.520	0.114	0.334	0.432

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(18) Geerhoek Vak: G 4

	1 BLADSTEELLENGTE	2 BLADSCHIJFLENGTE	3 BLADSCHIJFBREEDT	4 KNOLDIAMETER IN	5 KNOLHOOGTE IN MM	6 BLD.STL.+BLD.SCH	7 KNOLH/KNOLDIAM	8 KNOLDIAM/KNOLH
1 MOBILE	22.510	18.400	13.180	58.110	56.330	40.910	0.990	1.050
2 MONOTOP	18.390	16.500	13.620	60.000	57.000	34.890	0.970	1.070
3 MONOPOLY	21.110	17.820	13.320	61.670	57.670	38.590	0.950	1.090
4 KRT 40	20.690	17.690	13.530	62.560	56.890	38.160	0.930	1.120
5 MONORONDO	24.340	18.640	14.740	55.560	58.330	42.990	1.060	0.970
WITHIN SE	0.711	0.356	0.304	2.654	2.551	0.882	0.016	0.017
LSD AT 5%	2.155	1.079	0.922	8.051	7.740	2.674	0.049	0.050
LSD AT 1%	2.991	1.497	1.280	11.174	10.742	3.711	0.068	0.069
D.F.	14	14	14	14	14	14	14	14

Results of the Mod. Joined Regression Analysis

MJRA SLOPE	0.873	0.853	0.972	0.588	-0.002	0.891	0.901	0.957
SLOPE SE	0.157	0.123	0.149	0.328	0.196	0.131	0.488	0.512

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(19) Geerhoek Vak: G 4

VARIETY MEANS OVER YEARS

	1 BLADSTEELLENGTE	2 BLADSCHIJFLENGTE	3 BLADSCHIJFBREEDT	4 KNOLDIAMETER IN	5 KNOLHOOGTE IN MM	6 BLD.STL.+BLD.SCH	7 KNOLH/KNOLDIAM	8 KNOLDIAM/KNOLH
1 MOBILE	22.163	19.177	12.263	69.563	65.553	41.340	0.953	1.080
2 MONOTOP	18.963	17.340	12.857	67.200	62.943	36.303	0.947	1.080
3 MONOPOLY	22.397	18.367	12.693	69.437	68.630	40.653	0.993	1.033
4 KRT 40	21.823	18.430	13.020	68.043	64.497	40.180	0.957	1.073
5 MONORONDO	25.760	19.857	13.930	61.180	63.383	45.620	1.043	0.980
YEAR MS	7.995	8.124	14.996	633.634	689.679	35.012	0.005	0.003
VARIETY MS	52.491	8.048	3.401	106.814	46.305	99.333	0.015	0.017
VAR.YEAR MS	4.295	0.193	0.194	28.963	25.009	5.273	0.004	0.006
F1 RATIO	12.220	41.759	17.566	3.688	1.851	18.837	3.431	2.919
VAR.REP MS	3.204	0.827	0.447	15.012	21.917	5.149	0.004	0.005
F2 RATIO	1.341	0.233	0.433	1.929	1.141	1.024	1.098	1.129
BETWEEN SE	0.691	0.146	0.147	1.794	1.667	0.765	0.022	0.025
WITHIN SE	0.597	0.303	0.223	1.292	1.561	0.756	0.021	0.024

(20) Geerhoek Vak: G 4

COMPARISONS BETWEEN 1 MOBILE AND 3 MONOPOLY
T VALUES POSITIVE IF MOBILE LARGER THAN MONOPOLY
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS				COMBINED ANALYSIS			T VALUES YEARS			F3	P(F3)	
	85	86	87		T	PROB	SIG	85	86	87			
1 BLADSTEELLENGTE	-	+	+	ND	-0.24	0.819	NS	-1.20	0.06	1.39	1.14	0.37	ND
2 BLADSCHIJFLENGTE	+	+	+	ND	3.91	0.008	**	0.96	1.30	1.15	0.43	0.67	D
3 BLADSCHIJFBREEDT	-	-	-	ND	-2.07	0.084	NS	-1.28	-0.70	-0.33	0.61	0.57	ND
4 KNOLDIAMETER IN	+	-	-	ND	0.05	0.962	NS	1.83	-0.35	-0.95	1.01	0.41	ND
5 KNOLHOOGTE IN MM	+	-	-	ND	-1.31	0.240	NS	0.51	-2.07	-0.37	2.05	0.19	ND
6 BLD.STL.+BLD.SCH	-	+	+	ND	0.63	0.549	NS	-0.59	0.74	1.86	1.02	0.40	ND
7 KNOLH/KNOLDIAM	-	-	+	ND	-1.29	0.243	NS	-0.91	-1.72	1.75	1.99	0.20	ND
8 KNOLDIAM/KNOLH	+	+	-	ND	1.30	0.241	NS	0.82	1.59	-1.69	2.10	0.18	ND

(21) Geerhoek Vak: G 4

COMPARISONS BETWEEN 1 MOBILE AND 6 KRT 40
T VALUES POSITIVE IF MOBILE LARGER THAN KRT 40
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNTFICANCE LEVELS YEARS				COMBINED ANALYSIS			T VALUES YEARS			F3	P(F3)	
	85	86	87		T	PROB	SIG	85	86	87			
1 BLADSTEELLENGTE	-	+	+	ND	0.35	0.740	NS	-1.20	1.08	1.81	1.68	0.25	ND
2 BLADSCHIJFLENGTE	+	+	+	ND	3.61	0.011	*	0.82	1.06	1.41	0.06	0.94	D
3 BLADSCHIJFBREEDT	-	-	-	ND	-3.65	0.011	*	-1.96	-1.32	-0.81	1.05	0.39	D
4 KNOLDIAMETER IN	+	+	-	ND	0.60	0.571	NS	1.07	1.98	-1.19	1.51	0.28	ND
5 KNOLHOOGTE IN MM	+	+	-	ND	0.45	0.670	NS	0.95	0.13	-0.16	0.22	0.81	ND
6 BLD.STL.+BLD.SCH	-	+	+5	ND	1.07	0.325	NS	-0.64	1.47	2.21	1.53	0.27	ND
7 KNOLH/KNOLDIAM	+	-	+5	ND	-0.11	0.918	NS	0.00	-1.09	2.62	1.48	0.28	ND
8 KNOLDIAM/KNOLH	-	+	-1	ND	0.19	0.859	NS	-0.20	1.14	-2.96	1.92	0.21	ND

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(22) Geerhoek Vak: G 4

COMPARISONS BETWEEN 1 MOBILE AND 4 MONORONDO
T VALUES POSITIVE IF MOBILE LARGER THAN MONORONDO
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-1	-	-	ND	-3.68	0.010	*	-3.52	-2.03	-1.82	2.06	0.19	D
2 BLADSCHIJFLENGTE	-	-	-	ND	-3.29	0.017	*	-0.81	-1.40	-0.48	1.54	0.27	D
3 BLADSCHIJFBREEDT	-1	-5	-1	D	-8.04	0.000	***	-2.91	-2.88	-3.63	0.20	0.83	D
4 KNOLDIAMETER IN	+1	+1	+	D	3.30	0.016	*	3.74	4.01	0.68	1.38	0.31	D
5 KNOLHOOGTE IN MM	+5	-	-	ND	0.92	0.393	NS	2.63	-0.04	-0.55	1.96	0.20	ND
6 BLD.STL.+BLD.SCH	-1	-5	-	ND	-3.95	0.008	**	-2.99	-2.45	-1.67	1.82	0.22	D
7 KNOLH/KNOLDIAM	-	-5	-1	ND	-2.91	0.027	*	-0.36	-2.81	-3.06	2.34	0.16	D
8 KNOLDIAM/KNOLH	+	+5	+1	ND	2.79	0.032	*	0.20	2.39	3.38	2.67	0.13	D

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(23) Geerhoek Vak: G 4

COMPARISONS BETWEEN 2 MONOTOP AND 6 ERT 40
T VALUES POSITIVE IF MONOTOP LARGER THAN ERT 40
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS 85	86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-	-5	-5	ND	-2.93	0.026	*	-1.51	-2.78	-2.29	0.14	0.87	D
2 BLADSCHIJFLENGTE	-	-5	-5	ND	-5.27	0.002	**	-0.40	-2.17	-2.37	3.98	0.06	D
3 BLADSCHIJFBREEDT	-	-	+	ND	-0.79	0.461	NS	-0.04	-0.87	0.21	0.94	0.57	ND
4 KNOLDIAMETER IN	+	-	-	ND	-0.33	0.751	NS	0.49	-0.43	-0.68	0.21	0.82	ND
5 KNOLHOOGTE IN MM	+	-	+	ND	-0.66	0.534	NS	0.07	-1.08	0.03	0.53	0.61	ND
6 BLD.STL.+BLD.SCH	-	-1	-5	ND	-3.58	0.012	*	-1.30	-3.49	-2.62	0.44	0.67	D
7 KNOLH/KNOLDIAM	-	-	+	ND	-0.32	0.757	NS	-0.36	-0.78	1.75	0.73	0.51	ND
8 KNOLDIAM/KNOLH	+	+	-	ND	0.19	0.859	NS	0.20	0.68	-2.11	0.78	0.51	ND

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(24) Geerhoek Vak: G 4

COMPARISONS BETWEEN 2 MONOTOP AND 4 MONORONDO
T VALUES POSITIVE IF MONOTOP LARGER THAN MONORONDO
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS				COMBINED ANALYSIS			T VALUES YEARS			F3	P(F3)	
	85	86	87		T	PROB	SIG	85	86	87			
1 BLADSTEELLENGTE	-1	-1	-1	D	-6.96	0.000	***	-3.82	-5.88	-5.92	0.22	0.81	D
2 BLADSCHIJFLENGTE	-	-1	-1	D	-12.16	0.000	***	-2.02	-4.63	-4.25	9.01	0.01	D
3 BLADSCHIJFBREEDT	-	-5	-5	ND	-5.17	0.002	**	-0.99	-2.43	-2.61	2.03	0.19	D
4 KNOLDIAMETER IN	+1	+	+	ND	2.37	0.055	NS	3.17	1.60	1.18	0.28	0.76	ND
5 KNOLHOOGTE IN MM	+	-	-	ND	-0.19	0.858	NS	1.74	-1.24	-0.37	2.02	0.19	ND
6 BLD.STL.+BLD.SCH	-1	-1	-1	D	-8.61	0.000	***	-3.65	-7.41	-6.50	0.82	0.52	D
7 KNOLH/KNOLDIAM	-	-5	-1	ND	-3.13	0.020	*	-0.73	-2.50	-3.94	1.27	0.33	D
8 KNOLDIAM/KNOLH	+	+	+1	ND	2.79	0.032	*	0.61	1.93	4.22	1.27	0.33	D

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(25) Geerhoek Vak: G 4

COMPARISONS BETWEEN 3 MONOPOLY AND 4 MONORONDO
T VALUES POSITIVE IF MONOPOLY LARGER THAN MONORONDO
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS				COMBINED ANALYSIS			T VALUES YEARS			F3	P(F3)	
	85	86	87		T	PROB	SIG	85	86	87			
1 BLADSTEELLENGTE	-5	-	-1	ND	-3.44	0.014	*	-2.31	-2.09	-3.21	0.21	0.82	D
2 BLADSCHIJFLENGTE	-	-5	-	ND	-7.20	0.000	***	-1.77	-2.71	-1.63	3.60	0.08	D
3 BLADSCHIJFBREEDT	-	-5	-1	ND	-5.96	0.001	***	-1.63	-2.18	-3.31	0.70	0.53	D
4 KNOLDIAMETER IN	+	+1	+	ND	3.25	0.017	*	1.91	4.37	1.63	1.05	0.40	D
5 KNOLHOOGTE IN MM	+5	+	-	ND	2.23	0.068	NS	2.11	2.03	-0.18	1.66	0.25	ND
6 BLD.STL.+BLD.SCH	-5	-1	-1	D	-4.59	0.004	**	-2.40	-3.19	-3.53	0.11	0.89	D
7 KNOLH/KNOLDIAM	+	-	-1	ND	-1.62	0.157	NS	0.55	-1.09	-4.81	1.82	0.22	ND
8 KNOLDIAM/KNOLH	-	+	+1	ND	1.49	0.188	NS	-0.61	0.80	5.07	1.51	0.28	ND

