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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL WORKING PARTY FOR FRUIT CROPS

Forty-Sixth Session
Mpumalanga, South Africa, August 24 to 28, 2015

REVISED REPORT

adopted by the Technical Working Party for Fruit Crops

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Opening of the session

1. The Technical Working Party for Fruit Crops (TWF) held its forty-sixth session in Mpumalanga, South Africa, from August 24 to 28, 2015. The list of participants is reproduced in Annex I to this report.

2. The session was opened by Mr. Katsumi Yamaguchi (Japan), Chairman of the TWF, who welcomed the participants and thanked South Africa for hosting the TWF session.

3. The TWF was welcomed by Mr. Julian Jaftha, Chief Director, Plant Production & Health, Department of Agriculture, Forestry and Fisheries. A copy of the welcome address of Mr. Jaftha is provided in Annex II to this report.

4. The TWF received a presentation on the Plant Breeders' Rights (PBR) system in South Africa by Mr. Luvuyo Khoza, Senior Scientific Technician Production, Directorate Genetic Resources, Department of Agriculture, Forestry and Fisheries. A copy of the presentation is provided in Annex III to this report.

5. The TWF received a presentation on breeding and commercialization of citrus and sub-tropical crops in the Agricultural Research Council (ARC) by Mr. Arthur Sippel, Research Team Manager Plant Breeding, ARC. A copy of the presentation is provided in Annex IV to this report.

Adoption of the agenda

6. The TWF adopted the agenda as reproduced in document TWF/46/1 Rev.

Short reports on developments in plant variety protection

(a) Reports on developments in plant variety protection from members and observers

7. The TWF noted the information on developments in plant variety protection from members and observers provided in document TWF/46/22 Prov. The TWF noted that reports submitted to the Office of the Union after August 14, 2015, would be included in the final version of document TWF/46/22.

(b) Reports on developments within UPOV

8. The TWF received a presentation from the Office of the Union on the latest developments within UPOV, a copy of which is provided in document TWF/46/21.

TGP documents

Matters for adoption by the council in 2015

9. The TWF considered document TWF/46/3.

10. The TWF noted the revisions to documents TGP/0, TGP/5, TGP/9 and TGP/14 to be put forward for adoption by the Council at its forty-ninth ordinary session, as set out in paragraphs 6 to 18 of document TWF/46/3.

Future Revision of TGP Documents

Future revisions under development

11. The TWF noted that the proposals for future revisions of TGP documents to be discussed by the TWPs at their sessions in 2015 would be dealt with under separate documents.

Matters agreed by the TC concerning future revisions

12. The TWF noted that the TC had agreed that it would not be necessary to develop further guidance to address issues relating to plant material submitted for examination beyond that already provided in documents TG/1/3, TGP/7 and TGP/9.

13. The TWF noted that the TC had agreed that authorities should provide guidance on the requirements of material submitted for DUS examination to avoid the possible effect of the method of propagation (e.g. micropropagation) in the expression of DUS characteristics.

14. The TWF noted that the TC had agreed to add new standard wording in the TG template, Chapter 4.2 “Uniformity”, and amend ASW 8 (c) to provide guidance for Test Guidelines that are developed on the basis of varieties with one type of propagation when varieties may be developed in the future with other types of propagation, for future revision of document TGP/7, as set out in paragraph 24 of document TWF/46/3.

15. The TWF noted that the TC had agreed that the existing guidance in documents TGP/8: Part I: “DUS trial design and data analysis” and TGP/9 “Examining distinctness” was sufficient to address guidance for blind randomized trials.

16. The TWF noted that the TC had agreed to include guidance on “Examining characteristics using image analysis”, for future revision of document TGP/8, as presented in paragraphs 26 and 27 of document TWF/46/3.

Program for the development of TGP documents

17. The TWF noted the program for the development of TGP documents, as set out in the Annex to document TWF/46/3.

TGP/7: Development of Test Guidelines

Revision of document TGP/7: Drafter’s Kit for Test Guidelines

18. The TWF considered document TWF/46/12.

19. The TWF agreed with the proposal to revise document TGP/7 to reflect the introduction of the web-based TG Template after Version 1 is finalized.

20. The TWF agreed with the proposal to standardize the format of the Table of Characteristics in all Test Guidelines with a structure as set out in paragraph 15 of document TWF/46/12.

21. The TWF agreed that different colors could be used to differentiate elements in the Table of Characteristics, such as categories of characteristics, types of expression, explanations and recommendations for conducting the examination.

22. The TWF noted that all Leading Experts had prepared the draft Test Guidelines for discussion during the TWPs at their sessions in 2015 using the web-based TG Template.

23. The TWF noted that all Interested Experts had been required to provide their comments on draft Test Guidelines for discussion during the TWPs at their sessions in 2015 using the web-based TG Template.

24. The TWF noted the issues being addressed in response to the comments by Leading and Interested Experts that participated in the testing of the 2015 prototype of the web-based TG Template, as set out in paragraphs 13 and 14 of document TWF/46/12.

25. The TWF received a demonstration of the planned resolution of the issues being addressed in the 2015 prototype of the web-based TG Template, as set out in paragraphs 13 and 14 of document TWF/46/12.

26. The TWF agreed that Leading Experts should be able to make comments on their draft Test Guidelines in order to provide further information during the period for comments by the Interested Experts.

27. The TWF noted the timetable for development of the web-based TG Template, as set out in paragraphs 17 to 19 of document TWF/46/12.

28. The TWF agreed that more user accounts should be created to allow other experts to provide comments on draft Test Guidelines within the Web-based TG Template, in agreement with the designated TWP persons.

Revision of document TGP/7: Use of Proprietary Photographs and Illustrations in Test Guidelines

29. The TWF considered document TWF/46/13.

30. The TWF agreed with the proposed guidance in relation to text, photographs, illustrations or other material that could be subject to third party rights, as set out in paragraph 7 of document TWF/46/13, for inclusion in a future revision of document TGP/7, as follows:

> "In the case of text, photographs, illustrations or other material that is subject to third party rights, it is the responsibility of the author of the document, including Test Guidelines, to obtain the necessary permission of the third party. Material must not be included in documents where such permission is required but has not been obtained."

31. The TWF agreed with the TWV that a disclaimer should be added in relation to text, photographs, illustrations or other material that is subject to third party rights in the web-based TG template.

32. The TWF agreed that acknowledgment of the third party granting permission for any material used in UPOV documents should be made according to the terms of permission.

Revision of document TGP/7: Regional Sets of Example Varieties

33. The TWF considered document TWF/46/14.

34. The TWF considered whether to include guidance in document TGP/7 that a "region" should be comprised of more than one country in order to justify a regional set of example varieties in Test Guidelines and agreed that, in some cases, it could be useful to have regional sets of example varieties developed on the basis of countries that represented different geographical regions.

35. The TWF agreed with the TWV that the purpose of the UPOV Test Guidelines was international harmonization and therefore was not in favor of regional sets of example varieties as a common practice. However, the TWF agreed that when example varieties were not available or suitable for cultivation in a particular geographical region the information on example varieties used in different regions facilitated the interpretation of DUS test results and the use of variety descriptions for the purposes of distinctness.

36. The TWF noted that currently Test Guidelines were drafted on the basis of example varieties provided by the Leading Expert. The TWF agreed that regional sets of example varieties could be provided by a

single country if there was a sufficient number of example varieties for each characteristic in order to illustrate the range of variation.

37. The TWF agreed with the proposal to include guidance in document TGP/7 to explain that the TWP should determine the basis on which the region would establish an agreed regional set of example varieties (e.g. by an exchange of information, or by a ring-test).

TGP/8: Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability

Revision of document TGP/8: Part I: DUS Trial Design and Data Analysis, New Section: Minimizing the Variation due to Different Observers

38. The TWF considered document TWF/46/15 and received an explanation by the drafter, Mr. Nik Hulse (Australia), on the proposed guidance on "minimizing variation due to different observers of the same trial."

39. The TWF agreed with the draft guidance in the Annex to document TWF/46/15, for inclusion in a future revision of document TGP/8 on minimizing the variation due to different observers, subject to the following editorial change:

"However, the method has not been ~~used on~~ developed for PQ characteristics ~~to our knowledge~~ and ~~PQ characteristics~~ may also require extra information on calibration".

Revision of document TGP/8: Part II: Selected Techniques Used in DUS Examination, Section 9: the Combined-Over-Years Uniformity Criterion (COYU)

40. The TWF considered document TWF/46/16.

41. The TWF noted that participants of the exercise to test the software on the new method for the calculation of COYU should:

(i) seek to define probability levels to match decisions using the previous COYU method;
(ii) run the test for rejection probabilities of 1, 2 and 5% levels; and
(iii) assess whether the results are consistent in all crops

42. The TWF noted that the expert from the United Kingdom had distributed the software module for calculation of COYU and the guidance document to the participants of the exercise.

43. The TWF noted that the experts from Czech Republic, France, Finland, Germany, Kenya, Poland and United Kingdom would participate in the exercise to test the new software on COYU.

44. The TWF noted that a report on the practical exercise and the development of DUST module was presented at the thirty-third session of the TWC by an expert from the United Kingdom.

Revision of document TGP/8: Part II: Selected Techniques used in DUS Examination, New Section: Examining DUS in Bulk Samples

45. The TWF considered document TWF/46/17.

46. The TWF noted that the TC, at its fifty-first session, had agreed that further information on fulfilling the requirements of a DUS characteristic should be provided in the example of a characteristic examined on the basis of a bulk sample, and in that regard, had considered a discussion paper provided by an expert from the Netherlands on uniformity requirements in bulk characteristics, as reproduced Annex I to document TWF/46/17.

47. The TWF noted that the TC, at its fifty-first session, had agreed to consider further whether the analysis of individual plants to validate characteristics examined on the basis of bulk samples was necessary, and the possible cost implications, and had invited to propose alternative approaches for the examination of uniformity.

48. The TWF noted that the TC, at its fifty-first session, had agreed that the determination of states of expression should be based on existing variation between varieties and considering environmental influence.

49. The TWF considered whether characteristics examined on the basis of bulk samples should be assessed on the basis of the number of plants recommended in the Test Guidelines under Chapter 4.1.4 and noted that in some members visual observations of fruits from vegetatively propagated fruit crops were usually made on 20 fruits and the assessment of characteristics such as acidity, degrees brix and firmness of flesh, which resulted in destruction of the plant sample, was made on 10 fruits.

50. The TWF agreed that sampling for the assessment of characteristics that resulted in destruction of the plant sample was usually made by harvesting typical fruits from the same part of each tree (same stage of development, middle part of tree) and mixing them together. The appropriate number of fruits (10 or 20) would then be randomly selected for the assessment of each of the characteristics.

Revision of document TGP/8: Part II: Selected Techniques Used in DUS Examination, New Section: Data Processing for the Assessment of Distinctness and for Producing Variety Descriptions

51. The TWF considered document TWF/46/18.

52. The TWF noted that the TWC and the TWA had agreed that the guidance on "Different forms that variety descriptions could take and the relevance of scale levels", as reproduced in Annex I to document TWF/46/18, should be used as an introduction to future guidance to be developed on data processing for the assessment of distinctness and for producing variety descriptions.

53. The TWF noted that the TWC had agreed to compare the results of the practical exercise presented by the different participants to identify differences in the results obtained for further understanding of the different methodologies, at the thirty-third session of the TWC, held in Natal, Brazil, from June 30 to July 3, 2015.

54. The TWF noted that the European Union had reported to the Technical Committee that the project on a ring test on Apple for the management of variety description to be launched in 2015 had been suspended.

TGP/10: Examining Uniformity

Revision of document TGP/10: Assessing uniformity by off-types on basis of more than one growing cycle or on the basis of sub-samples

55. The TWF considered document TWF/46/9.

56. The TWF received an oral report by an expert from New Zealand on the assessment of uniformity using more than one growing cycle: New Zealand's experience for apple varieties originating as mutations.

57. The TWF also received an oral report by an expert from France on assessing uniformity by off types on basis of more than one growing cycle or on the basis of sub samples: considerations on Uniformity, Distinctness and description.

58. The TWF agreed that the authority in charge of DUS examination should be able to refuse a candidate because of a lack of uniformity after the first growing cycle, in particular for fruit crops where number of growing cycles was normally two.

59. The TWF considered the draft guidance for inclusion in a future revision of document TGP/10, as presented in Annexes I and II to document TWF/46/9. The TWF agreed that it should be clarified in the document whether the guidance in Annex I was meant for combining the results of two growing cycles of the same plant material (perennial crops). The TWF agreed that the document should continue to be discussed at its next session.

60. The TWF agreed to propose the following amendment to clarify the decision rule in Annex I, Approach 2: "…a variety is considered uniform if the total number of off-types at the end of the two growing cycles does not exceed the number of allowed off-types for the ~~combined~~ sample size of growing cycles 1 and 2 combined."

Statistical Methods for Visually Observed Characteristics

61. The TWF considered document TWF/46/20 and agreed that statistical methods were not routinely used for fruit crops.

62. The TWF noted that the TC, at its fifty-first session, had agreed to remove the document "Statistical methods for visually observed characteristics" from the program for the revision of document TGP/8, and to consider the matter under a separate agenda item.

63. The TWF noted that the TWC had invited an expert from China to make a presentation at the thirty-third session of the TWC on the analysis of visually observed characteristics using the DUST China (DUSTC) software package using the data set of meadow fescue provided by Finland.

Matters concerning variety descriptions

64. The TWF considered document TWF/46/10 and received a presentation by an expert from the European Union on "Experience with regard to variety descriptions and verifying the maintenance of the variety at the Community Plant Variety Office (CPVO)". A copy of the presentation is provided in document TWF/46/10 Add.