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(26) Geerhoek Vak: G 4

COMPARISONS BETWEEN 6 KRT 40 AND 4 MONDRONDO
T VALUES POSITIVE IF KRT 40 LARGER THAN MONDRONDO

	SIGNIFICANCE LEVELS YEARS 85	86		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	F3	P(F3)	
1 BLADSTEELLENGTE	-5	-1	ND	-3.18	0.011	*	-2.31	-3.11	0.01	0.93	D
2 BLADSCHIJFLENGTE	-	-5	ND	-1.88	0.093	NS	-1.62	-2.46	0.13	0.73	ND
3 BLADSCHIJFBREEDT	-	-	ND	-1.14	0.284	NS	-0.95	-1.56	0.13	0.73	ND
4 KNOLDIAMETER IN	+5	+	ND	2.88	0.018	*	2.67	2.03	0.05	0.82	D
5 KNOLHOOGTE IN MM	+	-	ND	0.56	0.592	NS	1.67	-0.16	0.53	0.51	ND
6 BLD.STL.+BLD.SCH	-5	-1	ND	-2.82	0.020	*	-2.35	-3.92	0.01	0.92	D
7 KNOLH/KNOLDIAM	-	-	ND	-1.31	0.223	NS	-0.36	-1.72	0.82	0.61	ND
8 KNOLDIAM/KNOLH	+	+	ND	1.06	0.315	NS	0.41	1.25	0.54	0.51	ND

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(27) Geerhoek Vak: G 4

COMPARISONS BETWEEN 6 KRT 40 AND 4 MONDRONDO
T VALUES POSITIVE IF KRT 40 LARGER THAN MONDRONDO
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS 85	86		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 85	86	F3	P(F3)	
1 BLADSTEELLENGTE	-5	-1	ND	-3.01	0.017	*	-2.31	-3.11	0.01	0.94	D
2 BLADSCHIJFLENGTE	-	-5	ND	-1.93	0.089	NS	-1.62	-2.46	0.13	0.72	ND
3 BLADSCHIJFBREEDT	-	-	ND	-1.73	0.122	NS	-0.95	-1.56	0.30	0.60	ND
4 KNOLDIAMETER IN	+5	+	ND	2.85	0.022	*	2.67	2.03	0.05	0.82	D
5 KNOLHOOGTE IN MM	+	-	ND	0.54	0.604	NS	1.67	-0.16	0.50	0.50	ND
6 BLD.STL.+BLD.SCH	-5	-1	ND	-2.76	0.025	*	-2.35	-3.92	0.01	0.92	D
7 KNOLH/KNOLDIAM	-	-	ND	-1.24	0.251	NS	-0.36	-1.72	0.74	0.58	ND
8 KNOLDIAM/KNOLH	+	+	ND	1.05	0.326	NS	0.41	1.25	0.52	0.51	ND

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(28) STERREBOS 868

COMPARISONS BETWEEN 6 KRT 40 AND 4 MONORONDO
T VALUES POSITIVE IF KRT 40 LARGER THAN MONORONDO

	SIGNIFICANCE LEVELS YEARS 86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-1	-1	D	-3.72	0.010	**	-3.11	-3.63	0.02	0.88	D
2 BLADSCHIJFLENGTE	-5	-	ND	-2.01	0.091	NS	-2.46	-1.89	0.50	0.51	ND
3 BLADSCHIJFBREEDT	-	-5	ND	-2.35	0.057	NS	-1.56	-2.82	0.05	0.82	ND
4 KNOLHOOGTE IN MM	-	-	ND	-0.33	0.749	NS	-0.16	-0.40	0.01	0.92	ND
5 KNOLDIAMETER IN	+	+	ND	2.26	0.064	NS	2.03	1.86	0.02	0.90	ND
6 BLD.STL.+BLD.SCH	-1	-1	D	-3.20	0.019	*	-3.92	-3.87	0.11	0.75	D
7 KNOLH/KNOLDIAM	-	-1	ND	-3.03	0.023	*	-1.72	-5.69	0.06	0.80	D
8 KNOLDIAM/KNOLH	+	+1	ND	2.76	0.033	*	1.25	6.33	0.18	0.69	D

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(29) STERREBOS 868

COMPARISONS BETWEEN 6 KRT 40 AND 4 MONORONDO
T VALUES POSITIVE IF KRT 40 LARGER THAN MONORONDO
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS 86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 86	87	F3	P(F3)	
1 BLADSTEELLENGTE	-1	-1	D	-4.16	0.009	**	-3.11	-3.63	0.03	0.86	D
2 BLADSCHIJFLENGTE	-5	-	ND	-2.24	0.075	NS	-2.46	-1.89	0.62	0.54	ND
3 BLADSCHIJFBREEDT	-	-5	ND	-3.45	0.018	*	-1.56	-2.82	0.11	0.75	D
4 KNOLHOOGTE IN MM	-	-	ND	-0.37	0.726	NS	-0.16	-0.40	0.01	0.91	ND
5 KNOLDIAMETER IN	+	+	ND	2.34	0.067	NS	2.03	1.86	0.02	0.89	ND
6 BLD.STL.+BLD.SCH	-1	-1	D	-3.64	0.015	*	-3.92	-3.87	0.14	0.72	D
7 KNOLH/KNOLDIAM	-	-1	ND	-2.99	0.030	*	-1.72	-5.69	0.06	0.81	D
8 KNOLDIAM/KNOLH	+	+1	ND	2.73	0.041	*	1.25	6.33	0.18	0.69	D

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(30) STERREBOS 868

COMPARISONS BETWEEN 8 MONA AND 4 MONORONDO
T VALUES POSITIVE IF MONA LARGER THAN MONORONDO

	SIGNIFICANCE LEVELS YEARS 86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 86	87	F3	P(F3)	
1 BLADSTEELLENGTE	+	-5	ND	-1.29	0.245	NS	0.06	-2.71	1.87	0.22	ND
2 BLADSCHIJFLENGTE	-	-1	ND	-1.96	0.098	NS	-1.13	-3.86	0.50	0.51	ND
3 BLADSCHIJFBREEDT	-	-5	ND	-1.63	0.154	NS	-0.59	-2.68	0.67	0.55	ND
4 KNOLHOOGTE IN MM	-5	-1	ND	-4.05	0.007	**	-2.77	-3.79	0.02	0.90	D
5 KNOLDIAMETER IN	+	-	ND	0.93	0.388	NS	1.95	-0.15	1.26	0.31	ND
6 BLD.STL.+BLD.SCH	-	-1	ND	-1.63	0.153	NS	-0.55	-3.75	1.30	0.30	ND
7 KNOLH/KNOLDIAM	-1	-1	D	-6.57	0.001	***	-4.38	-10.50	0.26	0.63	D
8 KNOLDIAM/KNOLH	+1	+1	D	6.48	0.001	***	3.75	11.83	0.28	0.62	D

KROOT 1986, 1987 20-MAY-88

(31) STERREBOS 868

COMPARISONS BETWEEN 8 MONA AND 4 MONORONDO
T VALUES POSITIVE IF MONA LARGER THAN MONORONDO
NB: WITH USE OF MODIFIED JOINED REGRESSION ANALYSIS

	SIGNIFICANCE LEVELS YEARS 86	87		COMBINED ANALYSIS T	PROB	SIG	T VALUES YEARS 86	87	F3	P(F3)	
1 BLADSTEELLENGTE	+	-5	ND	-1.44	0.209	NS	0.06	-2.71	2.34	0.18	ND
2 BLADSCHIJFLENGTE	-	-1	ND	-2.18	0.081	NS	-1.13	-3.86	0.62	0.54	ND
3 BLADSCHIJFBREEDT	-	-5	ND	-2.39	0.063	NS	-0.59	-2.68	1.44	0.27	ND
4 KNOLHOOGTE IN MM	-5	-1	ND	-4.48	0.006	**	-2.77	-3.79	0.02	0.89	D
5 KNOLDIAMETER IN	+	-	ND	0.96	0.382	NS	1.95	-0.15	1.34	0.29	ND
6 BLD.STL.+BLD.SCH	-	-1	ND	-1.86	0.122	NS	-0.55	-3.75	1.69	0.24	ND
7 KNOLH/KNOLDIAM	-1	-1	D	-6.48	0.001	**	-4.38	-10.50	0.25	0.64	D
8 KNOLDIAM/KNOLH	+1	+1	D	6.41	0.001	**	3.75	11.83	0.28	0.62	D

Summary of decisions in red beet

Comparisons of the conclusions from 2/3, or 2/2 and COY at 1%.

I: 5 cultivars ----> 10 comparisons between pairs;
3 years : 85, 86 and 87.
8 characters

B 2/3 -1%

COY-1%:		D	ND	
	D	5	3	8
	ND	0	2	2
		5	5	10

2/3

COY-1% (+ MJRA)		D	ND	
	D	5	4	9
	ND	0	1	1
		5	5	10

II: 3 candidates } ----> 24 comparisons
7 reference cultivars }
8 characters
2 years : 85 and 86

2/2 -1%

COY-1%		D	ND	
	D	3	4	7
	ND	0	17	17
		3	21	24

2/2 -1%

COY-1% (+ MJRA)		D	ND	
	D	3	10	13
	ND	0	11	11
		3	21	24

III 7 cultivars ----> 21 comparisons
8 characters
2 years : 86 and 87

2/2 -1%

		D	ND	
	D	7	5	12
	ND	1	8	9
		8	13	21

2/2 -1%

COY-1% (+ MJRA)		D	ND	
	D	8	8	16
	ND	0	5	5
		8	13	21

[Annex III follows]

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ANNEX III

I N R A - G E V E S
BRION
49250 BEAUFORT EN VALLEE

[Original: French]

METHODOLOGICAL REPORT ON CARROT

ESSAI METHODOLOGIQUE CAROTTE

TECHNICAL WORKING PARTY
FOR
VEGETABLES

Twenty-first Session
Wageningen, Netherlands, June 13 to 15, 1988

Essai méthodologique CAROTTE

Cette étude a pour but d'analyser les principaux caractères utilisés sur l'espèce carotte tant au niveau de leur fiabilité que de leur pouvoir séparateur. Elle devrait également permettre de mieux appréhender l'homogénéité des lots mis en culture et de déterminer des seuils d'homogénéité acceptables. En fait, cet essai méthodologique vise à mieux définir le suffisamment homogène et distinct, terme qui revient souvent lorsque l'on aborde les études D.H.S.

1. Protocole de l'étude :

Ces essais ont été implantés pendant trois ans, dans des conditions aussi similaires que possible, à la station INRA/GEVES de Mons-en-Chaussée (Somme).

a) - semis : 1ère quinzaine de juillet. (Réalisation de deux éclaircissages successifs pour obtenir environ 30/35 racines au mètre linéaire).

b) - dispositif expérimental : essai blocs à 6 répétitions, chaque parcelle élémentaire se composant de 3 lignes de deux mètres.

c) - variétés figurant dans l'essai : cette étude a été orientée sur le type Nantaise améliorée. Les variétés choisies ont été retenues pour représenter l'éventail de précocité de ce type variétal, et ce dans des structures génétiques différentes (populations ou hybrides).

Code	Dénomination	Origine	Type variétal
1	BUREAU	Tézier	Population
2	TANCAR	Clause	Hybride F1
3	TOUCHON	S.P.G.	Population
4	TIANA	Caillard	Hybride F1
5	Nantaise, race Tip Top	Caillard	Population
6	NANDOR	Clause	Hybride F1
7	Nantaise, race d'Aubagne	Vilmorin	Population
8	CADOR	Clause	Hybride F1
9	BANJO	Tézier	Hybride F1
10	IVOR	Clause	Hybride F1

/

d) - notations : Les notations ont été réalisées par les mêmes personnes pendant les 3 ans qu'a duré l'essai. Elles ont toujours été faites de façon anonyme, chaque parcelle élémentaire étant codée. Dans la majorité des cas, elles portaient sur 10 plantes prélevées dans chaque répétition, (effectif total de 60 plantes), et les dépouillements ont été réalisés sur les moyennes de chaque répétition.

Les prélèvements de racines, au champ, ont été réalisés sur les trois lignes, perpendiculairement au semis, afin d'éviter tout effet ligne.

e) - caractères notés : (le numéro de caractère entre parenthèses est celui figurant dans le document UPOV TWV/XXI/7 et correspondant au caractère)

1. Port du feuillage (caractère n° 1)

Caractère noté avant maturité, lorsque la culture est en pleine végétation (un à deux mois avant la récolte).

Caractère noté dans une échelle de 1 à 9.
Une note par répétition.

1. Horizontal
3. Demi-étalé
5. Intermédiaire
7. Demi-dressé
9. Dressé

2. Coloration du feuillage (caractère n° 4)

Caractère noté au même stade que le précédent.
Caractère noté dans une échelle de 1 à 9.
Une note par répétition.

3. Claire
5. Moyenne
7. Foncée.

3. Longueur du feuillage (caractère n° 2)

Caractère noté lors du premier arrachage avant maturité complète de l'ensemble des variétés. Résultats exprimés en centimètres.

.../...

4. Largeur du collet (caractère n° 6)

Caractère noté au même stade que le précédent.
Résultats exprimés en millimètres.

5. Longueur de la racine (caractère n° 7)

Caractère noté à maturité complète de l'ensemble des variétés. Deuxième arrachage.
Résultats exprimés en centimètres.

6. Calibre de la racine (caractère 9a)

Diamètre maximum/longueur de la racine
Caractère noté au même stade que le caractère n° 5.

7. Précocité de boutage (caractère 23a)

Caractère noté sur un arrachage précoce lorsque les variétés précoces arrivent à maturité (stade identique aux caractères 3 et 4).

Caractère noté, pour un arrachage donné, dans une échelle de 1 à 9 :

Forme de la base de la racine =
- 1. Très pointue
- 3. Pointue
- 5. Moyennement arrondie
- 7. Arrondie
- 9. Nettement arrondie

8. Précocité de coloration de coeur (caractère 23b)

Caractère noté au même stade et de la même façon que le précédent.

Coloration du coeur à la base de la racine
- 1. Très faible
- 3. Faible
- 5. Moyenne
- 7. Forte
- 9. Très forte

9. Importance du coeur (caractère 19b)

Diamètre du coeur/diamètre de la racine
Caractère noté à maturité complète.

10. Forme de l'épaulement (caractère n° 10)

Caractère noté à maturité complète dans une échelle de 1 à 9.

1. Très fortement cônique
3. Fortement cônique
5. Moyennement cônique
7. Faiblement cônique
9. Plan

11. Insertion du collet (caractère n° 11)

Caractère noté à maturité complète dans une échelle de 1 à 9.

1. Insertion très en creux
3. en creux
5. au même niveau
7. en cône
9. très en cône.

12. Coloration chair/coeur (caractère 19a)

Caractère noté à maturité complète dans une échelle de 1 à 9.

3. Coeur plus clair que le cortex
5. Coloration identique
7. Coeur plus foncé que le cortex.

13. Collet vert interne (caractère n° 21)

Ce caractère a été noté de deux façons différentes, visuellement dans une échelle de 1 à 9, (1, très faible -> 9, très fort et mesuré en millimètres. Les analyses statistiques réalisées en 85 montrent une précision meilleure lorsque l'on réalise une notation visuelle. (Coefficient de variation de 14,90 % contre 25,41 % dans le cas de mesures en millimètres).

Les résultats présentés dans cette étude correspondent donc à la notation visuelle dans une échelle 1 à 9.

.../...

14. Sortie de terre (caractère n° 22)

Caractère mesuré en millimètres avant arrachage, à maturité complète.

15. Coefficient de forme : ce coefficient a pour but de mieux quantifier la forme générale de la racine (tendance plus ou moins cylindrique).
Après avoir constaté que la densité des racines de carottes ne variait pas ou très peu d'un type à un autre, un coefficient de forme, basé sur le poids et le volume de la racine a été défini comme suit :

$$\text{Coef. forme} = \text{Poids racine} / \left(\text{Longueur racine} \times \frac{\pi \, \text{Diamètre}^2}{4}\right)$$

Des racines parfaitement cylindriques auraient un coefficient de forme proche de 1, des plus côniques un coefficient plus faible.

2. Résultats :

a) - Etude des caractères :

Les annexes 1 donnent, année par année, les résultats des analyses statistiques effectuées :
- moyennes des 6 répétitions
- F. variétés
- Coefficient de variation.

Les seuils de signification des F sont les suivants : 2,33 à 5 % et 3,26 à 1 %. La majorité des caractères étudiés présentent donc des effets variétés nettement significatifs.

Les coefficients de variation sont nettement plus élevés que ceux que l'on a l'habitude de rencontrer dans d'autres types d'essais ou sur d'autres espèces, mais ne semblent pas anormalement élevés comparativement à d'autres essais réalisés sur carotte.

Ces annexes 1 reprennent également les résultats d'analyses non paramétriques (coefficient de corrélation de rang de SPERMAN), qui permettent de comparer d'une année sur l'autre les classements obtenus.

.../...

Les seuils de signification de ces coefficients sont les suivants : rs 5 % = 0,60 et rs 1 % = 0,73.

L'annexe 2 récapitule, caractère par caractère, les corrélations de classement obtenues sur les trois années d'études et montre donc que la fiabilité des caractères varie de façon importante. Les caractères les plus fiables ne sont pas les plus utilisés ni ceux qui semblent les plus aisés à noter :

- sortie de terre
- forme de l'épaulement
- précocité de coloration de coeur
- coefficient de forme (étudié que deux années)

D'autres, très utilisés comme la longueur du feuillage ou le calibre de la racine, semblent, pour des séries variétales relativement étroites, donner des classements très irréguliers et ne pas pouvoir être retenus lors de l'établissement d'une clef de classification. Une hiérarchisation des caractères semble donc possible à ce niveau.

b) - Etude de l'homogénéité des lots :

Pour chaque année d'étude et pour chaque caractère, un écart type moyen des 10 variétés étudiées a été déterminé.

L'annexe 3 reprend, pour chaque variété, chaque année et chaque caractère, le pourcentage de dépassement de l'écart type observé lorsque celui-ci est supérieur à l'écart type moyen augmenté de son intervalle de confiance.

Exemple : - variété n° 1 - année 84 - caractère n° 3 :
. Ecart type de la variété inférieur à l'écart type moyen des 10 variétés -> - (non pris en compte)

- variété n° 1 - année 85 - caractère n° 3
. Ecart type de la variété supérieur à l'écart type moyen des 10 variétés -> 0,91 ((ec var 1 - ec moyen)/ec moyen) x 100 = 0,91

Le bas de ce tableau reprend, année par année et variété par variété, le nombre de dépassements observés (nombre de fois où la variété est moins homogène que l'ensemble variétal étudié), ainsi que la moyenne des dépassements observés (quantitication du manque d'homogénéité par rapport à la moyenne variétale). (dépassement caractère 2 + dépassement caractère 5 + ...)/nombre de caractères étudiés.

La dernière page de l'annexe 4 montre que ces deux approches donnent des résultats voisins puisqu'il existe une bonne corrélation entre le classe-

ment obtenu en considérant le nombre de dépassements moyens (NDM), et celui obtenu en considérant la moyenne des dépassements (MD).
Cette étude semble permettre une bonne approche de l'homogénéité variétale. En effet, ce classement fait apparaître aux trois premières places (dépassements les plus fréquents) des populations réputées moins homogène (Bureau, Touchon, Nantaise race d'Aubagne), et aux cinq dernières (dépassements les plus rares), des hybrides F1, plus homogènes (IVOR, TIANA, TANCAR, NANDOR, CADOR).

Il semble donc possible, à ce niveau, de quantifier l'homogénéité des lots et donc de fixer des seuils d'homogénéité suffisants pour permettre l'inscription des nouvelles variétés. L'homogénéité des nouvelles variétés serait comparée à :

- des seuils définis d'après un ensemble de variétés représentatives de l'espèce comme dans cette étude (populations et hybrides). On maintiendrait alors l'homogénéité générale des variétés cultivées de l'espèce.

- des seuils définis d'après des groupes variétaux plus restreints tels que les hybrides F1. On améliorerait alors l'homogénéité générale des variétés cultivées de l'espèce.

c) - Dépouillement pluri-annuel et comparaisons variétales :

* Etude des caractères :

Les annexes 4 donnent, pour chaque caractère étudié les résultats de l'analyse statistique. Les seuils de signification des F sont les suivants :

F - années : 3,09 à 5 % - 4,82 à 1 %
F - variétés : 1,93 à 5 % - 2,59 à 1 %
F - interaction : 1,68 à 5 % - 2,07 à 1 %

Les effets années et variétés sont généralement tous significatifs alors que les effets interaction restent généralement faibles.

Caractères pour lesquels l'effet années semble très important par rapport à l'effet variétés :

- Longueur du feuillage
- Largeur du collet
- Longueur de la racine
- Calibre de la racine
- Insertion du collet

Ces caractères pourront être utilisés pour comparer directement des variétés entre elles une même année de culture. Les prendre en compte dans une clef de classification établie à partir de descriptions réalisées différentes années pourrait présenter un certain risque.

Caractères pour lesquels l'interaction années/variétés est significative

- Port du feuillage : F - interaction : 2,24
- Couleur du feuillage : F - interaction : 2,54
- Largeur du collet : F - interaction : 3,30
- Calibre de la racine : F - interaction : 2,89
- Précocité de boutage : F - interaction : 2,46
- Précocité coloration du coeur : F - interaction : 3,69
- Insertion du collet : F - interaction : 4,93
- Coloration chair/coeur : F - interaction : 5,55

L'utilisation de tels caractères ne pourra se faire qu'avec prudence et après vérification sur plusieurs cycles de culture que la différence observée reste stable.

* Distinctions variétales :

L'annexe 5 montre que les 15 caractères utilisés permettent de distinguer assez nettement les 10 variétés étudiées puisque un seul couple ne se distingue que par deux caractères au seuil de 1 % et un caractère au seuil de 5 % (CADOR - NANDOR).

Une analyse d'ensemble devrait permettre de définir à partir de quel seuil une variété nouvelle est réellement distincte d'une autre. (1 caractère au seuil de 1 % pendant deux cycles de culture, deux caractères à 5 % ...).

3. Conclusion :

L'utilisation empirique des caractères peut conduire à d'importantes méprises quant à la distinction des variétés. La définition de seuils d'homogénéité et de distinction quantifiables doit être recherchée , afin de rendre plus rigoureuses les conclusions tirées des études D.H.S. La hiérarchisation des caractères, après étude de leur fiabilité et de leur répétabilité doit permettre d'élaborer des clefs de classifications fiables.

.../...

Une telle étude devrait donc permettre d'ébaucher les réponses aux questions que nous nous posons tous :

- Qu'est-ce qu'un caractère important ?
- Qu'est-ce qu'une variété suffisamment homogène ?
- A quel seuil commence la nouveauté et où s'arrête la sélection conservatrice ?