65. The TWF agreed that the plant material used as the basis for DUS examination was representative of the protected variety. The TWF agreed that, whenever possible, authorities should maintain a reference sample of the plant material of a protected variety. The TWF agreed that the description of a variety had limitations due to its link to the circumstances of the DUS examination but was an important element of the plant variety protection system and a useful tool for the analysis of distinctness.

Molecular techniques

66. The TWF considered document TWF/46/2.

67. The TWF noted the report on developments in the Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular (BMT), as set out in paragraphs 7 to 10 of document TWF/46/2.

68. The TWF noted that the Technical Committee (TC), at its fifty-first session, had agreed to develop a joint document explaining the principal features of the systems of Organization for Economic Co-operation and Development (OECD), UPOV and International Seed Testing Association (ISTA), subject to the approval of the Council and in coordination with the OECD and ISTA, as set out in paragraph 18 of document TWF/46/2.

69. The TWF noted that the TC, at its fifty-first session, had agreed to develop an inventory on the use of molecular marker techniques, by crop, with a view to developing a joint OECD/UPOV/ISTA document containing that information, in a similar format to UPOV document UPOV/INF/16 "Exchangeable Software", subject to the approval of the Council and in coordination with the OECD and ISTA, as set out in paragraph 20 of document TWF/46/2.

70. The TWF noted that the TC, at its fifty-first session, had agreed the proposal for the BMT, at its fifteenth session, to develop lists of possible joint initiatives with OECD and ISTA in relation to molecular techniques for consideration by the TC, as set out in paragraph 21 of document TWF/46/2.

71. The TWF noted that the OECD/UPOV/ISTA Joint Workshop on Molecular Techniques had agreed that it would be useful to repeat the joint workshop at relevant meetings of the OECD and ISTA, as set out in paragraph 19 of document TWF/46/2, and, in that regard, that the Technical Working Group Meeting of the OECD Seed Schemes, had agreed that another OECD/UPOV/ISTA Joint Workshop on Molecular Techniques should be organized either back-to-back with the Annual Meeting of the OECD Seed Schemes or in conjunction with the OECD Technical Working Group Meeting.

72. The TWF considered the initial draft question and answer concerning the information on the situation in UPOV with regard to the use of molecular techniques for a wider audience, including the public in general, discussed during the TC, at its fifty-first session as reproduced in paragraph 32 of document TWF/46/2, and agreed with the TWA that it should read as follows:

> "Is it possible to obtain protection of a variety on the basis of its DNA-profile?
>
> "A variety cannot be protected on the basis of DNA profiles. For a variety to be protected, it needs to be clearly distinguishable from all existing varieties on the basis of characteristics that are physically

expressed, e.g. plant height, time of flowering, fruit color, disease resistance etc. ~~[Molecular techniques (DNA profiles) may be used as supporting information].~~

73. The TWF noted that molecular marker techniques were being used by many UPOV members for variety identification and were an important tool in cases of enforcement of plant breeder's rights (PBR). The TWF agreed that it would be useful to provide information to a wider audience that molecular marker techniques were widely used in the context of PBR for variety identification and enforcement of the breeder's rights.

74. The TWF noted that France had been using molecular distances in combination with phenotypical distance for optimizing the size of trials in fruit crops since 2000. The TWF agreed that molecular markers also provided useful information on species which the authorities did not hold standard samples of living material.

75. The TWF noted that in many UPOV members breeders were requesting authorities to accept molecular marker information with applications for plant breeder's rights. The TWF noted that authorities did not require molecular marker information with the application for plant breeder's rights although some authorities accepted it as complementary information. The TWF noted the concern expressed by some members on matters relating to the confidentiality of molecular marker information and whether such information could be made available to the public.

Variety denominations

76. The TWF considered document TWF/46/4.

77. The TWF noted that the TC, at its fifty-first session, and the CAJ, at its seventy-first session, had noted the work on the possible development of a UPOV similarity search tool for variety denomination purposes by the Working Group for the Development of a UPOV Denomination Similarity Search Tool (WG-DST), including the test study. The TWF noted that the result of the test study had been reported to the second meeting of the WG-DST and that the most effective search tools had been described and documented, as set out in paragraphs 6 to 13 document TWF/46/4.

78. The TWF noted that the TC, at its fifty-first session, and the CAJ, at its seventy-first session, had noted the proposed revision of document UPOV/INF/12 in relation to changes of registered variety denominations, as set out in paragraph 18 document TWF/46/4, and that the CAJ had approved the presentation of that guidance for adoption by the Council at its forty-ninth ordinary session.

79. The TWF noted that the CAJ, at its seventy-first session, had agreed to invite the WG-DST to consider the comments by the CAJ-AG, at its ninth session, on the proposals in document UPOV/INF/12/5 Draft 2 concerning Sections 2.2.2 (b), 2.3.1 (c) and (d), and 2.3.3, in conjunction with the development of an effective UPOV similarity search tool, and any conclusions by the WG-DST to revise document UPOV/INF/12, if appropriate, as set out in paragraph 24 document TWF/46/4.

80. The TWF noted that the CAJ, at its seventy-first session, had agreed to consider the proposals of the CAJ-AG under Sections 2.2.2 (c), 4(a) and 4(e)(i) at its seventy-second session, as set out in paragraph 25 of document TWF/46/4.

Definition of color groups from RHS Colour Charts

81. The TWF considered document TWF/46/19.

82. The TWF noted that color charts were not routinely used for fruit crops and that varieties were allocated to color groups using the color groups in the Test Guidelines (Technical Questionnaire). The TWF agreed that growing trials for fruit crops were organized using varieties from the same color group and other color groups close to that of the candidate variety ("broad approach to color").

83. The TWF noted that the 50 UPOV Color Groups, as set out in document TGP/14, were currently being used by some authorities for the purpose of grouping varieties for DUS trials and agreed to request clarification on the reason for the explanation provided in document TGP/14 that "It is important to note that these color 'groups' were not created for the purpose of grouping varieties for DUS trials and should not be used for that purpose."

Experiences with new types and species

84. The TWF received a presentation by an expert from Morocco on experience with new varieties of Argania (*Argania spinosa* (L.) Skeels). A copy of the presentation is presented in document TWF/46/26 Add.

Management of variety collections

85. The TWF noted that in some UPOV members reference varieties of fruit crops were not managed directly by the authority and were kept by the breeders under different forms of partnerships.

Duration of DUS tests in the fruit sector

86. The TWF considered the information provided in document TWF/46/25 Rev.

87. The TWF noted that the total duration of DUS testing for fruit crops for some authorities would include the period required for establishment of the plants. The TWF agreed that over the establishment period it should be possible to conclude the DUS testing when the examining authority was certain of a negative outcome. The TWF also agreed that the DUS examination and the variety description could be completed after the first growing cycle.

88. The TWF considered the following proposal to amend document TGP/7:

> "ASW 2 (TG Template: Chapter 3.1) – Number of growing cycles
>
> "The duration of tests should be (a single/two) independent growing cycle(s) for the purpose of observation of characteristics following an adequate number of growing cycles for establishment of plants; at the end of each growing cycle(s) for the purpose of observation of characteristics the competent authority will determine whether or not the following growing cycle(s) is required. As soon as it can be established with certainty that the outcome of the DUS test will be negative, it can be stopped independently from the number of growing cycles carried out so far."

89. The TWF agreed to invite the European Union to continue drafting a proposal for reduction of duration of DUS tests in the fruit sector taking into consideration the comments received and agreed to continue discussions at its next session.

Harmonized example varieties for Apple: historical data and possible new development

90. The TWF considered document TWF/46/27.

91. The TWF agreed that it would be useful to develop guidance on minimizing variation between authorities and agreed to study the possible development of a calibration book for the harmonization of variety descriptions.

92. The TWF agreed that Mr. Jean Maison (European Union) would coordinate the project and would search varieties that had been described by different UPOV members using the current version of the Test Guidelines for Apple.

93. The TWF agreed that the different descriptions for the same varieties should be compared and the causes of variation identified (environment and/or observer). The TWF agreed that participants to the development of the calibration book for harmonized variety descriptions in apple could meet by electronic means and provide information on developments to the TWF, at its next session.

Discussion on draft Test Guidelines

**Apricot (*Prunus armeniaca *L.) (Partial revision)*

94. The subgroup discussed document TWF/46/23, presented by Mr. Hendrik Venter (South Africa), and agreed that a full revision of the Test Guidelines for Apricot be considered by TWF, at its forty-seventh session.

*Avocado rootstock (*Persea *Mill.)*

95. The subgroup discussed document TG/PERSE(proj.2), presented by Mr. Alejandro F. Barrientos-Priego (Mexico), and agreed the following:

Cover page	to replace current UPOV code with UPOV code PERSE (*Persea* Mill.)
1.	to read “These Test Guidelines apply to all varieties of *Persea* Mill. used as rootstock.”
Char. 4	to read “Young shoot: anthocyanin coloration”
Char. 7	to delete (b)
Char. 9	to have state “green” as state 1 and “yellow” as state 2
Char. 21	- to have states “low” to “high” - to be indicated as VG/MS
Char. 24	to add more example varieties
Char. 29	to read “at level”
Char. 31	to read “Leaf blade: density of pubescence of the lower surface on main vein”
Char. 34	- to have states “absent or sparse”, “medium” and “dense” - to read “Petiole: density of pubescence on upper side”
Char. 36	to delete MS
Char. 37	to be indicated as VG/MS
8.1	to add new label (c) for characteristics to be observed on upper third and to check throughout table of characteristics whether to be indicated as (b) and (c)
Ad. 7	to be deleted
Ads. 21, 22	to update grid according to TGP/7
Ad. 23	to improve formatting of illustration for state 2 (delete border)
Ad. 24	to replace illustration for state 3
Ad. 25	to improve formatting of illustration for state 3 (delete border)
Ad. 32	to read “…the leaf and smelling.”
9.	to complete reference to TG/97 “Avocado”
TQ 5	to include all even states of expression

*Black Walnut (*Juglans nigra *L.)*

96. The subgroup discussed document TG/JUGLA(proj.2), presented by Ms. Victoria Colombo (Spain), and agreed the following:

General	Leading Expert to confirm that all IP rights on photos, illustrations and text have been respected
1.	to specify the hybrids covered in the Test Guidelines
2.3	las sentence to read “The rootstock to be used is the progeny ‘Ng209’ x ‘Ra’ or any other commercial hybrid specified by the authority”
3.3.3	to be deleted
Table of Chars.	- to review allocation of (a) and (b) - to check example varieties (all commercial or available?)

Char. 2	- to add explanation where to observe (in the season) - to check whether to reduce scale to 5 notes (according to the scale of numbers in Ad. 2)
Char. 3	- to check whether to have states “absent” and “partially or fully developed” or to have a QN characteristic with states “absent”, “partially developed” and “present” - to add explanation
Char. 4	- to check whether to be indicated as QN with states “smaller”, “same size” and “larger” - to read “lateral leaflets”
Char. 5	- to clarify time of observation - to check whether to add more states (e.g. “brownish”)
Chars. 6, 7, 8, 9	to remove explanation on the time of observation of the characteristic from heading (“before Df”, “Ff2”) and move to explanation
Char. 6	- to check whether really QL - to read “conspicuousness”
Char. 7	- to add explanation/illustration - state “mostly isolated” to read “one” - to delete the word “mostly” from states 2 to 5
Char. 8	- to check whether really QL under different environmental conditions - to read “…anthocyanin…”
Char. 9	- to read “…length…” - to check whether to be indicated as MS - to check whether to reduce number of states of expression (in order to keep it as VG)
Char. 11	- to check whether really QL - what is the meaning of “well”? (fully developed?) - to add explanation/illustration - states to read “absent” and “present”
Char. 12	to check whether to have states broad oblong (1), narrow oblong (2), ovate (3) (see illustrations in Ad. 12)
Char. 13	to have states transverse elliptic (1), oblate (2), ovate (3), circular (4), medium elliptic (5), broad elliptic (6), transverse oblong (7)
Char. 14	- to delete (b) - to complete state 5 - to check wording (see TGP/14) - to read “Nut: shape of base” and to add explanation that observation should be made facing the suture
Char. 15	- to delete (b) - to check wording of states of expression (see TGP/14)
Char. 19	- to be indicated as QN - to replace words in brackets by “protrandric”, “homogamic”, “protandric”
8.1 (a)	to clarify growth stages in order to avoid overlapping of periods/stages
8.1 (e)	to remove “… from each tree”
8.2	General: to add full stop at the end of sentences
Ad. 1	- to delete the wording and keep illustration - to delete repeated title on top of illustrations
Ad. 2	- to have same states as in Char. 2 (“few”, “medium”, “many”) - to add “Number of leaflets to be assessed in growing season when leaves are completely developed.”
Ad. 6	to delete photographs and keep text explanation only
Ad. 10	to delete repeated title below illustrations
Ad. 12	is there a clear difference between states 2 and 3?
Ad. 13	to be presented in a grid according to TGP/14
Ad. 16	to read “Observations should be made when…”
Ad. 17	to read “Observations should be made when anthers are completely dehiscent during the period of pollen emission (Fm2).”
Ad. 20	to delete “between”

9.	literature references to be ordered alphabetically
TQ 4.2	to be clarified (to have alternative options (in vitro or micropropagated or…)
TQ 5	to complete scale with all the even states of expression for 5.2 and 5.3
TQ 6	to add example

Blueberry (Revision)