ANNEXE n° 1

CARACTERE : n° 1 - PORT DU FEUILLAGE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
9. BANJO	1,5	5,17	3	5,50	5	5,33	- 1,5	- 3,5	- 2
8. CADOR	1,5	5,17	1	6,83	1	6,50	+ 0,5	+ 0,5	0
6. NANDOR	3	5,00	2	6,16	2	6,33	+ 1	+ 1	0
2. TANCAR	4	4,83	6	4,83	3	5,66	- 2	+ 1	+ 3
5. N. TIP-TOP	5	4,67	9	4,33	9	4,50	- 4	- 4	0
3. TOUCHON	6	4,17	6	4,83	7,5	4,83	0	- 1,5	- 1,5
4. TIANA	7,5	3,83	4	5,16	4	5,50	+ 3,5	+ 3,5	0
1. BUREAU	7,5	3,83	8	4,66	6	5,16	- 0,5	+ 1,5	+ 2
10. IVOR	9	3,67	6	4,83	7,5	4,83	+ 3	+ 1,5	- 1,5
7. N. AUBAGNE	10	3,50	10	4,16	10	3,83	0	0	0
	F. var = 5,69 CV % = 16,13		F.var = 14,34 CV % = 10,21		F.var = 13,71 CV % = 12,13		rs = 0,73 *	rs = 0,70 *	rs = 0,87 ***

CARACTERE : n° 2 - COULEUR DU FEUILLAGE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
10. IVOR	1	6,50	1	6,00	1	6,50	0	0	0
2. TANCAR	2	6,00	4	4,83	4	5,66	- 2	- 2	0
6. NANDOR	3	5,17	4	4,83	5	5,50	- 1	- 2	- 1
9. BANJO	4,5	5,00	2	5,66	6	5,00	+ 2,5	- 1,5	- 4
8. CADOR	4,5	5,00	10	3,66	8,5	4,33	- 5,5	- 4	+ 1,5
1. BUREAU	6	4,83	4	4,83	2	6,16	+ 2	+ 4	+ 2
5. N. TIP-TOP	7	4,67	6,5	4,66	3	5,83	+ 0,5	+ 4	+ 3,5
3. TOUCHON	8,5	4,50	8	4,50	7	4,66	+ 0,5	+ 1,5	+ 1
7. N. AUBAGNE	8,5	4,50	6,5	4,66	8,5	4,33	+ 2	0	- 2
4. TIANA	10	4,17	9	3,83	10	4,00	+ 1	0	- 1
	F. var = 5,06 CV % = 14,69		F.var = 8,08 CV % = 11,82		F.var = 10,47 CV % = 13,22		rs = 0,69 *	rs = 0,63 *	rs = 0,75 ***

CARACTERE : n° 3 - LONGUEUR DU FEUILLAGE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
9. BANJO	1	40,10	6	32,60	3	32,05	- 5	- 2	+ 3
7. N. AUBAGNE	2	40,03	4	34,26	8	30,76	- 2	- 6	- 4
1. BUREAU	3	38,77	7	31,88	2	32,31	- 4	+ 1	+ 5
6. NANDOR	4	38,57	3	34,33	7	31,10	+ 1	- 3	- 4
8. CADOR	5	38,55	1	35,98	1	33,40	+ 4	+ 4	0
10. IVOR	6	37,95	2	34,75	6	31,23	+ 4	0	- 4
5. N. TIP TOP	7	37,23	5	32,78	4	31,80	+ 2	+ 3	+ 1
2. TANCAR	8	34,67	9	29,73	5	31,28	- 1	+ 3	+ 4
3. TOUCHON	9	34,18	8	30,31	9	29,31	+ 1	0	- 1
4. TIANA	10	32,67	10	29,50	10	28,26	0	0	0
	F. var = 6,51		F.var = 6,88		F.var = 16,31		rs = 0,49	rs = 0,49	rs = 0,39
	CV % = 6,90		CV % = 8,98		CV % = 6,09		NS	NS	NS

CARACTERE : n° 4 - LARGEUR DU COLLET

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
1. BUREAU	1	11,72	3	6,15	2	9,28	- 2	- 1	+ 1
7. N. AUBAGNE	2	11,33	2	6,35	3	9,25	0	- 1	- 1
5. N. TIP TOP	3	10,33	1	6,42	1	9,32	+ 2	+ 2	0
10. IVOR	4	9,93	9	5,72	4	9,00	- 5	0	+ 5
6. NANDOR	5	9,91	5	5,99	8	7,97	0	- 3	- 3
9. BANJO	6	9,75	4	6,06	5	8,92	+ 2	+ 1	- 1
8. CADOR	7	8,95	8	5,80	6	8,54	- 1	+ 1	+ 2
2. TANCAR	8	8,80	7	5,86	7	8,16	+ 1	+ 1	0
3. TOUCHON	9	8,68	6	5,99	9	7,95	+ 3	0	- 3
4. TIANA	10	8,33	10	5,70	10	7,29	0	0	0
	F. var = 7,38		F.var = 4,99		F.var = 11,77		rs = 0,71	rs = 0,89	rs = 0,70
	CV % = 9,92		CV % = 5,65		CV % = 6,60		*	***	*

CARACTERE : n° 5 - LONGUEUR DE LA RACINE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
7. N. AUBAGNE	1	19,11	4	16,99	7	15,30	- 3	- 6	- 3
1. BUREAU	2	18,99	1	17,22	1	16,51	+ 1	+ 1	0
5. N TIP TOP	3	18,28	2	17,21	2	16,21	+ 1	+ 1	0
10. IVOR	4	17,82	3	17,09	3	15,61	+ 1	+ 1	0
4. TIANA	5	17,59	6	16,54	5	15,55	- 1	0	+ 1
2. TANCAR	6	17,48	5	16,84	4	15,60	+ 1	+ 2	+ 1
6. NANDOR	7	17,33	9	15,62	9	15,06	- 2	- 2	0
3. TOUCHON	8	17,16	10	15,38	10	15,00	- 2	- 2	0
8. CADOR	9	16,98	8	16,31	6	15,38	+ 1	+ 3	+ 2
9. BANJO	10	16,60	7	16,37	8	15,15	+ 3	+ 2	-1

F. var = 4,42 CV % = 5,25	F.var = 3,15 CV % = 6,50	F.var = 5,79 CV % = 3,75	rs = 0,81 ***	rs = 0,61 *	rs = 0,90 ***

CARACTERE : n° 6 - CALIBRE DE LA RACINE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
6. NANDOR	1	0,217	1	0,177	2	0,224	0	- 1	- 1
10. IVOR	2	0,213	2	0,176	4	0,220	0	- 2	- 2
9. BANJO	3	0,212	8,5	0,162	3	0,223	- 5,5	0	+ 5,5
1. BUREAU	4,5	0,205	10	0,159	7	0,205	- 5,5	- 2,5	+ 3
8. CADOR	4,5	0,205	3,5	0,174	1	0,227	+ 1	+ 3,5	+ 2,5
2. TANCAR	6	0,195	7	0,163	5	0,211	- 1	+ 1	+ 2
3. TOUCHON	7	0,193	3,5	0,174	6	0,207	+ 3,5	+ 1	- 2,5
5. N TIP TOP	8,5	0,188	6	0,166	9,5	0,200	+ 2,5	- 1	- 3,5
7. N. AUBAGNE	8,5	0,188	8,5	0,162	8	0,202	0	+ 0,5	+ 0,5
4. TIANA	10	0,175	5	0,167	9,5	0,200	+ 5	+ 0,5	- 4,5

F. var = 7,24 CV % = 5,86	F.var = 6,82 CV % = 5,18	F.var = 10,69 CV % = 4,34	rs = 0,36 NS	rs = 0,84 ***	rs = 0,43 NS

CARACTERE : n° 7 - PRECOCITE DE BOUTAGE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
3. TOUCHON	1	6,28	1	6,25	1	6,05	0	0	0
4. TIANA	2	5,63	2	5,61	2,5	5,36	0	- 0,5	- 0,5
6. NANDOR	3	5,03	3	5,05	2,5	5,36	0	+ 0,5	+ 0,5
9. BANJO	4	4,93	10	4,21	6	4,98	- 6	- 2	+ 4
10. IVOR	5	4,47	6	4,63	10	4,40	- 1	- 5	- 4
8. CADOR	6	4,45	8	4,40	4	5,21	- 2	+ 2	+ 4
2. TANCAR	7	4,23	4	4,81	8	4,66	+ 3	- 1	- 4
1. BUREAU	8	4,03	9	4,35	7	4,85	- 1	+ 1	+ 2
5. N TIP TOP	9	4,02	5	4,68	5	5,00	+ 4	+ 4	0
7. N. AUBAGNE	10	3,35	7	4,61	9	4,41	+ 3	+ 1	- 2
	F. var = 13,32 CV % = 11,81		F.var = 36,57 CV % = 7,63		F.var = 9,41 CV % = 10,10		rs = 0,54 NS	rs = 0,68 *	rs = 0,56 NS

CARACTERE : n° 8 - PRECOCITE DE COLORATION DE COEUR

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
5. N TIP TOP	1	5,12	1	5,08	1	4,93	0	0	0
2. TANCAR	2	4,42	3	4,58	5	3,68	- 1	- 3	- 2
10. IVOR	3	4,37	4	4,53	2	4,18	- 1	+ 1	+ 2
8. CADOR	4	4,33	2	4,60	4	3,71	+ 2	0	- 2
4. TIANA	5	4,22	8	4,11	8	3,31	- 3	- 3	0
6. NANDOR	6	4,17	5	4,50	3	4,08	+ 1	+ 3	+ 2
1. BUREAU	7	4,00	9	4,10	7	3,35	- 2	0	+ 2
9. BANJO	8	3,98	7	4,23	6	3,55	+ 1	+ 2	+ 1
3. TOUCHON	9	3,57	6	4,28	9	2,95	+ 3	0	- 3
7. N. AUBAGNE	10	2,55	10	3,70	10	2,21	0	0	0
	F. var = 22,34 CV % = 8,02		F.var = 13,64 CV % = 6,17		F.var = 38,35 CV % = 7,80		rs = 0,82 ***	rs = 0,81 ***	rs = 0,82 ***

CARACTERE : n° 9 - IMPORTANCE DU COEUR

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
9. BANJO	1	0,462	2,5	0,409	2	0,432	- 1,5	- 1	+·0,5
5. N TIP TOP	2	0,442	1	0,448	1	0,442	+ 1	+ 1	0
10. IVOR	3	0,432	2,5	0,409	4	0,417	+ 0,5	- 1	- 1,5
7. N. AUBAGNE	4,5	0,427	7	0,391	8	0,395	- 2,5	- 3,5	- 1
8. CADOR	4,5	0,427	4	0,396	3	0,429	+ 0,5	+ 1,5	+ 1
1. BUREAU	6	0,422	5,5	0,392	10	0,378	+ 0,5	- 4	- 4,5
6. NANDOR	7	0,417	5,5	0,392	6	0,402	+ 1,5	+ 1	- 0,5
3. TOUCHON	8	0,408	8	0,384	5	0,415	0	+ 3	+ 3
4. TIANA	9	0,396	9,5	0,371	9	0,390	- 0,5	0	+ 0,5
2. TANCAR	10	0,395	9,5	0,371	7	0,397	+ 0,5	+ 3	+ 2,5

F. var = 7,24 CV % = 5,86	F.var = 30,71 CV % = 4,33	F.var = 18,07 CV % = 4,57	rs = 0,92 ***	rs = 0,68 *	rs = 0,76 ***

CARACTERE : n° 10 - FORME DE L'EPAULEMENT

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
1. BUREAU	1	5,08	2	4,76	1	5,45	- 1	0	+ 1
6. NANDOR	2	5,00	5	4,63	7	4,68	- 3	- 5	- 2
7. N. AUBAGNE	3	4,98	3	4,77	4	5,25	0	- 1	- 1
8. CADOR	4	4,92	4	4,71	2	5,41	0	+ 2	+ 2
10. IVOR	5	4,78	1	5,03	3	5,38	+ 4	+ 2	- 2
2. TANCAR	6	4,50	6	4,46	5	4,86	0	+ 1	+ 1
3. TOUCHON	7	4,40	7	4,33	8	4,64	0	- 1	- 1
9. BANJO	8	4,27	8	4,25	6	4,78	0	+ 2	+ 2
5. N TIP TOP	9	4,23	9	4,18	10	3,88	0	- 1	- 1
4. TIANA	10	3,90	10	4,06	9	4,63	0	+ 1	+ 1

F. var = 7,34 CV % = 8,40	F.var = 7,82 CV % = 6,21	F.var = 5,07 CV % = 12,75	rs = 0,84 ***	rs = 0,75 ***	rs = 0,87 ***

CARACTERE : n° 11 - INSERTION DU COLLET

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
8. CADOR	1	2,20	6	2,78	1	4,70	- 5	0	+ 5
6. NANDOR	2	2,03	1	3,45	5	3,73	+ 1	- 3	- 4
2. TANCAR	3	1,93	7	2,76	2	4,03	- 4	+ 1	+ 5
1. BUREAU	4	1,92	2	3,08	4	3,93	+ 2	0	- 2
10. IVOR	5	1,68	4	2,88	3	4,01	+ 1	+ 2	+ 1
4. TIANA	6	1,57	3	2,91	7	3,13	+ 3	- 1	- 4
7. N. AUBAGNE	7	1,40	8	2,26	8	2,71	- 1	- 1	0
9. BANJO	8	1,33	9	2,16	6	3,30	- 1	+ 2	+ 3
3. TOUCHON	9	1,30	5	2,81	9	2,70	+ 4	0	- 4
5. N. TIP TOP	10	1,27	10	2,01	10	2,28	0	0	0

F. var = 12,73 CV % = 16,60	F.var = 12,58 CV % = 11,30	F.var = 14,31 CV % = 13,89	rs = 0,55 NS	rs = 0,88 ***	rs = 0,32 NS

CARACTERE : n° 12 - COLORATION CHAIR / COEUR

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
5. N. TIP TOP	1	5,48	2,5	4,56	1	5,20	- 1,5	0	+ 1,5
2. TANCAR	2	4,50	6	4,30	5	4,40	- 4	- 3	+ 1
6. NANDOR	3	4,38	2,5	4,56	4	4,53	+ 0,5	- 1	- 1,5
4. TIANA	4	4,23	7	4,25	8	3,98	- 3	- 4	- 1
10. IVOR	5	4,20	4	4,50	2,5	4,66	+ 1	+ 2,5	+ 1,5
8. CADOR	6	4,15	1	4,60	2,5	4,66	+ 5	+ 3,5	- 1,5
9. BANJO	7	3,93	5	4,46	7	4,05	+ 2	0	- 2
1. BUREAU	8	3,87	9	4,05	6	4,15	- 1	+ 2	+ 3
3. TOUCHON	9	3,80	8	4,20	9	3,90	+ 1	0	- 1
7. N. AUBAGNE	10	3,02	10	3,73	10	3,23	0	0	0

F. var = 21,31 CV % = 7,54	F.var = 22,53 CV % = 4,16	F.var = 14,95 CV % = 8,37	rs = 0,64 *	rs = 0,71 *	rs = 0,85 ***

CARACTERE : n° 13 - COLLET VERT INTERNE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
4. TIANA	1	4,87	2	5,11	2	4,08	- 1	- 1	0
3. TOUCHON	2	3,97	1	5,55	1	4,40	+ 1	+ 1	0
8. CADOR	3,5	3,22	10	3,10	8	2,91	- 6,5	- 4,5	+ 2
1. BUREAU	3,5	3,22	5	3,90	4	3,43	- 1,5	- 0,5	+ 1
7. N. AUBAGNE	5	3,20	7	3,76	3	3,45	- 2	+ 2	+ 4
2. TANCAR	6	3,15	4	4,10	6	2,98	+ 2	0	- 2
9. BANJO	7	3,07	6	3,81	5	3,00	+ 1	+ 2	+ 1
6. NANDOR	8	2,85	9	3,38	9	2,56	- 1	- 1	0
5. N. TIP TOP	9	2,72	3	4,18	7	2,95	+ 6	+ 2	- 4
10. IVOR	10	2,62	8	3,39	10	2,33	+ 2	0	- 2

F. var = 9,29	F.var = 11,61	F.var = 10,64	rs = 0,43	rs = 0,79	rs = 0,72
CV % = 15,48	CV % = 14,90	CV % = 20,65	NS	***	*

CARACTERE : n° 14 - SORTIE DE TERRE

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
4. TIANA	1	24,77	2	13,65	2	16,23	- 1	- 1	0
2. TANCAR	2	20,63	4	9,90	5	12,51	- 2	- 3	- 1
3. TOUCHON	3	20,18	1	14,01	1	18,06	+ 2	+ 2	0
1. BUREAU	4	20,05	6	7,98	3	15,50	- 2	+ 1	+ 3
5. N. TIP TOP	5	16,22	3	11,18	4	15,21	+ 2	+ 1	- 1
8. CADOR	6	16,12	5	8,86	6	12,40	+ 1	0	- 1
6. NANDOR	7	13,15	8	6,53	8	11,10	- 1	- 1	0
10. IVOR	8	12,92	7	6,70	9	10,43	+ 1	- 1	- 2
9. BANJO	9	11,07	9	5,28	7	11,90	0	+ 2	+ 2
7. N. AUBAGNE	10	7,68	10	2,95	10	7,58	0	0	0

F. var = 14,92	F.var = 4,50	F.var = 5,38	rs = 0,88	rs = 0,87	rs = 0,88
CV % = 19,29	CV % = 42,98	CV % = 26,00	***	***	***

CARACTERE : n° 15 - COEFFICIENT DE FORME

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			
3. TOUCHON			1	0,759	1	0,778			0
5. N. TIP TOP			2	0,736	2	0,765			0
4. TIANA			3	0,708	4	0,723			1
7. N. AUBAGNE			4	0,703	3	0,732			+ 1
9. BANJO			5	0,693	7	0,696			- 2
6. NANDOR			6	0,681	9	0,664			- 3
1. BUREAU			7	0,676	5,5	0,698			+ 1,5
2. TANCAR			8	0,673	8	0,687			0
10. IVOR			9	0,666	5,5	0,698			+ 3,5
8. CADOR			10	0,613	10	0,650			0

F. var =	F.var = 23,41	F.var = 11,14	rs =	rs =	rs = 0,82
CV % =	CV % = 2,95	CV % = 4,87			***

CARACTERE :

Variétés	1984		1985		1986		≠ Rangs 84/85	≠ Rangs 84/86	≠ Rangs 85/86
	Rangs	Valeurs	Rangs	Valeurs	Rangs	Valeurs			

F. var =	F.var =	F.var =	rs =	rs =	rs =
CV % =	CV % =	CV % =			

ANNEXE 2

Fiabilité de classement des caractères :

Coefficient moyen :

- Classement 3 fois significatif à 1 % :

. Caractère n° 14	: Sortie de terre	0,88
. Caractère n° 10	: Forme de l'épaulement	0,82
. Caractère n° 8	: Précocité de coloration de coeur	0,82

- Classement 2 fois significatif à 1 % et 1 fois à 5 % :

. Caractère n° 9	: Importance du coeur	0,79
. Caractère n° 5	: Longueur de la racine	0,77

- Classement 1 fois significatif à 1 % et 2 fois à 5 % :

. Caractère n° 1	: Port du feuillage	0,77
. Caractère n° 4	: Largeur du collet	0,77
. Caractère n° 12	: Coloration chair/coeur	0,73
. Caractère n° 2	: Couleur du feuillage	0,69

- Classement 1 fois significatif à 1 %, 1 fois à 5 % et 1 fois non significatif :

. Caractère n° 13	: Collet vert interne	0,65

- Classement 1 fois significatif à 1 % et 2 fois non significatif :

. Caractère n° 11	: Insertion du collet	0,58
. Caractère n° 6	: Calibre de la racine	0,54

- Classement 1 fois significatif à 5 % et 2 fois non significatif :

. Caractère n° 7	: Précocité de boutage	0,59

- Classement 3 fois non significatif :

. Classement n° 3	: Longueur du feuillage	0,46

- Caractère étudié une seule année mais assez nettement significatif :

. Caractère n° 15	: Coefficient de forme	0,82

Dépassement en % de l'intervalle de confiance de l'écart type moyen

Caractères	1. BUREAU			2. TANCAR			3. TOUCHON			4. TIANA			5. N. TIP TOP		
	84	85	86	84	85	86	84	85	86	84	85	86	84	85	86
3. Longueur du feuillage	-	0,91	6,97	-	-	9,26	-	-	10,98	-	-	-	-	-	0,95
4. Largeur du collet	14,61	-	6,99	-	-	-	-	-	5,96	-	-	-	-	-	-
5. Longueur de la racine	5,17	7,87	7,76	-	-	-	-	5,72	-	-	-	-	-	0,32	-
6. Calibre de la racine	-	-	-	-	-	-	-	-	16,82	-	-	-	-	-	-
7. Précocité de boutage	-	-	9,06	-	-	-	15,04	13,24	5,54	-	-	-	4,51	4,53	2,02
8. Précocité coloration coeur	3,92	-	3,75	-	-	1,54	5,88	4,42	22,52	-	-	-	-	-	-
9. Importance du coeur	3,17	6,03	6,25	-	-	-	-	-	-	-	-	2,08	-	-	6,25
10. Epaulement	-	-	-	-	5,64	-	-	2,04	11,95	17,98	-	0,92	-	5,64	-
11. Insertion du collet	7,59	-	10,17	-	-	7,86	-	-	-	-	-	-	-	-	-
12. Coloration chair/coeur	-	9,33	20,48	-	-	-	2,30	12,00	23,77	-	-	-	-	-	-
13. Collet vert interne	-	-	2,86	-	-	-	-	6,82	26,53	25,71	-	4,49	-	14,99	6,94
14. Sortie de terre	5,51	-	21,98	-	-	-	-	24,69	-	1,54	25,98	11,77	-	20,66	6,14
Nombre de dépassements	6	4	10	0	1	3	3	7	8	3	1	4	1	5	5
Dépassement moyen	3,33	2,01	8,02	0	0,47	1,55	1,93	5,74	10,34	3,77	2,16	1,60	0,38	3,84	1,86

Dépassement en % de l'intervalle de confiance de l'écart type moyen

Caractères	6. NANDOR			7. N. AUBAGNE			8. CADOR			9. BANJO			10. IVOR		
	84	85	86	84	85	86	84	85	86	84	85	86	84	85	86
3. Longueur du feuillage	-	-	-	-	5,96	15,00	-	-	3,81	0,67	5,01	-	-	9,11	-
4. Largeur du collet	-	-	-	19,63	-	12,61	-	-	-	-	10,67	10,97	-	-	15,54
5. Longueur de la racine	-	-	-	14,22	-	-	-	-	-	-	-	-	-	-	-
6. Calibre de la racine	-	-	-	-	-	-	-	-	12,15	9,38	-	-	3,13	-	-
7. Précocité de boutage	-	-	-	-	-	2,02	-	-	-	-	-	3,78	-	-	16,97
8. Précocité coloration coeur	-	-	0,44	50,00	20,39	1,54	-	-	-	3,92	8,11	25,82	-	-	1,54
9. Importance du coeur	10,71	13,35	-	-	-	-	-	-	-	-	0,55	8,33	5,61	4,20	-
10. Epaulement	-	11,64	-	-	-	11,37	-	-	-	-	-	-	-	-	-
11. Insertion du collet	13,92	17,89	-	-	-	-	20,25	16,84	8,63	-	-	-	-	-	4,78
12. Coloration chair/coeur	-	-	-	63,22	53,33	36,91	-	-	-	-	-	20,48	-	-	-
13. Collet vert interne	-	-	-	19,05	-	-	-	-	2,04	-	-	9,39	-	-	-
14. Sortie de terre	-	-	-	-	-	-	-	-	-	-	-	0,52	-	20,91	-
Nombre de dépassements	2	3	1	5	3	6	1	1	4	3	4	7	2	3	4
Dépassement moyen	2,05	3,57	0,04	13,84	6,64	6,62	1,69	1,40	2,22	1,16	2,03	6,61	0,73	2,85	3,24

Annexe 3 0665

(suite)

ETUDE DE L'HOMOGENEITE :

Classement des variétés sur les trois années d'étude :

Variétés	NDM	Rangs	MD	Rangs	Différence
1 - BUREAU	6,66	1	4,45	3	- 2
3 - TOUCHON	6	2	6	2	0
7 - Nantaise race d'AUBAGNE	4,66	3,5	9,03	1	+ 2,5
9 - BANJO	4,66	3,5	3,27	4	- 0,5
5 - Nantaise race TIP TOP	3,66	5	2,03	7	- 2
10 - IVOR	3	6	2,27	6	0
4 - TIANA	2,66	7	2,51	5	+ 2
6 - NANDOR	2	8,5	1,89	8	+ 0,5
8 - CADOR	2	8,5	1,77	9	- 0,5
2 - TANCAR	1,33	10	0,67	10	0