97. The subgroup discussed document TG/137/5(proj.1), presented by Mr. Nik Hulse (Australia), and agreed the following:

General	Leading Expert to confirm that all IP rights on photos, illustrations and text have been respected
Cover page	to check whether to include *V. darowii*
1.	to check whether any changes are necessary in order to include ornamental varieties in the scope of the Test Guidelines
3.1.1	to read “The minimum duration of tests should normally be one independent growing cycles.”
3.1.2	to read “In particular, it is essential that the plants produce a satisfactory crop of fruit in the season prior to test and in the growing cycles.”
3.3.1	to check whether to add explanation on the particular requirements for high and low chilling varieties
4.1.4	to read “Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 5 plants or parts taken from each of 5 plants and any other observations made on all plants in the test, disregarding any off-type plants. In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 3.”
4.2.2	to read “…, no off-types are allowed”
Char. 2	- to check whether to add illustration - to be indicated as QN
Char. 3	- to check whether to reduce number of colors - to check whether characteristic should be observed on sunny side of shoot
Char. 7	- to add illustration - to be indicated as MG/VG - to have states of expression from “low” to “high”
Char. 8	to add illustration (grid)
Char. 9	- to be combined with Char. 10 - to be indicated as PQ - to have states “light green”, “medium green” and “dark green”, “blue green” and “yellow”
Char. 11	to check whether really QL
Char. 12	- to replace (a) by (c) - to correct spelling “anthocyanin”
Char. 13	- to add explanation or illustration - to be indicated as MG/VG
Char. 14	- to add illustrations - to include example varieties for low chilling
Char. 15	- to have 5 states of expression - to add explanation on how to be observed - to check whether to split into length, width and ratio length/width
Char. 16	to add explanation to be observed at anthesis (and remove “c”)
Char. 17	- to have notes 1, 2, 3 - to add explanation
Char. 18	to replace “fruit cluster” by “infructescence”

Char. 19	- to delete (*) - to have notes 1, 3, 5
Char. 21	- to replace “round” with “circular” - to add grid
Char. 22	- to add illustration - to add state of expression “horizontal”
Char. 23	- to check whether to add illustration (check TG Pear) - to check whether to be deleted
Char. 24	- to add illustration - to have notes 1, 3, 5
Char. 25	- to check wording of characteristic name and states of expression - to have 3 notes only
Char. 27	to add states of expression “pink” and “blackish blue”
Char. 28	- to delete (*) - to check spelling example variety “O’Neil” (“O’Neal”?)
Char. 29	- to delete (*) - to have notes 1, 3, 5 - to add explanation on time of assessment
Char. 32 to 36	to be indicated as MG/VG
Char. 37	to replace “cream” with “yellowish white”
New char.	to check whether to add new characteristics - “Leaf: glaucosity on upper side” with states 1 “absent or weak” to 3 “strong” - “Leaf: color of edge” with states “red” and “green” - “Leaf: blistering with states “absent” and “present” - “Leaf: glossiness” with states “absent” and “present” - “Flower: ground color of corolla tube” with states “white”, “greenish white” and “yellowish white” - “Flower: color of receptacle” with states “green”, “pink”, “red”, “blue” - “Fruit: ratio height/width”
8.1 (c)	to check whether to replace “full flowering” by “anthesis”

*Chestnut (*Castanea sativa *Mill.) (Revision)*

98. The subgroup discussed document TG/124/4(proj.2), presented by Mr. Takeshi Esaki and Mr. Katsumi Yamaguchi (Japan), and agreed the following:

General	Leading Expert to confirm that all IP rights on photos, illustrations and text have been respected
Table of Chars.	- to add more example varieties - What does (C) and (B) behind the names of example variety mean? To add explanation in Chapter 6.5 and/or 6.4
Char. 3	to have notes 1, 3, 5
Char. 5	- to be indicated as QL - to add explanation/illustration (phyllotaxis?) - to read “Current season's shoot: phyllotaxis” - to delete MS
Char. 6	- to check whether really QL - to check whether to delete
Char. 7	to read “Current season's shoot: color of upper side of stem”
Char. 8	- to read “season’s” and “lenticels” - to have notes 1, 3, 5
Char. 11	- to delete MS - to move wording in brackets to 8.2
Chars. 13 to 16	- to delete (*) - state 2 to read “outwards”

Char. 14	- state 1 to read “symmetric to slightly asymmetric” - state 2 to read “moderately asymmetric”
Char. 18	to check whether really QL
Char. 22	to check wording of states of expression (see Ad. 22)
Char. 24	to be indicated as QL
Char. 25	to check wording
Char. 26	- to check whether to read “Bur: shape” or whether to split in two characteristic - to check wording of states of expression in TGP/14
Char. 27	to check whether “spines” is the appropriate term (Could it be hair?; see TGP/14)
Char. 29	- to check whether 9 notes are appropriate - state 3 to read “weak”
Chars. 30, 31	- to combine with char. 31 and have states absent or very weak (1), weak (2), medium (3), strong (2) - to check whether to have 5 or 9 notes - to delete MS
Char. 32	- state 2 to read “broad ovate” - to revise order of states according to TGP/14
Char. 33	to clarify “extend of pubescence”
Char. 34	to read “Nut: area of hilum”
Char. 35	to clarify difference between “curved” and “wavy” and check terms (TGP/14)
Char. 36	to check whether to be indicated as QN (add state 3 “strongly conspicuous” or QL (state 2 to read “inconspicuous”
Char. 37	- to check whether to be indicated QN (add state 3 “strong” or QL (to have states 1 “absent”, 9 “present”
Char. 39	to check method of observation
Char. 40	to check “fresh fruit” versus (g)
Char. 42	to check whether really QL
New chars.	- to check whether to add new characteristic “Plant: number of male inflorescences” with states “few”, “medium”, ”many” - to check whether to add characteristic on female flowers - to check whether to add new characteristic on sugar content/sweetness
8.1	to have labels (a) to (f) instead of (b) to (g)
8.1 (b)	to read “Plant: Observations…”
8.1 (c)	to read “…on middle third shoots”
8.1 (d)	to clarify “bearing shoots”
8.1 (g)	to read “Nut: Observations on the nut should be made on nuts mature for consumption. In case of burs containing three nuts, the middle one should be disregarded.”
Ad. 1	to correct spelling to “abundance” and “vegetative”
Ad. 8	- to be improved - to become Ad. 10
Ad. 13	to be improved
Ad. 15	to provide ratio illustration for this char. only and move current illustration applying to several chars. to 8.1
Ad. 16	to add sentence “Observations should be made on current season’s shoots held upright.”
Ad. 28	to be improved
Ads. 29, 30, 31	to be moved to 8.1
Ad. 32	- to use standard grid according to TGP/14 - states to correspond to Char. 32
Ad. 34	to only have one illustration indicating the hilum without states/proportions
Ad. 40	to check whether to improve
Ads. 44, 45, 46	to check whether to be improved

9.	to be completed
TQ 5, TQ 6	to be completed

**Coconut (*Cocos nucifera *L.)*

99. The subgroup discussed document TG/COCOS(proj.4), presented by Ms. Vera Machado (Brazil), and agreed the following:

General	Leading Expert to confirm that all IP rights on photos, illustrations and text have been respected
1.	second paragraph to be deleted
4.2.3	to be deleted
5.3	- to delete (c) (characteristic 8) - (e) to read “Fruit: shape”
6.5	to delete last sentence “The petiole…” or to move to correct place in TG
T.o.C.	to delete example varieties “BRS 001”, “BRS 002” and “BRS 003”
Char. 2	to read “Young plant:…” to delete “A”
Char. 6	to read “Stem: width of bole”
Char. 7	to add (*) (the char. is used for grouping) to have states from “short” to “tall”
Char. 12	to remove capital letter in state “Yellow”
Char. 19	to have states from “narrow” to “broad”
Char. 20	to have states from “short” to “long”
Chars. 21, 22	to delete VG
Char. 26	- to be moved after Char. 27 - to correct spelling “elliptic” - to read “Fruit: shape”
Char. 28	to correct spelling “elliptic”
8.1 (a)	to read “(a) Tree, stem, petiole, leaf and leaflet: Observations should be made when the eleventh leaf scar appears (see photo of a plant with leaf scars). Observations on petiole, leaf and leaflet should be made on a mature leaf. Observations on leaflets should be made on 2 opposite leaflets in the middle of the rachis.”
Ad. 1	- to delete photograph - to read “Should be observed 6 months after germination.”
Ad. 2	to delete text and keep photograph only
Ad. 6	to read “The width of the bole should be assessed at its widest part.”
Ad. 9	to replace photograph with illustration
Ad. 10	- to replace photograph with illustration - to read “The petiole thickness should be observed at the insertion of the first leaflet.”
Ad. 11	- to read “The petiole width should…” - to replace photograph with illustration
Ad. 13	- to read “The length of the rachis should be assessed from the most proximal leaflet to the tip of the rachis.” - to delete second illustration (right side)
Ad. 15	to read “The length of a leaflet should be assessed in the middle part of the rachis.”
Ad. 16	to add “The width of leaflet should be observed at the widest point of a leaflet in the middle of the rachis”
Ad. 18, 19	- to check whether to be combined - to check whether to replace illustrations
Ad. 22	- to indicate only female flowers (remove arrows indicating spikelets) - to delete second photograph

Ad. 23	to read “The length of first spikelet with female flowers should be assessed on the first spikelet with female flowers from the base of the inflorescence.”
Ad. 26	to improve grid
Ad. 28	to improve grid
Ad. 29	- to delete the table - to keep only indication of shell in the photograph
TQ 4.1	to select appropriate standard wording
TQ 5	to add even notes to all characteristics
TQ 6	to add example “Fruit: color” with states “green” and “yellow”

Macadamia (Revision)

100. The subgroup discussed document TG/111/4(proj.1), presented by Mr. Nik Hulse (Australia), and agreed the following:

General	Leading Expert to confirm that all IP rights on photos, illustrations and text have been respected
2.2	to read “The material is to be supplied in the form of grafted plants on a rootstock specified by the authority.”
2.3	to replace “12 plants” with “10 plants”
3.1.2	to replace “fruit bodies” with “plants”
Table of Chars.	- to check whether to add more (*) - to add more example varieties - to revise order of characteristics
Char. 1	to have states upright (1), semi upright (2), spreading (3) and drooping (4) - to add illustration (see TGP/14)
Char. 2	- to delete MS - to check example varieties for state 1 - state 3 to read “tall”
Char. 3	to be deleted
Char. 4	- to add explanation on when to observe - to check whether to be deleted
Char. 5	- to read “Stem: texture of surface” - to check wording of states of expression (to have states smooth (1), medium (2), rough (3)?)
Char. 6	to have states absent (1) and present (9)
Char. 7	- to delete part in brackets - to check whether 9 notes are necessary - to have the following example varieties: state short (1): KMB-3, MRG-20, MRG-25 state medium (2): EMB-1 state long (3): KRG-15
Char. 10	to add illustration (grid)
Char. 11	- to read “Leaf blade: shape of apex” - to have states apiculate (1), acuminate (2), acute (3), obtuse (4)
Char. 12	to check whether to read “obtuse”
Char. 13	- to add state 1 “very weak” and check example varieties - to check whether to have 9 notes
Char. 14	- to read “Leaf blade: incisions of margin” - to add illustration
Char. 15	- to read “Leaf blade margin: number of spines on margin” - to add explanation
Char. 16	to be deleted

Char. 17	- to move before leaf blade characteristics - to add explanation
Char. 18	- to read “Leaf blade: …” - to have notes 1, 2, 3
Char. 22	- to check whether really QL - to add explanation
Char. 23	- to delete MS - to have notes 1, 2, 3 - to add example varieties - to check whether to reword characteristic
Char. 24	to add illustration
Char. 26	to check whether a fruit or nut characteristic
Char. 28	- to delete MS - to add example varieties
Char. 30	- to delete “predominant” - check states and type of expression
Char. 32	- to add explanation - to delete MS
Char. 33	to add explanation where to be observed
Char. 34	- to add state partially open (2) - to be indicated as QN
Chars. 35, 36	to add explanation/illustration
8.	to add explanation covering several characteristics on which leaves observations should be made
Ad. 30	- to read “Observations should be made …” - to clarify “mature tree”
Ad. 31	- to read “Observations should be made …”
9.	to be completed
TQ 5	to be completed
TQ 6	to be completed

Pear, Japanese Pear

101. The subgroup discussed document TG/PYRUS(proj.1), presented by Mr. Chris Barnaby (New Zealand), and agreed the following:

General	- Leading Expert to confirm that all IP rights on photos, illustrations and text have been respected - to delete *Pyrus communis* L., *Pyrus pyrifolia* (Burm. f.) Nakai, *Pyrus pyrifolia* (Burm. f.) Nakai var. *culta* (Mak.) Nakai from the Test Guidelines - main common name of Test Guidelines to read “Pear Hybrids” - to check whether to reduce number of characteristics
Table of Chars.	to add example varieties
Char. 2	to be deleted
Char. 6	reorder states of expression according to TGP/14
Char. 10	to check whether to be combined with Char. 11
Char. 12	- to add illustration
Char. 13	to read “One-year-old shoot: number of spurs”
Char. 15	- to add explanation on where to propose - to be moved before Characteristic 14
Char. 19	- to add illustration - to have states from “low” to “high”
Char. 20	illustrations to be presented in the grid