NDM = Nombre moyen de dépassements

MD = Moyenne des dépassements sur 3 ans

Coefficient de corrélation de rangs = 0,89 rs 1 % = 0,73

rs 5 % = 0,60

Annexe 4

AI : CAPOMU

act: PORT FEUILLAGE

	annee 1	annee 2	annee 3	moyenne
ar 1	3.83	4.66	5.16	4.55
ar 2	4.83	4.83	5.66	5.11
ar 3	4.16	4.83	4.83	4.61
ar 4	3.83	5.16	5.50	4.83
ar 5	4.66	4.33	4.50	4.49
ar 6	5.00	6.16	6.33	5.83
ar 7	3.50	4.16	3.83	3.83
ar 8	5.16	6.83	6.50	6.16
ar 9	5.16	5.50	5.33	5.33
ar 10	3.66	4.83	4.83	4.44
moyennes	4.38	5.13	5.24	4.92

urces de varation	DL	SCE	CM	F
nnees	2	26.55	13.27	33.75
arietes	9	79.47	8.83	22.45
nteraction	18	15.89	0.88	2.24
esiduelle	150	58.99	0.39	

valle de confiance des differences : .64 a 1% - .512 a 5%

.	1	2	3	4	5	6	7	8	9	10
*	NS /									
*	* /	NS /								
*	NS /	NS /	NS /							
*	NS /	NS /	NS /	NS /						
*	NS /	* /	NS /	NS /	NS /					
*	*** /	*** /	*** /	*** /	*** /	NS /				
*	*** /	*** /	*** /	*** /	*** /	*** /	NS /			
*	*** /	*** /	*** /	*** /	*** /	NS /	*** /	NS /		
*	*** /	NS /	*** /	NS /	*** /	NS /	*** /	*** /	NS /	
*	NS /	*** /	NS /	NS /	NS /	*** /	* /	*** /	*** /	NS /

ESSAI : CACOUMU

Caract: COULEUR FEUILLAGE

	annee 1	annee 2	annee 3	moyenne
Var 1	4.83	4.83	6.16	5.27
Var 2	6.00	4.83	5.66	5.50
Var 3	4.50	4.50	4.66	4.55
Var 4	4.16	3.83	4.00	3.99
Var 5	4.66	4.66	5.83	5.05
Var 6	5.16	4.83	5.50	5.16
Var 7	4.50	4.66	4.33	4.49
Var 8	5.00	3.66	4.33	4.33
Var 9	5.00	5.66	5.00	5.22
Var 10	6.50	6.00	6.50	6.33
moyennes	5.03	4.74	5.19	4.99

Sources de varation	DL	SCE	CM	F
annees	2	6.21	3.10	6.80
varietes	9	73.38	8.15	17.85
interaction	18	20.89	1.16	2.54
residuelle	150	68.49	0.45	

Intervalle de confiance des differences : .6895 a 1% - .5516 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	NS /	NS /							
3	*	*** /	*** /	NS /						
4	*	*** /	*** /	* /	NS /					
5	*	NS /	NS /	NS /	*** /	NS /				
6	*	NS /	NS /	* /	*** /	NS /	NS /			
7	*	*** /	*** /	NS /	NS /	* /	* /	NS /		
8	*	*** /	*** /	NS /	NS /	*** /	*** /	NS /	NS /	
9	*	NS /	NS /	* /	*** /	NS /	NS /	*** /	*** /	NS /
10	*	*** /	*** /	*** /	*** /	*** /	*** /	*** /	*** /	NS /

ESSAI : CALFMU

Caract: LONGUEUR FEUILLAGE

	annee 1	annee 2	annee 3	moyenne
Var 1	38.76	31.88	32.31	34.32
Var 2	34.66	29.73	31.28	31.89
Var 3	34.18	30.31	29.31	31.27
Var 4	32.66	29.50	28.26	30.14
Var 5	37.23	32.78	31.80	33.93
Var 6	38.56	34.33	31.10	34.66
Var 7	40.03	34.26	30.76	35.02
Var 8	38.55	35.98	33.40	35.97
Var 9	40.10	32.60	32.05	34.91
Var 10	37.95	34.75	31.23	34.64
moyennes	37.27	32.61	31.15	33.67

Sources de varation	DL	SCE	CM	F
annees	2	1225.73	612.86	75.84
varietes	9	582.88	64.76	8.01
interaction	18	152.36	8.46	1.04
residuelle	150	1212.02	8.08	

Intervalle de confiance des differences : 2.9 a 1% - 2.32 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	* /	NS /							
3	*	*** /	NS /	NS /						
4	*	*** /	NS /	NS /	NS /					
5	*	NS /	NS /	* /	*** /	NS /				
6	*	NS /	* /	*** /	*** /	NS /	NS /			
7	*	NS /	*** /	*** /	*** /	NS /	NS /	NS /		
8	*	NS /	*** /	*** /	*** /	NS /	NS /	NS /	NS /	
9	*	NS /	*** /	*** /	*** /	NS /	NS /	NS /	NS /	NS /
10	*	NS /	* /	*** /	*** /	NS /	NS /	NS /	NS /	NS /

ESSAI : CALCMU

Caract: LARGEUR COLLET

	annee 1	annee 2	annee 3	moyenne
Var 1	11.71	6.15	9.29	9.05
Var 2	8.80	5.86	8.15	7.60
Var 3	8.67	5.99	7.95	7.53
Var 4	8.35	5.70	7.29	7.11
Var 5	10.33	6.42	9.31	8.69
Var 6	9.90	5.99	7.97	7.95
Var 7	11.33	6.35	9.25	8.98
Var 8	8.95	5.80	8.54	7.76
Var 9	9.75	6.06	8.91	8.24
Var 10	9.93	5.72	9.00	8.21
moyennes	9.77	6.00	8.56	8.11

Sources de variation	DL	SCE	CM	F
annees	2	443.87	221.93	427.90
varietes	9	66.97	7.44	14.34
interaction	18	30.84	1.71	3.30
residuelle	150	77.79	0.51	

Intervalle de confiance des differences : .735 a 1% - .588 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	*** /	NS /							
3	*	*** /	NS /	NS /						
4	*	*** /	NS /	NS /	NS /					
5	*	NS /	*** /	*** /	*** /	NS /				
6	*	*** /	NS /	NS /	*** /	* /	NS /			
7	*	NS /	*** /	*** /	*** /	NS /	*** /	NS /		
8	*	*** /	NS /	NS /	* /	*** /	NS /	*** /	NS /	
9	*	*** /	* /	* /	*** /	NS /	NS /	*** /	NS /	NS /
10	*	*** /	* /	* /	*** /	NS /	NS /	*** /	NS /	NS /

ESSAI : CALRMU

Caract: LONGUEUR RACINE

	annee 1	annee 2	annee 3	moyenne
Var 1	19.00	17.21	16.51	17.57
Var 2	17.48	16.85	15.60	16.64
Var 3	17.15	15.38	15.00	15.84
Var 4	17.60	16.53	15.55	16.56
Var 5	18.26	17.21	16.21	17.23
Var 6	17.33	15.63	15.06	16.01
Var 7	19.11	16.98	15.30	17.13
Var 8	16.98	16.31	15.38	16.22
Var 9	16.26	16.36	15.15	15.92
Var 10	17.81	17.10	15.61	16.84
moyennes	17.70	16.55	15.53	16.60

Sources de varation	DL	SCE	CM	F
annees	2	140.35	70.17	72.97
varietes	9	57.62	6.40	6.65
interaction	18	19.28	1.07	1.11
residuelle	150	144.23	0.96	

Intervalle de confiance des differences : 1.00075 a 1% - .8006 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	* /	NS /							
3	*	*** /	NS /	NS /						
4	*	*** /	NS /	NS /	NS /					
5	*	NS /	NS /	*** /	NS /	NS /				
6	*	*** /	NS /	NS /	NS /	*** /	NS /			
7	*	NS /	NS /	*** /	NS /	NS /	*** /	NS /		
8	*	*** /	NS /	NS /	NS /	*** /	NS /	* /	NS /	
9	*	*** /	NS /	NS /	NS /	*** /	NS /	*** /	NS /	NS /
10	*	NS /	NS /	* /	NS /	NS /	* /	NS /	NS /	* / NS /

ESSAI : CACRMU

Caract: CALIBRE RACINE

	annee 1	annee 2	annee 3	moyenne
Var 1	0.20	0.15	0.20	0.18
Var 2	0.19	0.16	0.21	0.18
Var 3	0.19	0.17	0.20	0.19
Var 4	0.17	0.16	0.19	0.18
Var 5	0.18	0.16	0.20	0.18
Var 6	0.21	0.17	0.22	0.20
Var 7	0.18	0.16	0.20	0.18
Var 8	0.20	0.17	0.22	0.20
Var 9	0.21	0.16	0.22	0.19
Var 10	0.21	0.17	0.22	0.20
moyennes	0.19	0.16	0.21	0.19

Sources de varation	DL	SCE	CM	F
annees	2	0.06	0.03	296.08
varietes	9	0.01	0.00	13.72
interaction	18	0.00	0.00	2.89
residuelle	150	0.01	0.00	

Intervalle de confiance des differences : .01025 a 1% - .0082 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	NS /	NS /							
3	*	NS /	NS /	NS /						
4	*	* /	* /	*** /	NS /					
5	*	NS /	NS /	NS /	NS /	NS /				
6	*	*** /	*** /	*** /	*** /	*** /	NS /			
7	*	NS /	NS /	NS /	NS /	NS /	*** /	NS /		
8	*	*** /	*** /	*** /	*** /	*** /	NS /	*** /	NS /	
9	*	* /	* /	NS /	*** /	*** /	NS /	*** /	NS /	NS /
10	*	*** /	*** /	*** /	*** /	*** /	NS /	*** /	NS /	NS /

ESSAI : CAPBMU

Caract: PRECOCITE BOUTAGE

	annee 1	annee 2	annee 3	moyenne
Var 1	4.03	4.35	4.85	4.41
Var 2	4.23	4.81	4.66	4.57
Var 3	6.28	6.25	6.05	6.19
Var 4	5.63	5.61	5.36	5.53
Var 5	4.01	4.68	5.00	4.56
Var 6	5.03	5.05	5.36	5.15
Var 7	3.35	4.61	4.41	4.12
Var 8	4.45	4.40	5.21	4.68
Var 9	4.93	4.21	4.98	4.71
Var 10	4.46	4.63	4.40	4.49
moyennes	4.64	4.86	5.03	4.84

Sources de varation	DL	SCE	CM	F
annees	2	4.55	2.27	7.77
varietes	9	61.37	6.81	23.29
interaction	18	12.97	0.72	2.46
residuelle	150	43.92	0.29	

ntervalle de confiance des differences : .55225 a 1% - .4418 a 5%

var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	NS /	NS /							
3	*	*** /	*** /	NS /						
4	*	*** /	*** /	*** /	NS /					
5	*	NS /	NS /	*** /	*** /	NS /				
6	*	*** /	*** /	*** /	NS /	*** /	NS /			
7	*	NS /	* /	*** /	*** /	NS /	*** /	NS /		
8	*	NS /	NS /	*** /	*** /	NS /	* /	*** /	NS /	
9	*	NS /	NS /	*** /	*** /	NS /	NS /	*** /	NS /	NS /
10	*	NS /	NS /	*** /	*** /	NS /	*** /	NS /	NS /	NS /

ESSAI : CAPCMU

Caract: PRECOCITE COL.COEUR

	annee 1	annee 2	annee 3	moyenne
Var 1	4.00	4.10	3.35	3.81
Var 2	4.41	4.58	3.68	4.22
Var 3	3.56	4.28	2.95	3.59
Var 4	4.21	4.11	3.31	3.88
Var 5	5.11	5.08	4.93	5.04
Var 6	4.16	4.50	4.08	4.24
Var 7	2.55	3.70	2.21	2.82
Var 8	4.33	4.60	3.71	4.21
Var 9	3.98	4.23	3.55	3.92
Var 10	4.36	4.53	4.18	4.36
moyennes	4.07	4.37	3.59	4.01