Char. 24	to check wording of states 3 and 4 (see TGP/14)
Char. 28	to be deleted
Char. 29	- to check method of observation - to add illustration
Char. 30	- to check whether really QL - to clarify “long shoots” - to check whether the characteristic is determined by the age of the tree
Char. 33	- to check method of observation - to check whether to have states “few”, “medium”, “many”
Char. 34	to add illustration
Char. 36	to add illustration
Char. 38	to be indicated as QN
Char. 40	to be indicated as QN
Char. 41	to add grid with illustrations
Char. 42	to add illustrations
Char. 48	- to check method of observation - to add explanation - to have states of expression from “very low” to “very high”
Char. 50	to clarify “maximum”
Char. 53	to add explanation on ground color (see TGP/14)
Char. 54	to add explanation on over color (see TGP/14)
New char.	to check whether to add a new characteristic describing pattern of over color
Char. 58	to be indicated as QN
Char. 61	to be indicated as QN
Char. 62	to add illustration
Char. 63	to explain how to assess
Char. 65, 66, 70, 71	to have notes 1, 3, 5
Char. 73	to explain how to assess
Char. 74	to add explanation
Char. 75	to add explanation
Char. 76	to add explanation
Char. 77	- to add explanation - to check whether to add VG
Char. 78	- to have notes 1 to 5 - to have states from “very low” to “very high”
Char. 79	to check whether to reduce scale
Char. 80	- to check whether really QL - to check whether to be deleted
Chars. 81, 82, 83	to be indicated as MG/VG
Char. 83	to add explanation
8.1	to check whether to add explanations on where to observe flower and fruit characteristics
Ad. 28	to clarify where to observe
Ads. 65, 66, 70, 71, 78	to be moved to 8.1
Ad. 67	to review wording (approximately, almost)
Ad. 68	to explain where to observe
TQ 5	to complete scale for Chars. 45, 54,82, 83
TQ 6	to be completed

*Walnut (*Juglans regia *L.) (Revision)*

102. The subgroup discussed document TG/125/7(proj.3), presented by Ms. Dong Pei and Mr. Qing-guo Ma (China), and agreed the following:

General	Leading Expert to confirm that all IP rights on photos, illustrations and text have been respected
Char. 2	to add illustration
Char. 3	- to delete “predominantly” from all states of expression - to be indicated as PQ - to add illustrations
Char. 4	- to replace state of expression “elliptic” with “narrow elliptic”, - to add states “medium elliptic” and “broad elliptic”
Char. 5	to be deleted
Char. 6	- to read: “Plant: second flowering” - to have states of expression absent (1) and present (9) - to add (*) and add characteristic to TQ 5 - to add explanation
Char. 7	- to be indicated as MG - to read “Female flower: …” - state 5 to read “more than 20”
Char. 16	to check whether to have notes 1 to 5
Char. 18	to be indicated as VG
Char. 21	state 3 to read “medium brown”
Char. 22	to be indicated as MG/VG
Char. 23	- to read “Nut: thickness of dividing membranes” - to add explanation that “primary and secondary dividing membranes should be observed”
Char. 26	- to delete (e) - to be indicated as MG
Char. 27	- to delete (e) - to read “Kernel: ease of removal from shell”
Char. 28	- to be indicated MG/VG - to be moved after Char. 24
Char. 29	to be indicated as MG
Char. 30	to be deleted
Char. 31	to be indicated as MG
Char. 32	- to read “Time of…” - to be indicated as MG
Char. 33	to be indicated as MG
8.1 (b)	to replace “developmental branches” with “vegetative branches”
8.1 (c)	to read “Observations on leaflets should be made on leaves…”
8.1 (d)	to read “…during full-blossom…” (delete “its”)
Ad. 4	add a grid (to clarify difference in ration between “lanceolate” and “ovate”)
Ad. 5	to be deleted
Ad. 10, 11, 12	to be presented in grid
Ad. 27	second sentence to read “Assess the ease of…”
9.	- to delete reference “GB/T…” - to revise literature according to TGP/7
TQ. 5	to complete even states for all characteristics

Guidance for drafters of Test Guidelines

103. The TWF considered document TWF/46/11.

104. The TWF agreed with the plan to update the TG drafters' webpage to provide the information as set out in paragraph 11 of document TWF/46/11:

Web-based TG Template
Additional characteristics
Summary information on quantity of plant material required on adopted Test Guidelines
Test Guidelines under development (reference to document TC/[xx]/2)
Shapes extract from document TGP/14

Definition of "recurved"

105. The TWF considered document TWF/46/28.

106. The TWF noted the current extent of use of the term "recurved" in UPOV documents and agreed that further clarification and botanical references would be needed for possibly replacing the term "recurved". The TWF agreed to request the drafter from Israel to continue drafting the document to be presented for the TWF at its next session.

Matters to be resolved concerning Test Guidelines adopted by the Technical Committee

Test Guidelines for Pecan Nut (document TG/PECAN(proj.12))

107. The TWF considered document TWF/46/24 and agreed with the new illustrations proposed by the Leading Expert.

Information and databases

(a) UPOV information databases

108. The TWF considered document TWF/46/5.

GENIE database

109. The TWF noted the information on allocation of crop type(s) for UPOV codes used in the PLUTO database as of June 26, 2014.

110. The TWF noted that information on crop type(s) had been introduced in the GENIE database and the GENIE database had been modified to show the crop type(s) for each UPOV Code.

111. The TWF noted that a standard report for TWP allocations for UPOV codes had been introduced on the GENIE webpage.

112. The TWF noted that allocation of crop type(s) for further UPOV codes would occur when UPOV codes are used in the PLUTO database for the first time.

113. The TWF agreed to check the UPOV codes used in the PLUTO database for the first time, since June 26, 2014, which are provided in Annex III, part C to document TWF/46/5 (available on the TWF/46 website) and to submit comments to the Office of the Union by September 30, 2015.

114. The TWF noted a comment by an expert from New Zealand that the genus *Neotyphodium* had been revised and renamed *Epichole.*

UPOV code system

115. The TWF agreed to check the amendments to UPOV codes, which are provided in Annex III part A, to document TWF/46/5.

116. The TWF agreed to check the new UPOV codes or new information added for existing UPOV codes, which are provided in Annex III, part B, to document TWF/46/5.

117. The TWF agreed to submit comments on Annex III, parts A "UPOV codes amendments to be checked" and B "New UPOV codes or new information", to the Office of the Union by September 30, 2015.

PLUTO database

118. The TWF noted the summary of contributions to the PLUTO database from 2012 to 2014 and the current situation of members of the Union on data contribution, as presented in Annex II to document TWF/46/5.

119. The TWF noted that an additional column in the PLUTO search screen, showing the date on which the information was provided, had been introduced.

120. The TWF noted that both the "Denomination" and "Breeder's Ref" fields had been made searchable, independently or in combination, by denomination search tools on the "Denomination Search" page of the PLUTO database.

121. The TWF noted the information concerning the training course "Contributing data to the PLUTO database", held in Geneva in December 2014 and the plans to organize three further courses, in English, French and Spanish, from September 7 to 9, 2015, from November 23 to 25, 2015, and from October 5 to 7, 2015, respectively (dates to be confirmed).

(b) Variety description databases

122. The TWF considered document TWF/46/6.

123. The TWF noted that the TWC had invited an expert from China to present the analysis of variance for the interaction "variety x location" (environment) of the QN characteristics considered in the study using the statistical module of the new software "DUSTC" developed by China for presentation at its thirty-third session.

124. The TWF noted that the TC had agreed to include a discussion item on facilitating the development of databases at its fifty-second session.

125. The TWF noted the experiences of members on management and use of databases and agreed that databases for fruit crops containing morphological and/or molecular data could be useful for grouping varieties and organizing the growing trials and for the analysis of distinctness. The TWF noted the variation due to different locations on the expression of characteristics and agreed that this variation should be taken into consideration when using variety descriptions.

(c) Exchange and use of software and equipment

126. The TWF considered document TWF/46/7.

127. The TWF noted that the Council, at its forty-eighth ordinary session, had adopted the revision of document UPOV/INF/16 "Exchangeable Software" (document UPOV/INF/16/4 on the basis of document UPOV/INF/16/4 Draft 1).

128. The TWF noted that discussions on the inclusion of the SISNAVA software in document UPOV/INF/16 would be continued in the TWC, subject to the conclusion on discussions on the variation of variety descriptions over years in different locations.

129. The TWF noted that the TC, at its fifty-first session, and the CAJ, at its seventy-first session, had agreed the proposed revision of document UPOV/INF/16/4 concerning the inclusion of information on the use of software by members of the Union in conjunction with the comments of the TC, as set out in Annex I to document TWF/46/7 and a draft of document UPOV/INF/16/5 "Exchangeable Software" would be presented for adoption by the Council at its forty-ninth ordinary session.

130. The TWF noted that the Council, at its forty-eighth ordinary session, had adopted document UPOV/INF/22 "Software and equipment used by members of the Union" (document UPOV/INF/22/1).

131. The TWV noted that the TC, at its fifty-first session, and the CAJ, at its seventy-first session, had agreed the proposed revision of document UPOV/INF/22/1 concerning software and equipment used by members of the Union in conjunction with the comments of the TC, as set out in Annex II to document TWF/46/7, and a draft of document UPOV/INF/22 would be presented for adoption by the Council at its forty-ninth ordinary session.

(d) Electronic application systems

132. The TWF considered document TWF/46/8.

133. The TWF noted the developments concerning the development of a prototype electronic form.

Recommendations on draft Test Guidelines

(a) Test Guidelines to be put forward for adoption by the Technical Committee

134. The TWF agreed that the following draft Test Guidelines should be submitted to the TC for adoption at its fifty-second session, to be held in Geneva from March 14 to 16, 2016, on the basis of the following documents and the comments in this report:

Subject	Relevant document(s)
Avocado rootstock (*Persea* Mill.)	TG/PERSE(proj.2)
*Coconut (*Cocos nucifera* L.)	TG/COCOS(proj.4)

(b) Test Guidelines to be discussed at the forty-seventh session

135. The TWF agreed to discuss the following draft Test Guidelines at its forty-seventh session:

Apricot (*Prunus armeniaca* L.) (Revision)
Argania (*Argania spinosa* (L.) Skeels)
Blueberry (*Vaccinium angustifolium* Aiton; *V. corymbosum* L.; *V. formosum* Andrews; *V. myrtilloides* Michx.; *V. myrtillus* L.; *V. virgatum* Aiton; *V. simulatum* Small) (Revision)
Black Walnut (*Juglans nigra* L.)
Chestnut (*Castanea sativa* Mill.) (Revision)
Date palm (*Phoenix dactylifera*)
Macadamia *(Macadamia integrifolia* Maiden et Betche, *Macadamia tetraphylla* L.A.S. Johnson) (Revision)
Papaya (*Carica papaya* L.) (Revision)
Pear Hybrids (*P. xbretschneideri* Rehder; *P. xlecontei* Rehde; *P. ussuriensis* Maxim.)
Pistachio (*Pistacia* L.)
Physic Nut (*Jatropha curcas* L.)
Walnut (*Juglans regia* L.) (Revision)

136. The leading experts, interested experts and timetables for the development of the Test Guidelines are set out in Annex VI of this report.

(c) Possible Test Guidelines to be discussed in 2017

137. The TWF expressed its interest to consider drafts for revision of the Test Guidelines for Sweet Cherry and Sour Cherry (documents TG/35/7 and TG/230/1, respectively) in 2017.

Date and place of the next session

138. At the invitation of the European Union, the TWF agreed to hold its forty-seventh session in Angers, France, from November 14 to 18, 2016, with the preparatory workshop on November 13, 2016.

Future program

139. The TWF proposed to discuss the following items at its next session:

1. Opening of the Session
2. Adoption of the agenda
3. Short reports on developments in plant variety protection
   (a) Reports from members and observers (written reports to be prepared by members and observers
   (b) Reports on developments within UPOV (oral report by the Office of the Union)
4. Molecular Techniques (document to be prepared by the Office of the Union)
5. TGP documents (documents to be prepared by the Office of the Union)
6. Variety denominations (document to be prepared by the Office of the Union)
7. Information and databases
   (a) UPOV information databases (documents to be prepared by the Office of the Union)
   (b) Variety description databases (documents to be prepared by the Office of the Union)
   (c) Exchangeable software (document to be prepared by the Office of the Union)
   (d) Electronic application systems (document to be prepared by the Office of the Union)
8. Uniformity assessment (document to be prepared by the Office of the Union)
9. Experiences with new types and species (oral reports invited)
10. Management of variety collections (oral reports invited)
11. Duration of DUS tests in the fruit sector (document to be prepared by the European Union)
12. Calibration book for harmonized variety description in apple (document to be prepared by the European Union)
13. Matters concerning variety descriptions (document to be prepared by the Office of the Union and documents invited)
14. Proposal for revision of the term “recurved” (document to be prepared by Israel)
15. Matters to be resolved concerning Test Guidelines adopted by the Technical Committee
16. Proposals for partial revision/corrections of Test Guidelines
17. Discussion on draft Test Guidelines (Subgroups)
18. Recommendations on draft Test Guidelines
19. Guidance for drafters of Test Guidelines
20. DUS examination of mutant varieties of apple (document to be prepared by the European Union)

21. Minimum distance between varieties (document to be prepared by the European Union)

22. Method of observation for derived characteristics (document to be prepared by New Zealand and documents invited)

23. Date and place of the next session

24. Future program

25. Adoption of the Report of the session (if time permits)

26. Closing of the session

Visit

140. On the afternoon of August 26, 2015, the TWF visited the Agricultural Research Council for Tropical and Subtropical Crops (ARC-ITSC) in Mbombela, Mpumalanga Province, where it was welcomed by Mr Mduduzi Ngcobo, Research Team Manager, Horticulture and Postharvest Division, ARC-ITSC, who provided an overview of the ARC-ITSC. The TWF also received a presentation on avocado breeding and production by Mr. Theo Bekker, Technical Manager, Westfalia Technological Services; and a presentation on Marula by Mr. Dudley McKnight, General Manager, Mirma Products. Copies of these presentations are provided in Annex V to this report. The TWF also visited the variety collections and breeding programs of passion fruit, litchi, avocado and macadamia of the ARC-ITSC.

141. The TWF adopted this report at the close of the session.

[Annexes follow]

ANNEX I

LIST OF PARTICIPANTS

I. MEMBERS

AUSTRALIA

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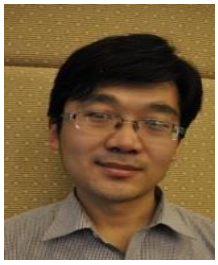

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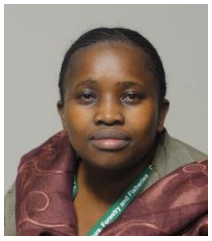

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Katsumi Yamaguchi, Chair

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[Annex II follows]

ANNEX II

WELCOME ADDRESS BY MR. JULIAN JAFTHA, CHIEF DIRECTOR,
PLANT PRODUCTION & HEALTH, DEPARTMENT OF AGRICULTURE,

The Chairperson of the Technical Working Party for Fruit Crops
Representatives of the UPOV office
Distinguished Delegates from UPOV Member Countries and Regional Groupings
Support Personnel from the Department of Agriculture, Forestry & Fisheries.

It is a pleasure to welcome you to South Africa on behalf of the Department of Agriculture, forestry & Fisheries.

We are pleased that the UPOV accepted an invitation from our country to conduct this session of the Technical Working Party for Fruit Crops in South Africa. The province of Mpumalanga has been selected to allow you to view some of the ongoing work around variety development in the area. We will receive an overview from provincial officials from this Province during the welcoming dinner. And so, I will not elaborate further on this wonderful setting; let us allow the true host to welcome us to their home.

We continue to be a proud member of UPOV and have over the years ensured our consistent participation in all the relevant governance structures of UPOV, including the Technical Working Parties. Allow me to acknowledge the superb work done by all technical experts across the UPOV family towards the development of the standards towards uniform plant variety description.

This TWF meeting was also preceded by a PBR information session. The session was attended by some members of the Technical Working Party, the UPOV Office and very appropriately breeders and industry role players. The Information session focused on:

- General Provisions of the UPOV 1991 Convention
- Acts in respect of harvested material,
- Essentially derived varieties.

These topics were selected as it represents key matters which often concerns member countries in the implementation of the Convention. We thank the UPOV Office for the very detailed presentation on the key aspects as well as the representatives from Australia, Canada and the CPVO. We fully appreciate the complexity of these matters but, it remains up to Contracting Parties to work within the structures of UPOV to develop the appropriate guidance on these and other matters. Allow me to also acknowledge the presentations from Canada, Australia and CPVO. From the country presentations it was clear that there is some variance in interpretation but also very useful common elements were evident to allow other Parties to learn from their experience. From the initial feedback, I am convinced that the hosting of the information session was well-timed and well-themed. I would encourage the Office of UPOV to consider instituting a practice where this type of information sessions becomes a regular feature during the hosting of the Technical Working Party Meetings.

Chairperson, the distinguished delegate from Canada yesterday said that when we mention the value of Plant Variety Protection (PVP) in a forum like this, it is like preaching to the converted. I fully agree with this but allow me to give some perspective from SA in this regard.

SA's National Development Plan has identified Agriculture as one of the sectors to stimulate economic growth. In response to the policy pronouncement, crops have been identified which have high value in terms of growth potential and its potential to absorb labour. Fruit crops are amongst those which have been identified as having high growth potential and a high potential to absorb labour. Our department has since developed plans to stimulate and support the fruit value chain. Key amongst our interventions is to support primary production; more specifically we've identified the need to ensure that our producers have access to

appropriate varieties. And this is where plant variety protection becomes relevant as we all know that an effective PVP system contributes to access to the latest varieties.

You have an extended agenda ahead of you and I trust that the discussions will take us forward towards finalising the relevant Test Guidelines. We hope that the surroundings will not be too much of a distraction but allow an elevated level of creativity amongst the participants to achieve the objectives of this meeting.

We have several people around to ensure that your stay is comfortable; please do not hesitate to call on anyone of them.

Once again, welcome.

[Annex III follows]

ANNEX III

AN OVERVIEW OF PLANT BREEDERS RIGHTS SYSTEM IN THE REPUBLIC OF SOUTH AFRICA

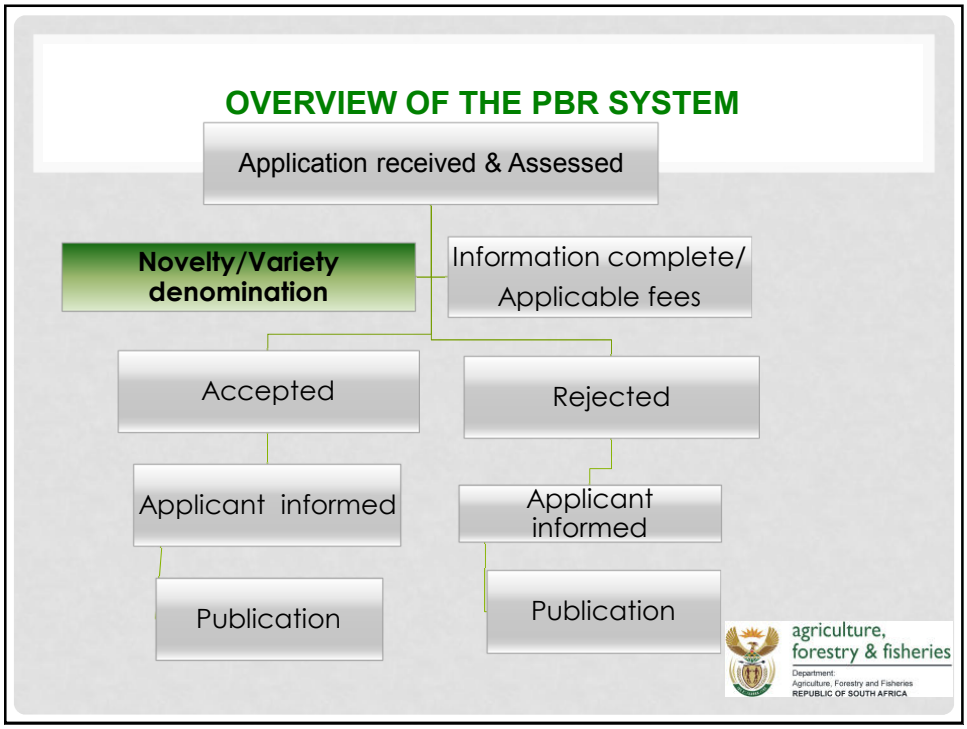
DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES

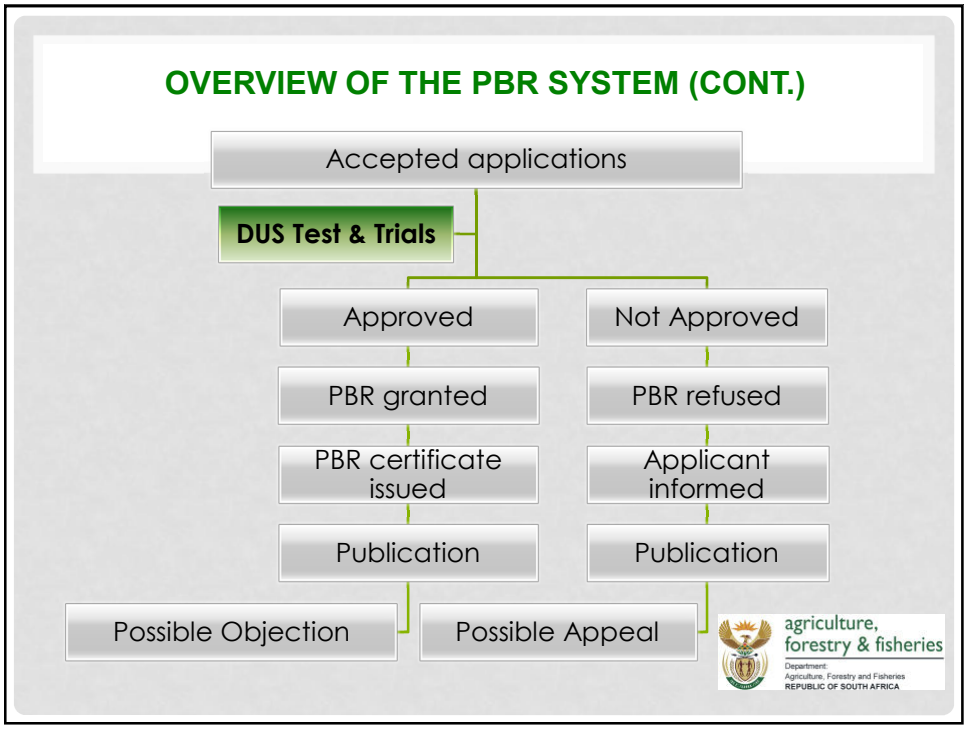
agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

PLANT BREEDRS RIGHT ACT

- The legislation frame used to grant PBR is Plant Breeders Rights Act, 1976 (Act No 15 of 1976).
- The Act provides for the following:
  - Requirements for the granting of the right
  - Scope of protection
  - Licencing, etc

agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA


OVERVIEW OF THE PBR SYSTEM
Application received & Assessed
Novelty/Variety denomination
Information complete/ Applicable fees
Accepted
Rejected
Applicant informed
Applicant informed
Publication
Publication
agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA


OVERVIEW OF THE PBR SYSTEM (CONT.)
Accepted applications
DUS Test & Trials
Approved
Not Approved
PBR granted
PBR refused
PBR certificate issued
Applicant informed
Publication
Publication
Possible Objection
Possible Appeal
agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

EVALUATION CENTRES

Evaluation centre in Roodeplaat

agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

ROODEPLAAT OFFICE CROPS

AGRIC CROPS

Solanum Tuberosum L

Triticum L

Zea mays L

VEGETABLE CROPS

Allium cepa

Phaseolus vulgaris L

Solanum lycopersicum L

ORNAMENTAL CROPS

Aloe L

Chrysanthemum L

Rosa L

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Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

EVALUATION CENTRE

Evaluation centre in Stellenbosch

agriculture, forestry & fisheries
Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

STELLENBOSCH EVALUATION CENTRE CROPS

FRUIT CROPS

Prunus persica L

Vitis L.

Rubus idaeus L

Citrus L

AGRIC CROPS

Dactylis glomerata

Lolium perene

Festuca

ORNAMENTAL CROPS

Leucospermum

Protea

Leucadendron

VEGETABLE CROPS

Allium cepa

Cucumis sativus

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Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

TRIAL DESIGN AND TECHNIQUES

- Trials are established using the Technical questionnaires to determine the standards from the database for all crops.
- TGP 8 outlined principle is used to design trial for examination purposes.
- DUS evaluations are done by experienced examiners working for the Department of Agriculture, Forestry and Fisheries.

agriculture, forestry & fisheries
Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

BREEDERS COOPERATION IN DUS EXAMIINATION FOR FRUIT CROPS

- Trials are established and evaluated on the premises of the Breeders
- Reference Collection is used for comparative standards
- DUS examiners & Breeders work closely with the establishment of the trial

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Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

VARIETY COLLECTION

- The establishment and maintenance of Variety collection is an ongoing challenge considering the different climate condition that we have.
- Variety collection are established with the cooperation of the Breeders, some times in their premises
- A Stone Fruit Reference Collection has been established in collaboration with Agricultural Research Council on their premises
- The Kiwi Fruit Reference Collection was also a joint venture between the Department and Kiwi Fruit industry.
- In SA The emphasis is towards a breeder based testing system for fruit and ornamental crops

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REPUBLIC OF SOUTH AFRICA

STONE FRUIT REFERENCE COLLECTION AT BIEN DONNE

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REPUBLIC OF SOUTH AFRICA

STONE FRUIT REFERENCE COLLECTION

The Stone Fruit Living Reference Collection in Bien Donne consist of:

- 42 different plum varieties
- 13 different almond varieties

96 different peach varieties grouped in:

- 40 Yellow flesh
- 50 Rose yellow flesh
- 6 White flesh

76 different nectarine varieties grouped in:

- 7 White flesh
- 69 Yellow flesh

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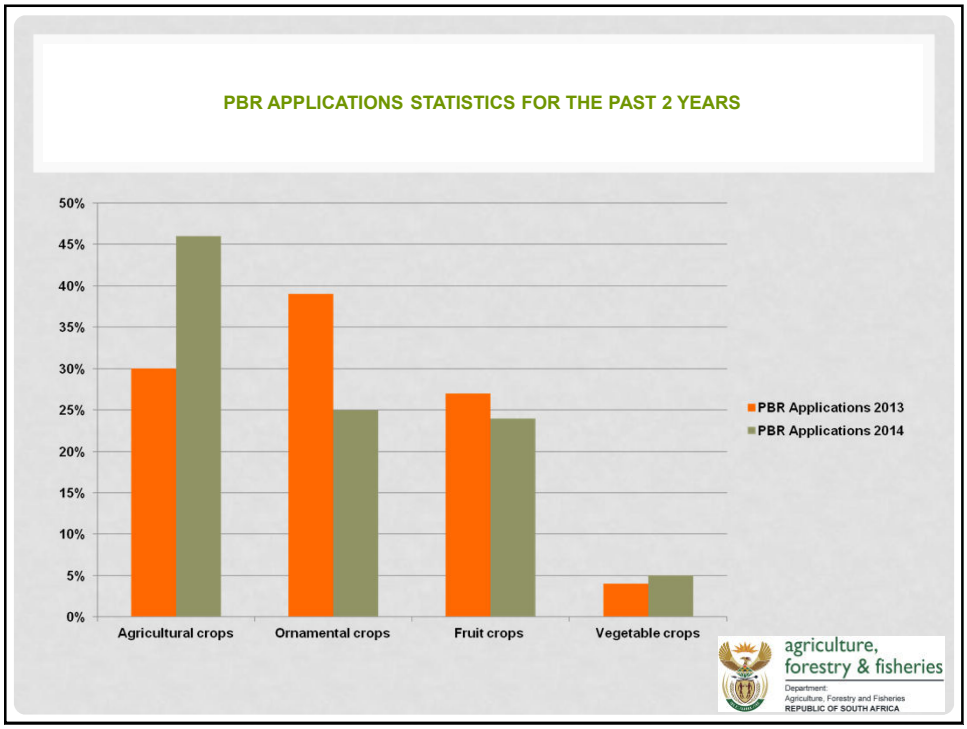
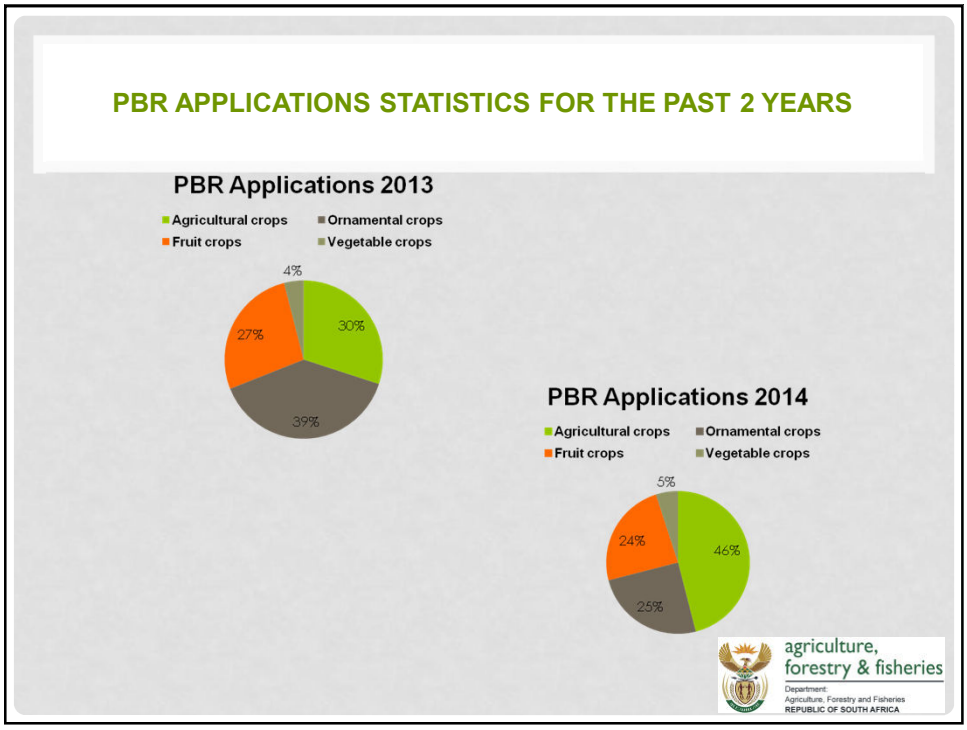
REPUBLIC OF SOUTH AFRICA

PLANT BREEDER'S RIGHTS STATISTIC FOR 2014

- With reference to Applications and valid Plant Breeders' Rights for 2014 the following is reported:
- An additional **16** taxa have been declared in terms of the Plant Breeders' Rights Act during **2014**.
- **243** PBR applications were received of which **46% [111] were for Agricultural crops**, **25% [62] for Ornamental crops**, **24% [59] for Fruit crops** and **5% [11] for Vegetable crops**.
- As of December **2014**, a **TOTAL** of **2710** varieties had valid plant breeder's rights in South Africa, of which **33% [903] were for Ornamental** crops, **35% [941] for Agricultural** crops, **23% [633] for Fruit** crops and **9% [233] for Vegetable** crops.

agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA


PBR APPLICATIONS STATISTICS FOR THE PAST 2 YEARS
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Agricultural crops
Ornamental crops
Fruit crops
Vegetable crops
PBR Applications 2013
PBR Applications 2014
agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA


PBR APPLICATIONS STATISTICS FOR THE PAST 2 YEARS
PBR Applications 2013
Agricultural crops
Ornamental crops
Fruit crops
Vegetable crops
4%
30%
27%
39%
PBR Applications 2014
Agricultural crops
Ornamental crops
Fruit crops
Vegetable crops
5%
46%
24%
25%
agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

THANK YOU

agriculture, forestry & fisheries
Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

[Annex IV follows]

BREEDING AND COMMERCIALISATION OF CITRUS AND SUBTROPICAL CROPS

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Agricultural Research Council
Institute for Tropical and Subtropical Crops
Nelspruit, SOUTH AFRICA

46TH Technical Working Party for Fruit Cops
International Union for the Protection of New Varieties of Plants (UPOV)
Protea Hotel Kruger Gate, Skukuza, Mpumalanga, South Africa.
24 August 2015

ARC • LNR
Excellence in Research and Development

HISTORY of the ARC-ITSC

Institute established 1926

- 1930: 1st citrus rootstock evaluation block: 60 rootstock sel & 25 cvs (3400 data trees)
- 1931: Dr Hofmeyer appointed. He bred the 'Hortus Gold' papaya
- 1932: Avocado cultivars acquired from California
- 1933: Apple rootstocks planted: too cold to take to the Cape

ARC • LNR
Excellence in Research and Development

HISTORY

1939 to 1941:

- Citrus: 300 species, cvs & selections
- Avocado: 70 cvs & sel
- Mango: 60 cvs & sel
- Pecan nut: 40 cvs & sel
- Litchi: 25 cvs & sel
- Variety orchard: 150 species

HISTORY

Citrus breeding project started in 1974.
Initially: Easy peeling selections & Blackspot resistance

First breeding orchards at Addo: 1984

Objectives later expanded to:

- Seedlessness
- Longer season
- Increased and regular high yields
- Improved quality
- Longer shelf-life

COMMERCIALISATION

In past – freely available.

– Hortus Gold papaya, Nelmak 2 macadamia nut.

Newer generation:

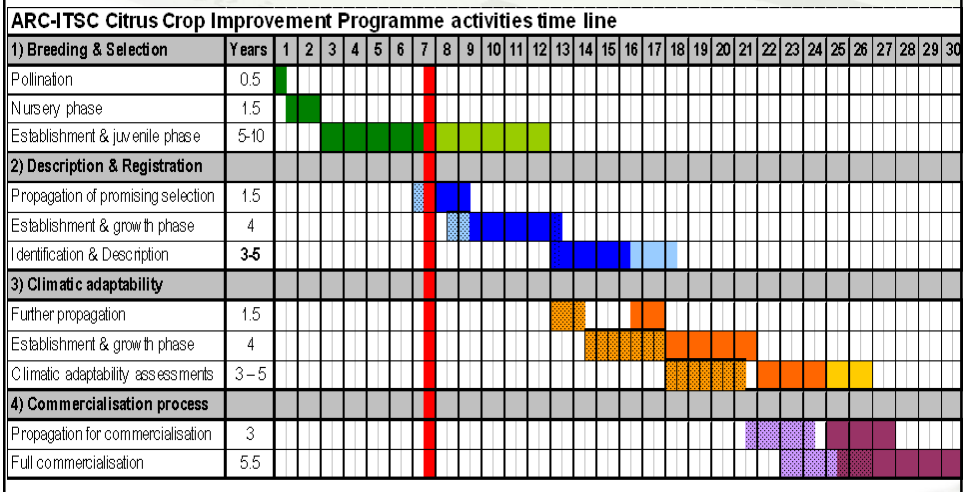
- Heidi mango: sold for R1 to Industry
- TS-G2 guava rootstock: R0.50
- Citrus cvs (Nelruby, Roma, Edelgard, Robin, Pomelit, Nova SL): R0.60 (R0.10 to CRI for admin)
- Eureka SL: R3.00 p/tree (+fruit royalty)
  - Currently R28.00 per tree once off

COMMERCIALISATION CONSTRAINTS

TYPE OF CROP

- Tree crops vs annual crops
- Long term crop & long juvenile phase
  - 10-15 year breeding phase
  - 4-5 year (semi-commercial) orchard trials
- Reproductive biology
  - Pollen / ovule sterility
  - Cross & self-incompatibility
  - Poli-embriony
- Complex Genotype x Environment Interaction

FRUIT TREE BREEDING TIME FRAME



CONSUMER / MARKET

- Changing consumer preferences
  - Long turn-around time
  - Fresh fruit vs processed product
  - Many characteristics: colour, taste, shape, etc
- Health & wellness fabs
- GMO's
- Stringent GlobalGap requirements

INTELLECTUAL PROPERTY

- International (UPOV) & National laws/policy
- PBR regulations
  - Time constraints (Especially USA)
- ARC policy
- Name constraints
  - Valley Gold (Acceptable is RSA & USA; not in Eurozone)
- Disclosure

ARC SITUATION

- Central control – Office of Technology Transfer
- Open system:
  - Tender process
  - BEE rules and allocations
  - Business Plan
- Issues:
  - Ideal/best commercialisation system
  - Royalty structures

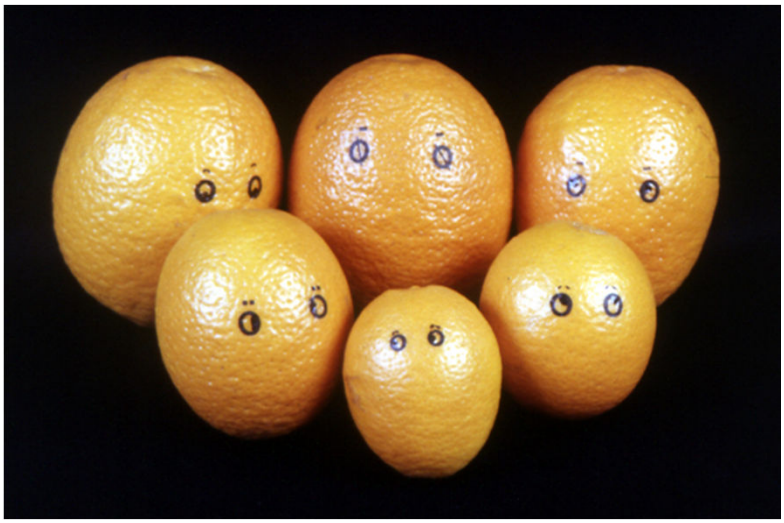
Royalty Structures

- Tree royalty
- Fruit royalty
- Tree & fruit royalty
- Combined “Once-off” royalty
- Licence fee (Per year; per hectare / tree)
- Trademarks & Patent fees

COMPARISON

- Compare to maize system ito
  - Turnover of plant material (Maize sells seed every year; fruit trees only sold once)
  - An ARC approved agent appointed – deals with all seed. With fruit trees: currently much competition within industry.
  - Old or Faulty cvs can quickly be replaced; Years to do the same with fruit trees.

Thank you



[Annex V follows]

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WELCOME AND OVERVIEW of the Agricultural Research Council Tropical and Subtropical Crops

Dr Mduduzi Ngcobo

Presented to the
46TH Technical Working Party for Fruit Cops
International Union for the Protection of New Varieties of Plants (UPOV)

26 August 2015

ARC-Tropical and Subtropical Crops Main Campus Situated in the Capital of Mpumalanga, Mbombela