Sources de varation	DL	SCE	CM	F
annees	2	18.32	9.16	87.91
varietes	9	53.64	5.96	57.20
interaction	18	6.93	0.38	3.69
residuelle	150	15.62	0.10	

Intervalle de confiance des differences : .32925 a 1% - .2634 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	*** /	NS /							
3	*	NS /	*** /	NS /						
4	*	NS /	*** /	* /	NS /					
5	*	*** /	*** /	*** /	*** /	NS /				
6	*	*** /	NS /	*** /	*** /	*** /	NS /			
7	*	*** /	*** /	*** /	*** /	*** /	*** /	NS /		
8	*	*** /	NS /	*** /	*** /	*** /	NS /	*** /	NS /	
9	*	NS /	* /	* /	NS /	*** /	* /	*** /	* /	NS /
10	*	*** /	NS /	*** /	*** /	*** /	NS /	*** /	NS /	*** / NS /

ESSAI : CAICOMU

Caract: IMPORTANCE COEUR

	annee 1	annee 2	annee 3	moyenne
Var 1	0.422	0.392	0.378	0.397
Var 2	0.396	0.371	0.397	0.388
Var 3	0.407	0.383	0.414	0.401
Var 4	0.396	0.371	0.390	0.385
Var 5	0.443	0.448	0.442	0.444
Var 6	0.422	0.392	0.401	0.405
Var 7	0.429	0.391	0.395	0.405
Var 8	0.426	0.396	0.429	0.417
Var 9	0.463	0.408	0.431	0.434
Var 10	0.436	0.409	0.417	0.420
moyennes	0.424	0.396	0.409	0.410

Sources de varation	DL	SCE	CM	F
annees	2	0.023	0.011	27.549
varietes	9	0.059	0.006	15.301
interaction	18	0.013	0.000	1.680
residuelle	150	0.064	0.000	

ntervalle de confiance des differences : .021 a 1% - .0168 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	NS /	NS /							
3	*	NS /	NS /	NS /						
4	*	NS /	NS /	NS /	NS /					
5	*	*** /	*** /	*** /	*** /	NS /				
6	*	NS /	* /	NS /	* /	*** /	NS /			
7	*	NS /	* /	NS /	* /	*** /	NS /	NS /		
8	*	* /	*** /	NS /	*** /	*** /	NS /	NS /	NS /	
9	*	*** /	*** /	*** /	*** /	NS /	*** /	*** /	* /	NS /
10	*	*** /	*** /	* /	*** /	*** /	NS /	NS /	NS /	NS /

ESSAI : CAFEMU

Caract: FORME EPAULEMENT

	annee 1	annee 2	annee 3	moyenne
Var 1	5.08	4.76	5.45	5.09
Var 2	4.50	4.46	4.86	4.61
Var 3	4.40	4.33	4.63	4.45
Var 4	3.90	4.06	4.63	4.19
Var 5	4.23	4.18	3.88	4.09
Var 6	5.00	4.63	4.68	4.77
Var 7	4.98	4.76	5.25	4.99
Var 8	4.91	4.71	5.41	5.01
Var 9	4.26	4.25	4.78	4.43
Var 10	4.78	5.03	5.38	5.06
moyennes	4.60	4.52	4.89	4.67

Sources de varation	DL	SCE	CM	F
annees	2	4.69	2.34	11.23
varietes	9	22.17	2.46	11.80
interaction	18	4.75	0.26	1.26
residuelle	150	31.31	0.20	

Intervalle de confiance des differences : .46625 a 1% - .373 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	* NS /									
2	* *** /	NS /								
3	* *** /	NS /	NS /							
4	* *** /	* /	NS /	NS /						
5	* *** /	*** /	NS /	NS /	NS /					
6	* NS /	NS /	NS /	*** /	*** /	NS /				
7	* NS /	* /	*** /	*** /	*** /	NS /	NS /			
8	* NS /	* /	*** /	*** /	*** /	NS /	NS /	NS /		
9	* *** /	NS /	NS /	NS /	NS /	NS /	*** /	*** /	NS /	
10	* NS /	* /	*** /	*** /	*** /	NS /	NS /	NS /	*** /	NS /

ESSAI : CAICMU

Caract: INSERTION COLLET

	annee 1	annee 2	année 3	moyenne
Var 1	1.91	3.08	3.93	2.97
Var 2	1.93	2.76	4.03	2.91
Var 3	1.30	2.81	2.70	2.27
Var 4	1.56	2.91	3.13	2.53
Var 5	1.26	2.01	2.28	1.85
Var 6	2.03	3.45	3.73	3.07
Var 7	1.40	2.26	2.71	2.12
Var 8	2.20	2.78	4.70	3.22
Var 9	1.33	2.16	3.30	2.26
Var 10	1.68	2.88	4.01	2.86
moyennes	1.66	2.71	3.45	2.61

Sources de varation	DL	SCE	CM	F
annees	2	97.27	48.63	335.18
varietes	9	34.59	3.84	26.49
interaction	18	12.88	0.71	4.93
residuelle	150	21.76	0.14	

Intervalle de confiance des differences : .38875 a 1% - .311 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	* NS /									
2	* NS /	NS /								
3	* *** /	*** /	NS /							
4	* *** /	* /	NS /	NS /						
5	* *** /	*** /	*** /	*** /	NS /					
6	* NS /	NS /	*** /	*** /	*** /	NS /				
7	* *** /	*** /	NS /	*** /	NS /	*** /	NS /			
8	* NS /	* /	*** /	*** /	*** /	NS /	*** /	NS /		
9	* *** /	*** /	NS /	NS /	*** /	*** /	NS /	*** /	NS /	
10	* NS /	NS /	*** /	* /	*** /	NS /	*** /	* /	*** /	NS /

ESSAI : CACCMU

Caract: COLORATION CHAIR/COE

	annee 1	annee 2	annee 3	moyenne
Var 1	3.86	4.05	4.15	4.02
Var 2	4.50	4.30	4.40	4.40
Var 3	3.80	4.20	3.90	3.96
Var 4	4.23	4.25	3.98	4.15
Var 5	5.48	4.56	5.20	5.08
Var 6	4.38	4.56	4.53	4.49
Var 7	3.01	3.73	3.23	3.32
Var 8	4.15	4.60	4.66	4.47
Var 9	3.93	4.46	4.05	4.14
Var 10	4.20	4.50	4.66	4.45
moyennes	4.15	4.32	4.27	4.25

Sources de varation	DL	SCE	CM	F
annees	2	0.89	0.44	6.18
varietes	9	33.63	3.73	51.74
interaction	18	7.22	0.40	5.55
residuelle	150	10.83	0.07	

Intervalle de confiance des differences : .27425 a 1% - .2194 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	*** /	NS /							
3	*	NS /	*** /	NS /						
4	*	NS /	* /	NS /	NS /					
5	*	*** /	*** /	*** /	*** /	NS /				
6	*	*** /	NS /	*** /	*** /	*** /	NS /			
7	*	*** /	*** /	*** /	*** /	*** /	*** /	NS /		
8	*	*** /	NS /	*** /	*** /	*** /	NS /	*** /	NS /	
9	*	NS /	* /	NS /	NS /	*** /	*** /	*** /	*** /	NS /
10	*	*** /	NS /	*** /	*** /	*** /	NS /	*** /	NS /	*** /	NS /

ESSAI : CACVIMU

Caract: COLLET VERT INTERNE

	annee 1	annee 2	annee 3	moyenne
Var 1	3.21	3.90	3.43	3.51
Var 2	3.15	4.10	2.98	3.41
Var 3	3.96	5.55	4.40	4.63
Var 4	4.86	5.11	4.08	4.68
Var 5	2.71	4.18	2.95	3.28
Var 6	2.85	3.38	2.56	2.93
Var 7	3.20	3.76	3.45	3.47
Var 8	3.21	3.10	2.91	3.07
Var 9	3.06	3.81	3.00	3.29
Var 10	2.61	3.38	2.33	2.77
moyennes	3.28	4.02	3.21	3.50

Sources de varation	DL	SCE	CM	F
annees	2	24.56	12.28	28.54
varietes	9	68.90	7.65	17.79
interaction	18	9.56	0.53	1.23
residuelle	150	64.54	0.43	

Intervalle de confiance des differences : .6695 a 1% - .5356 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	NS /	NS /							
3	*	*** /	*** /	NS /						
4	*	*** /	*** /	NS /	NS /					
5	*	NS /	NS /	*** /	*** /	NS /				
6	*	* /	NS /	*** /	*** /	NS /	NS /			
7	*	NS /	NS /	*** /	*** /	NS /	* /	NS /		
8	*	NS /	NS /	*** /	*** /	NS /	NS /	NS /	NS /	
9	*	NS /	NS /	*** /	*** /	NS /	NS /	NS /	NS /	NS /
10	*	*** /	* /	*** /	*** /	NS /	NS /	*** /	NS /	NS /	NS /

ESSAI : CASTMU

Caract: SORTIE DE TERRE

	annee 1	annee 2	annee 3	moyenne
Var 1	20.05	7.98	15.50	14.51
Var 2	20.63	9.90	12.51	14.34
Var 3	20.18	14.01	18.06	17.42
Var 4	24.76	13.65	16.23	18.21
Var 5	16.21	11.18	15.21	14.20
Var 6	13.15	6.53	11.10	10.26
Var 7	7.68	2.95	7.58	6.07
Var 8	16.11	8.86	12.40	12.46
Var 9	11.06	5.28	11.90	9.41
Var 10	12.91	6.70	10.43	10.01
moyennes	16.27	8.70	13.09	12.69

Sources de varation	DL	SCE	CM	F
annees	2	1734.42	867.21	49.85
varietes	9	2320.26	257.80	14.81
interaction	18	351.92	19.55	1.12
residuelle	150	2609.40	17.39	

Intervalle de confiance des differences : 4.255 a 1% - 3.404 a 5%

	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	NS /	NS /							
3	*	NS /	NS /	NS /						
4	*	* /	* /	NS /	NS /					
5	*	NS /	NS /	NS /	* /	NS /				
6	*	* /	* /	*** /	*** /	* /	NS /			
7	*	*** /	*** /	*** /	*** /	*** /	* /	NS /		
8	*	NS /	NS /	*** /	*** /	NS /	NS /	*** /	NS /	
9	*	*** /	*** /	*** /	*** /	*** /	NS /	NS /	NS /	NS /
10	*	*** /	*** /	*** /	*** /	* /	NS /	* /	NS /	NS /	NS /