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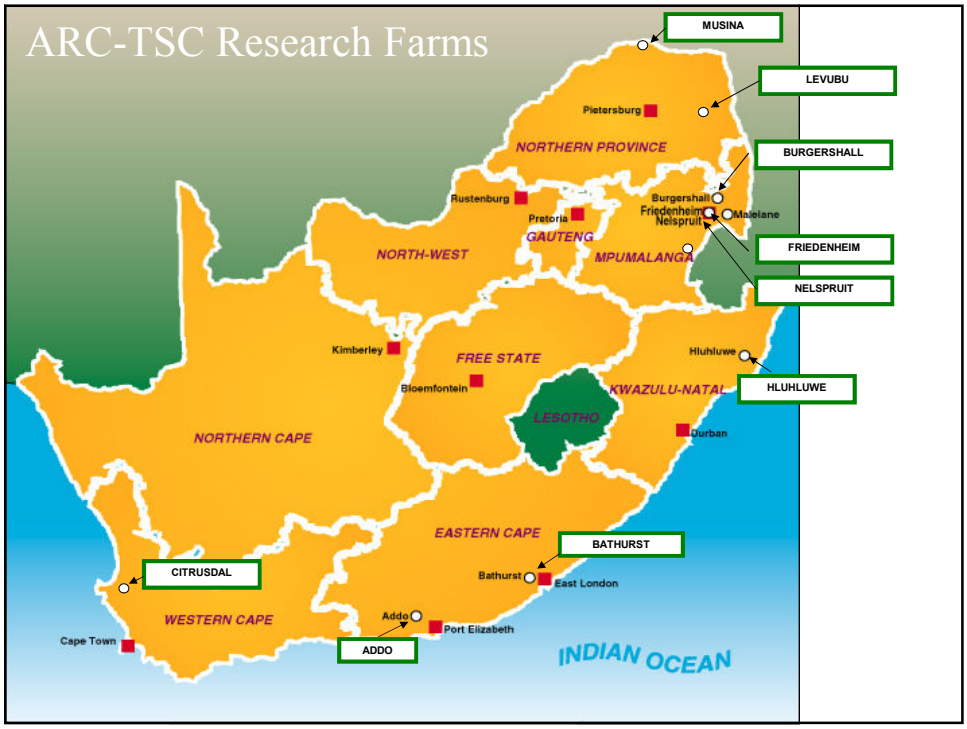
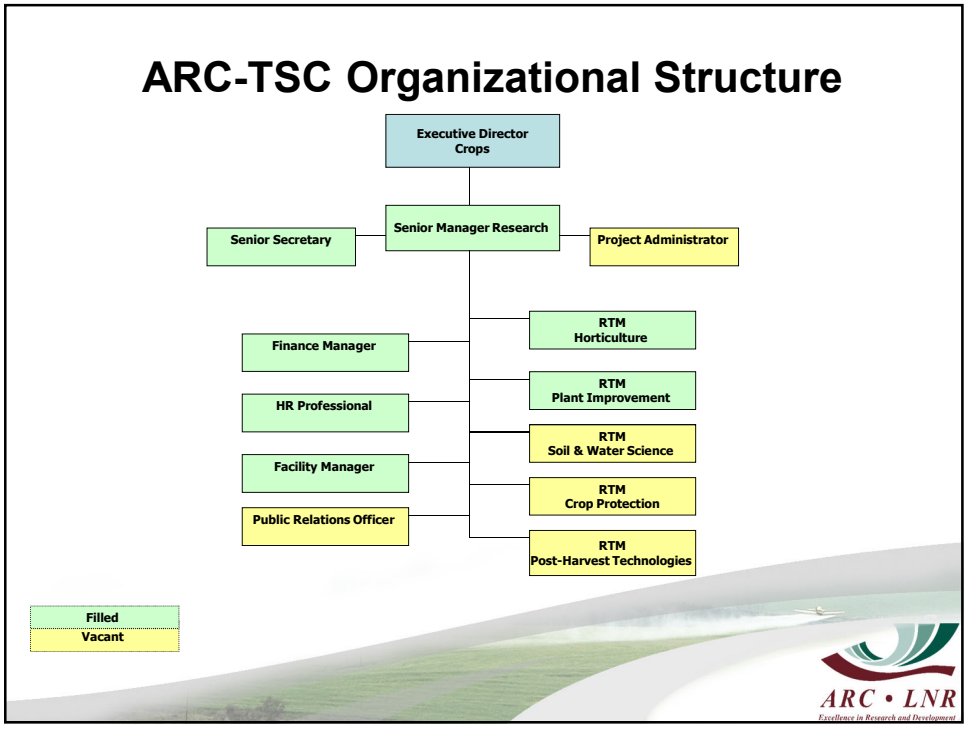

ARC-TSC Research Farms
MUSINA
LEVUBU
BURGERSHALL
FRIEDENHEIM
NELSPRUIT
HLUHLUWE
BATHURST
CITRUSDAL
ADDO
Pietersburg
NORTHERN PROVINCE
Rustenburg
Pretoria
GAUTENG
NORTH-WEST
MPUMALANGA
Burgershall
Friedenheim
Nelspruit
Malelane
Kimberley
FREE STATE
Bloemfontein
Hluhluwe
KWAZULU-NATAL
LESOTHO
Durban
NORTHERN CAPE
EASTERN CAPE
Bathurst
East London
WESTERN CAPE
Addo
Port Elizabeth
Cape Town
INDIAN OCEAN


ARC-TSC Organizational Structure
Executive Director Crops
Senior Secretary
Senior Manager Research
Project Administrator
Finance Manager
HR Professional
Facility Manager
Public Relations Officer
RTM Horticulture
RTM Plant Improvement
RTM Soil & Water Science
RTM Crop Protection
RTM Post-Harvest Technologies
Filled
Vacant
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Mandate

To provide sustainable and appropriate technologies for production and post-harvest handling of citrus and subtropical crops in order to enhance food security and nutrition, global competitiveness and wealth creation by addressing national priorities through our research agenda and related activities

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Expertise

- More than 90 years of citrus and subtropical fruit research experience
- From Africa for Africa – an intimate knowledge of climatic conditions and cultural practices of the continent
- Horticulturists, Entomologists, Pathologists, Soil Scientists, Nematologists, Physiologists, Plant Breeders and Biotechnologists – all experts on fruit and nut crops

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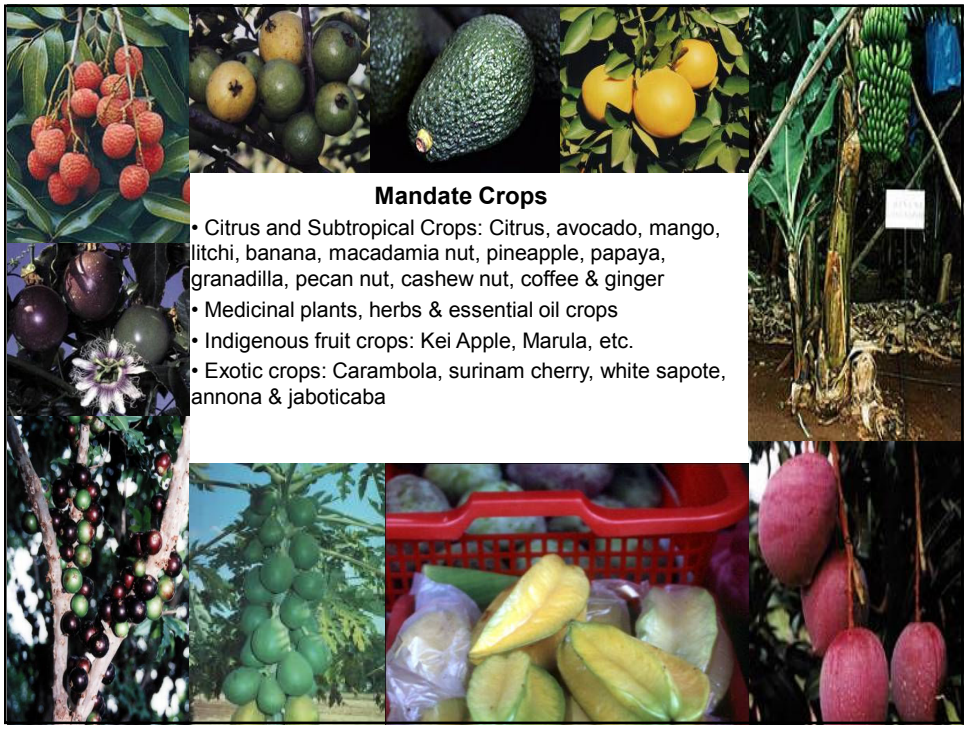
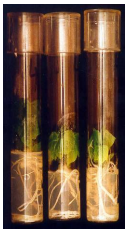


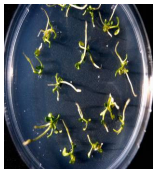
Mandate Crops

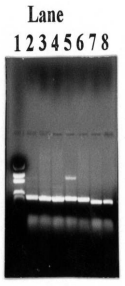
- Citrus and Subtropical Crops: Citrus, avocado, mango, litchi, banana, macadamia nut, pineapple, papaya, granadilla, pecan nut, cashew nut, coffee & ginger
- Medicinal plants, herbs & essential oil crops
- Indigenous fruit crops: Kei Apple, Marula, etc.
- Exotic crops: Carambola, surinam cherry, white sapote, annona & jaboticaba

Research Programmes

- Plant Breeding
- Crop Protection
- Soils & Water Science
- Post-Harvest Technologies
- Horticulture







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Plant Breeding

- Breeding new cultivars
- Evaluation in various production areas
- Selecting superior scions and rootstocks
- Maintain biodiversity: Gene banks & propagation
- Biotechnology

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Plant Breeding (cont.)

- An new early litchi selection, R1G22, has been bred and registered by ITSC. It has stable characteristics and good fruit qualities.
- This early selection will allow South African farmers to supply litchis to the market earlier than the traditional cultivars in use.
- The early harvest will result in additional jobs as people will now have to be harvest longer.

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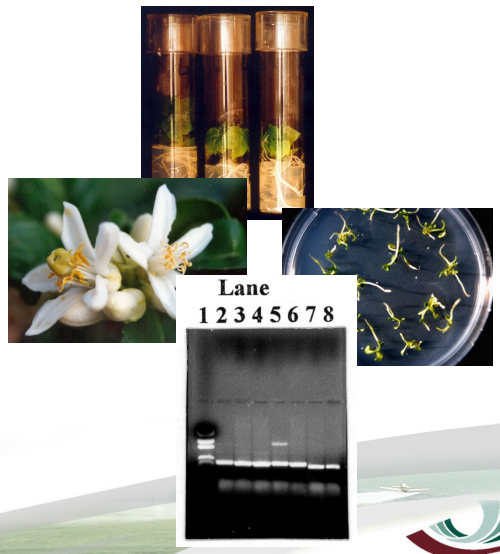
Biotechnology

- Indigenous plant breeding
- Alternative breeding techniques for crop improvement
- Micro-propagation
- Rejuvenation
- Molecular Markers
- Flow cytometry
- Germplasm storage & dissemination
- Training



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Crop Protection

- Plant diseases
- Insect pests
- Nematode pests

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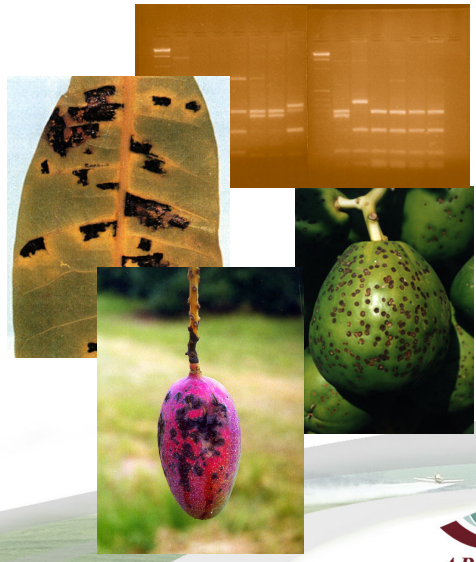
Plant Disease

- Viruses and viroids cross protection
- Control of soil- and air-born diseases
- Services: Citrus Improvement Programme & viroid indexing (Avocado sunblotch)



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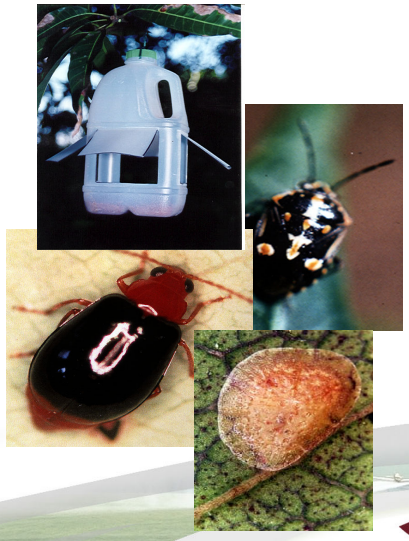
Entomology

- Integrated management of economic pests
- Evaluation of pesticides
- Pest monitoring systems



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Entomology (cont.)

- The ARC-ITSC, DAFF and Subtrop have embarked on a national surveillance program to monitor alien invasive fruit fly species in the north-eastern parts of Limpopo and Mpumalanga.
- One of these notorious pest species, i.e. *Bactrocera dorsalis*, has already established in the northern parts of South Africa.
- Strategies need to developed to control this new pest.

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Soil & Water Science

- Plant nutrition
- Irrigation
- Soil management
- Soil/leaf/water analyses
- Advisory services on subtropical crops

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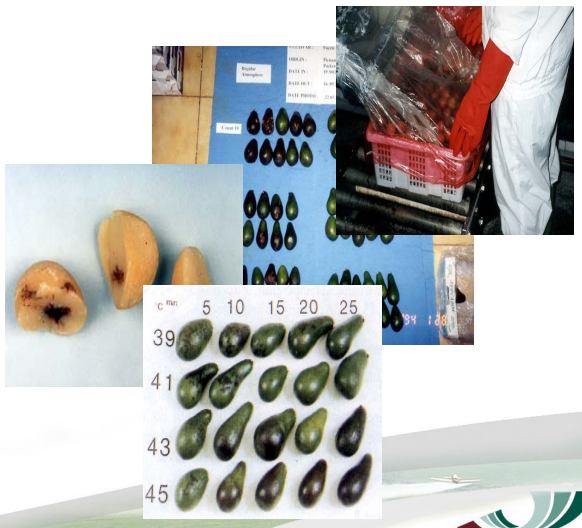
Post-Harvest Technology

- Cold storage requirements
- Sea export protocols
- Minimally processed products



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Exotic Fruit

- The Processing Unit at the ARC-ITSC was successful in making chutney, jelly and jam with the exotic star fruit or *Averrhoa carambola* (Carambola).
- Carambola fruit are rich in antioxidants and Vitamin C, whilst it is low in sugar, sodium and acid.
- Entire fruit usable with a taste that is a mix of papaya, orange and grapefruit
- Star shape of the cut fruit makes it very popular for use as decorative material in salads.

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Horticulture

- Orchard/Crop management
- Sustainable rural livelihood
- Organic crop production
- Cultivation practices

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Crop Management

- Orchard planning and maintenance
- Orchard manipulation practices such as pruning
- Crop physiology

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Community Involvement

- Engages a community as a whole
- 5255 households involved
- Assists community to organize it & build its capacity through training
- Provides technical and other resources to achieve high levels of agricultural production

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Intercropping Citrus, Vegetables & Herbs in the Eastern Cape

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Technology Transfer

- Farmers' days
- Study groups
- Workshops
- Demonstration trials
- Training courses

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Technology Transfer (cont.)

- Series of text books on cultivation of different citrus and subtropical crops.
- Production guidelines for small-scale farmers
- Production manuals
- Popular articles
- Scientific publications

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Impact on Horticulture Sector

- Research support to citrus and subtropical fruit industries contributed to establishment of a vibrant industry that is export driven and also caters for local demand.
- Focus on problem solving research in support of commercial farmers (close relationship with producer organisations).
- Rural development programme in support of small-scale and emerging farmers as well as rural communities.