ESSAI : CACFMU

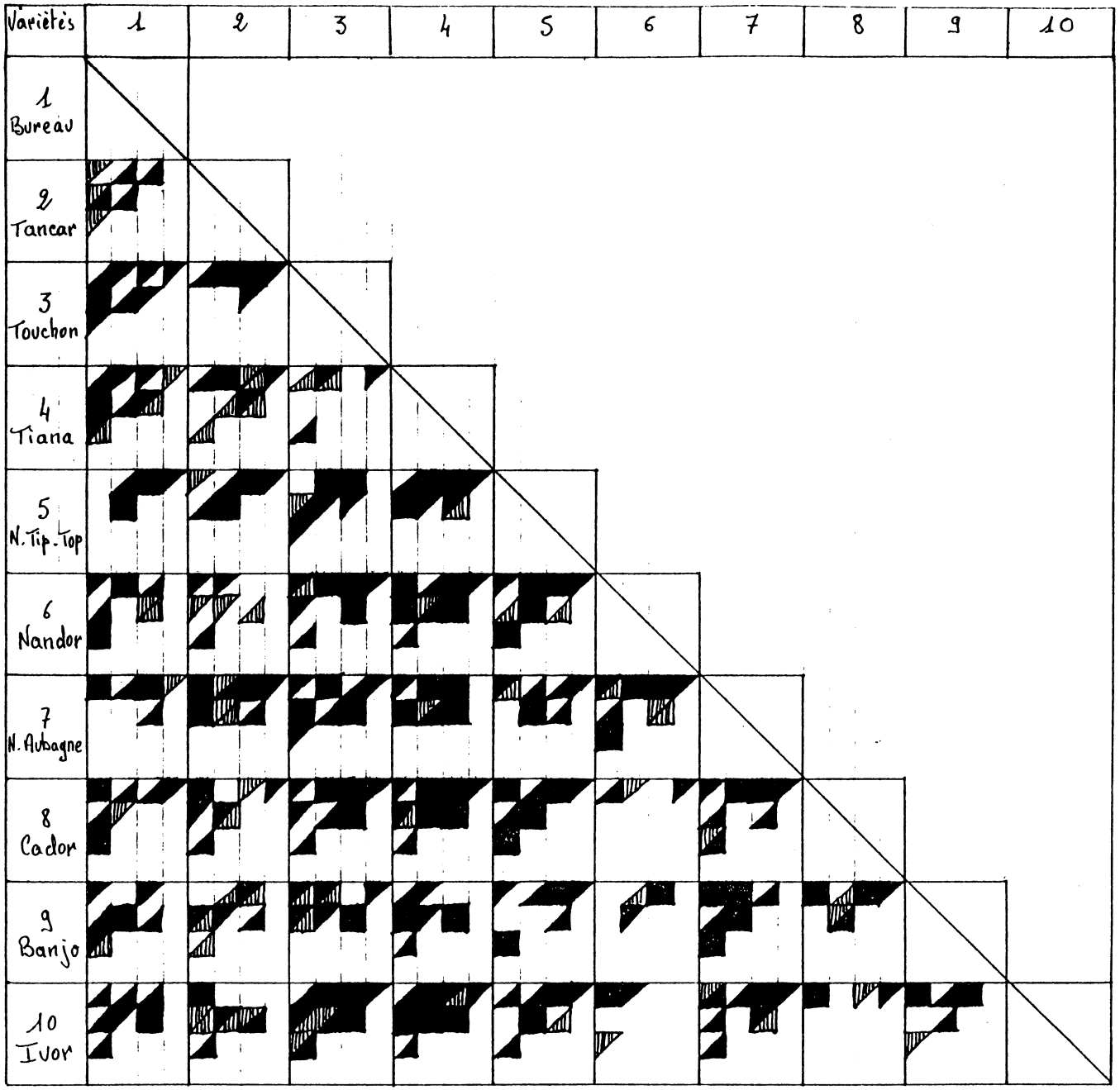
Caract: COEF.FORME RACINE

	annee 1	annee 2	moyenne
Var 1	0.676	0.697	0.686
Var 2	0.673	0.687	0.680
Var 3	0.759	0.778	0.768
Var 4	0.708	0.723	0.715
Var 5	0.735	0.765	0.750
Var 6	0.680	0.664	0.672
Var 7	0.702	0.732	0.717
Var 8	0.613	0.649	0.631
Var 9	0.692	0.695	0.694
Var 10	0.665	0.697	0.681
moyennes	0.690	0.709	0.699

Sources de varation	DL	SCE	CM	F
annees	1	0.010	0.010	10.628
varietes	9	0.170	0.018	19.683
interaction	9	0.006	0.000	0.735
residuelle	100	0.096	0.000	

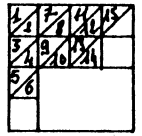
Intervalle de confiance des differences : .0315 a 1% - .0252 a 5%

Var.	1	2	3	4	5	6	7	8	9	10
1	*	NS /								
2	*	NS /	NS /							
3	*	*** /	*** /	NS /						
4	*	* /	*** /	*** /	NS /					
5	*	*** /	*** /	NS /	*** /	NS /				
6	*	NS /	NS /	*** /	*** /	*** /	NS /			
7	*	* /	*** /	*** /	NS /	*** /	*** /	NS /		
8	*	*** /	*** /	*** /	*** /	*** /	*** /	*** /	NS /	
9	*	NS /	NS /	*** /	NS /	*** /	NS /	NS /	*** /	NS /
10	*	NS /	NS /	*** /	*** /	*** /	NS /	*** /	*** /	NS /	NS /



: ≠ seuil 1 %

: ≠ seuil 5 %



1. Port du feuillage.
2. Couleur du feuillage.
3. Longueur du feuillage.
4. Largeur du collet.
5. Longueur de la racine.
6. Calibre racine
7. Précocité de boutage.
8. Précocité coloration coeur.
9. Importance du coeur.
10. Forme de l'epaulement.
11. Incertion du collet.
12. Colaation chair/coeur.
13. Collet veut interna.
14. Sortie de terre.
15. Coefficient de forme.

Depouillement

pluri. annuel.

[Annex IV follows]

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ANNEX IV

RIVRO WAGENINGEN

RIJKSINSTITUUT VOOR HET RASSENONDERZOEK VAN CULTUURGEWASSEN

INSTITUT DE L'ÉTAT POUR LA RECHERCHE SUR LES VARIÉTÉS DE PLANTES CULTIVÉES
GOVERNMENT INSTITUTE FOR RESEARCH ON VARIETIES OF CULTIVATED PLANTS
STAATLICHES INSTITUT FÜR DIE SORTENPRÜFUNG VON KULTURPFLANZEN

Nieuwe Wageningseweg 1, Bennekom
RIVRO, P.B. 32
6700 AA Wageningen - Holland
08370 - 79111
Doorkiesnummer 79...

Dr. J.B. Sweet
N.I.A.B.
Huntington Road
Cambridge CB3 0LE
United Kingdom

onderwerp	uw brief	ons kenmerk	datum
		88-387 NvM/AG	22-03-1988

Dear Dr. Sweet,

Last week I recieved the draft report of the Bremia lactucae-workshop of November last year.

To clarify the Dutch position I want to make the following observations (see copy of page 1):

Ad 1: 1) During the workshop I pointed out that the breeders' organisation in the Netherlands strongly opposes against the use of R-genes for Bremia-resistance in lettuce in official reports. RIVRO has an agreement with the breeders that we will continue to mention the interaction pattern to NL-races at least for the time being. But as we do not want to frustrate international cooperation, we will exchange the necessary information to the foreign test-authorities. And as a result:
2) We did not agree on the wording: "the variety posesses at least the R-gene components .....". From a technical point of view this wording is correct, because we cannot mention R-genes, which cannot be detected. In this context we agreed with this proposal.

Ad 3: Special tests will only be carried out for DUS-testing if necessary for distinction.

Ad 4: For the Netherlands it is doubtful if we will get permission from the phytosanitary authorities (PD) for routine-tests with the races IL 4, S 1, SF 1 and CS 9.

For the remainder I can agree with your draft. We would be glad if you could indicate more detailed or explicit the Dutch position in your report.

Sincerely yours,

N.P.A. van Marrewijk

c.c.: Mr. R. Brand, INRA-GEVES (France)
UPOV, Geneva (Switzerland)

OBSERVATIONS MADE BY FRENCH BREEDERS PROFESSIONAL ORGANISATIONS - A.C.V.P.F., LETTUCE INRA BREEDER AND INRA - GEVES ABOUT REPORT ON THE SUBGROUP MEETING ON BREMIA LACTUCAE - TWV/XXI/14 -.

POINT 1 - NOMENCLATURE OF R. FACTORS

There is an agreement to adopt the system of R. gene nomenclature developed by Dr I.R. CRUTE et al as described in the circulated paper by Dr J.B. SWEET but with the reserve to adopt only gènes for wich the genetic situation have been cleared exactly (particularly the allelism of the considered gene or allèle). Due to this remark, we don't agree to adopt the "genes R 16, R 18 (and also R 17) for wich there are doubts about their identification as single allele. Further genetic identification is needed for R 16, R 17 and R 18.

POINT 2 - USEFUL R. GENES

Due to point 1, France want the following writing :

"... It was suggested that the currently useful R - gènes are :

2, 3, 5/8, 6, 7, 11

and that only these will be tested for routinely. This was agreed but it was emphasised that the role of new R - genes should be constantly reviewed (particulary after studies for R 16, R 17, R 18.

POINT 3 - SPECIAL TESTS

The following sentance to be added at the end of the paragraph :

"... distinctness and uniformity purposes. These special lists could be realised by the breeders with coded varieties and under control of official services.

POINT 4 - BREMIA RACES

Taking account of the reaction of the proposed BREMIA races in front of R. gènes, we have the following remarks :

IL 4 only one french laboratory have this race. We have no opposition to its adoption but this race has to be distributed to any public or private firm wich will require it.

.../...

S 1 the two french laboratories wich have this race declare that this race has problems of fluctuation in results in front of R. gènes. So we are not for its adoption until now.

NL 13 We have some problems of reaction with SAFFIER variety in front of this race, but due to the heterogeneity of the different available seedlots of SAFFIER certainly. We have no opposition to the adoption of this race.

NL 12 Some remarks of fluctuation than S 1. We are opposed to the adoption of this race until now.

SF 1 This race have never been listed in FRANCE. We have not information about it so we have no reason to be against its adoption.

NL 7 We agree for the adoption.

NL 15 This race is unknow in FRANCE, but it have the some virulences than K T2. This K T2 race have been distributed in France via Mrs BLOK and Mrs MAISONNEUVE - INRA. Is K T2 really identic to NL 15 ? Who introduces the names NL 15 and K T2 ?

NL 14 Only one french laboratory worked with this race in France. We have not enough information to have opposition to its adoption.

NL 10 We like better to adopt the Tv race wich has a better discrimination in virulences than NL 10 specealy with Tv, we are able to discriminate R 11 from R 16 in a R 11 R 16 variety.

CS 9 We have not this race in FRANCE. Due to its virulence, we don't see the interest to adopt it.

We agree with the table 1, except for NL 13 due to its virulence compared to SAFFIER genotype.

POINT 8 RESISTANCE TESTING METHODS

a. maintenance

Is it the best way to maintain the races conforms on varieties possessing no Known R - gènes ? Would it not be better to maintain them on varieties possessing complementary virulence gènes ? More, generally the sporulation of the races are better on batavia types.

c. sample size

We want to modify the sentance as following :

"at least 30 (and in case of doubt 100 in another test) separate plants of each variety should be listed to establish the uniformity of the variety's R gene component, at the exception of the varieties possessing genetic tolerance (as SABINE). Faculty of sporulation of varieties has to be considered on the interprétation of the test.

.../...

g. recording

Two records are necessary on cotyledons test :

1st record : 7 to 10 days after inoculation in good condition of sporulation.

2nd record : 3 days after 1st record (particulary for varieties with low faculty to sporulate.

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TECHNISCHE UNIVERSITÄT MÜNCHEN
Lehrstuhl für Phytopathologie
in Weihenstephan
Lehrstuhlinh.: o. Prof. Dr. agr. habil G. M. Hoffmann

8050 Freising-Weihenstephan, den 30.03.1988
Telefon 08161/713681

In Kopie
an Herrn Dr. Habben
Bundessortenamt Hannover
Postfach 61 04 40
3000 Hannover 61

zur Kenntnis.

Dr. G.B. Sweet
National Institute of
Agricultural Botany
Cambridge CB3 OLE
ENGLAND

Dear Dr. Sweet,

a few days before I got the draft report of the Bremia lactucae workshop at Cambridge last year.

Concerning the text I want to claim some objections. I wonder that R-gene 4 is considered under the topic "useful R-genes", for virulence-gene 4 belongs to nearly every Bremia-isolate we are working with. I therefore propose to withdraw R-4 as being unimportant as useful R-gene.

Under topic 4 "Bremia races" NL14 is listed. I propose to withdraw this race as being unimportant for testing. On the one hand this race has been found not very often, on the other hand the V-genes in this race are not quite different from those in other pathotypes.

Concerning the same topic we intend to use KT 2 instead of CS9. I remember the opinion of Mr. Crute, that these pathotypes are nearly of same quality.

Under topic 8 "Methods", some varieties are mentioned without R-genes. I wonder that "Attraktion" is not mentioned as being a cultivar with much quality, without any R-gene and, last not least, still in use. In topic 8 g we pointed out that there is very seldom 100 % sporulation after an artificial inoculation. Asfar as I can remember we agreed in the case of the first record "when control has maximum sporulation".

With best wishes
Sincerely yours

gez.
(Dr. V. Zinkernagel)
nach Diktat verreist.

[End of document]