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Thank You

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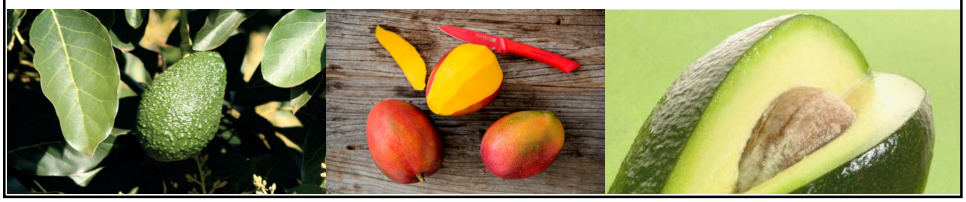
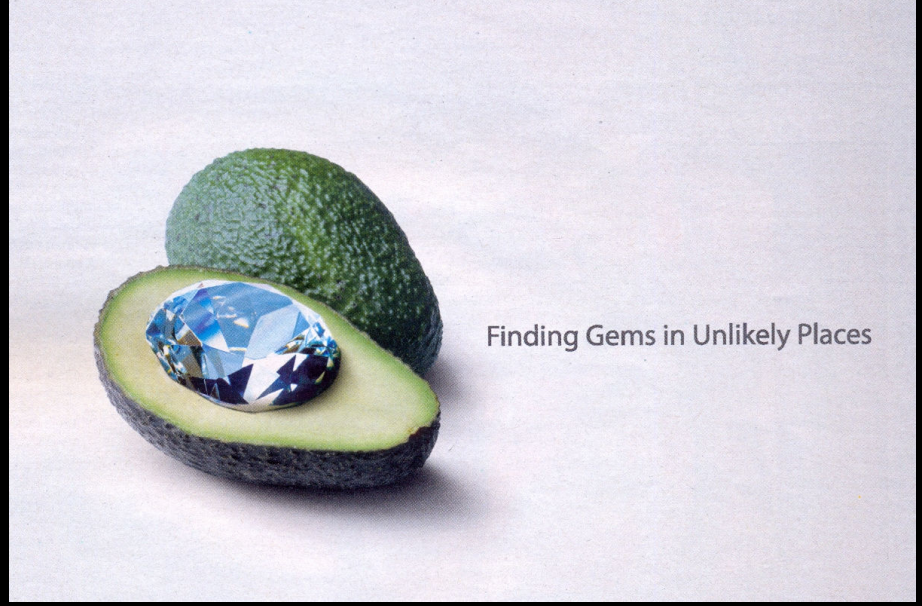
Avocados, world trends and where Westfalia Fruit fits in

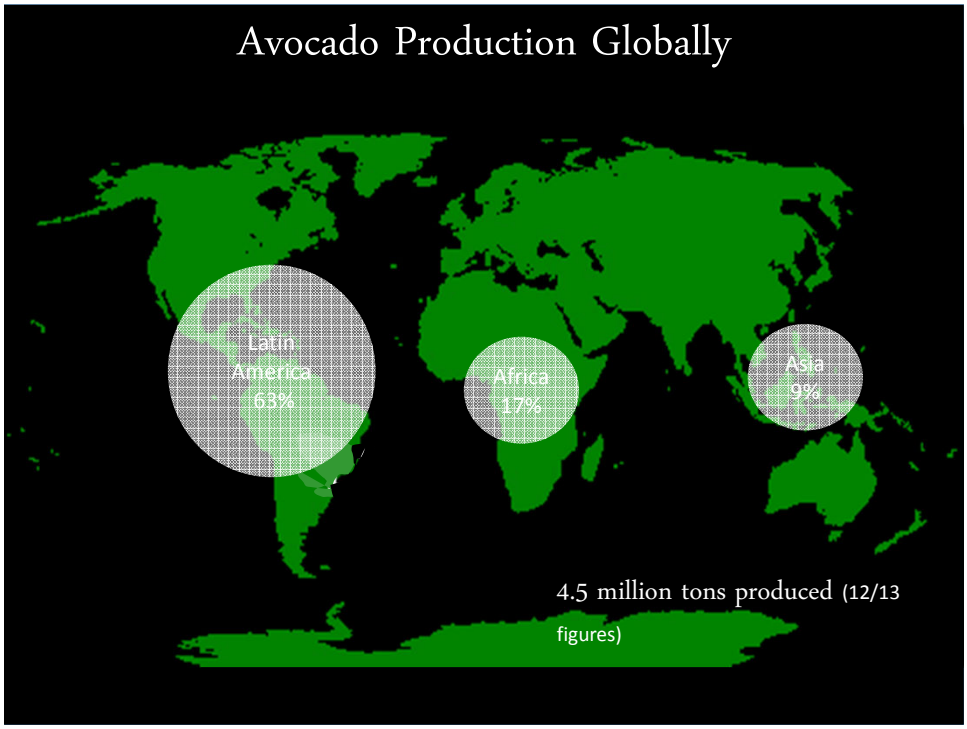
Theo Bekker, Westfalia Technological Services





Seen recently in Lufthansa Magazine, a striking advert
China Yangzhou GIP (Guangling Industrial Park)

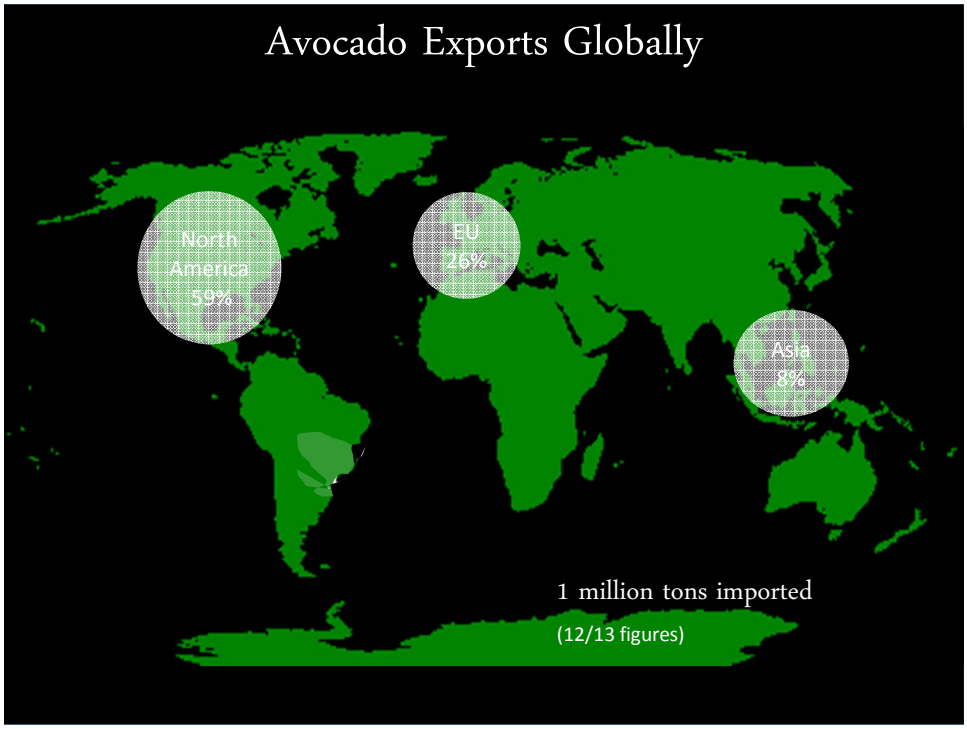

Avocado Production Globally

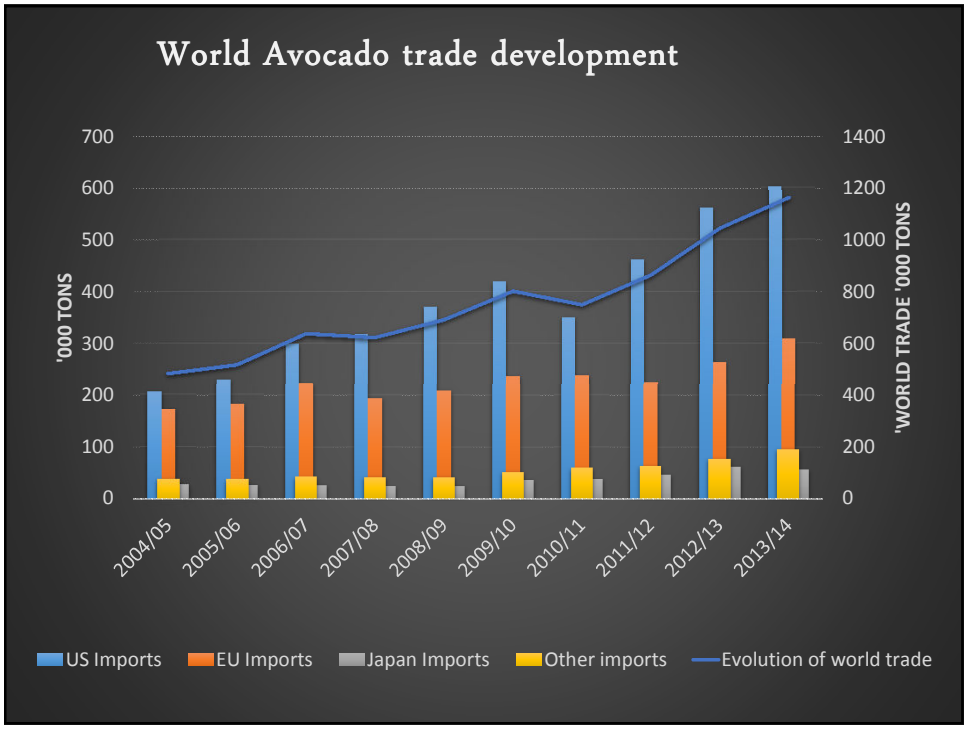

Avocado Production Globally
Latin America 63%
Africa 17%
Asia 9%
4.5 million tons produced (12/13 figures)

Production countries and growth

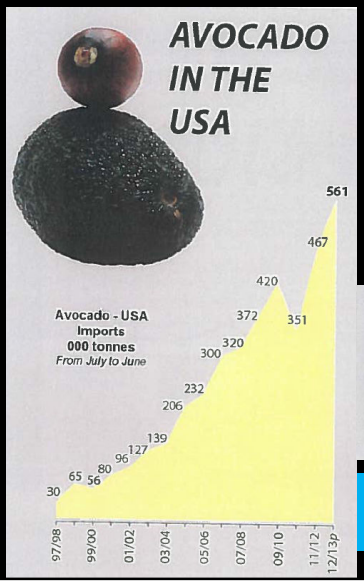
	Avocado Cultivation area in 2013/14	Annual estimated growth	Avocado production (2012-14 average)
	ha	ha/year	ton
Mexico	168 000	>10 000	1 300 000
Chile	27 000	-1 750	184 000
California	21 800	-300	185 000
Spain	9 400	100	70 000
Colombia	9 300	>1 000	25 000
Israel	7 000	200-300	100 000
Morocco	5 000	300-500	9 000
New Zealand	4 200	300-500	21 000
Winter Season total	**251 700**	**>10 000**	**1 904 000**
Peru	13 000-15 000	1 000-2 000	150 000
South Africa	14 500-15 000	500	110 000-120 000
Kenya	10 000-11 000	500	na
Brazil	1 000	150	na
Summer season total	**40 250**	**2 650**	**300 000**

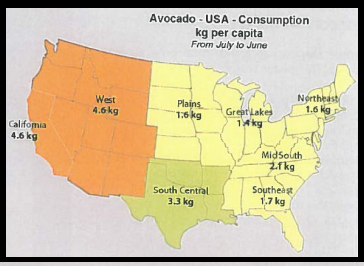
Global Avocado Consumption


Avocado Exports Globally
North America 59%
EU 26%
Asia 8%
1 million tons imported
(12/13 figures)

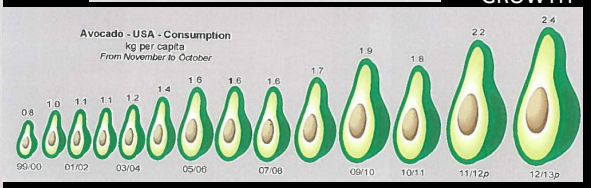

World Avocado trade development
'000 TONS
'WORLD TRADE '000 TONS
700
600
500
400
300
200
100
0
1400
1200
1000
800
600
400
200
0
2004/05
2005/06
2006/07
2007/08
2008/09
2009/10
2010/11
2011/12
2012/13
2013/14
US Imports
EU Imports
Japan Imports
Other imports
Evolution of world trade

US Avocado Consumption





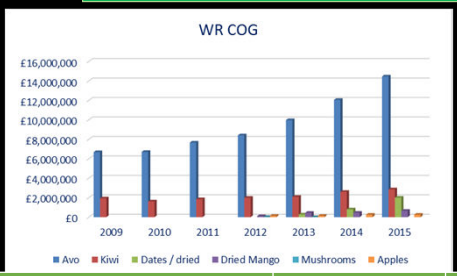
300% GROWTH



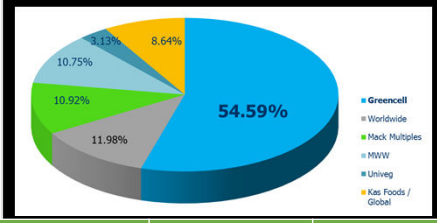
Consistent YOY growth within the US.
Traditional regions shown slower growth.
Regardless of growth, per capita average at 2.4Kg per person.

UK Retail History

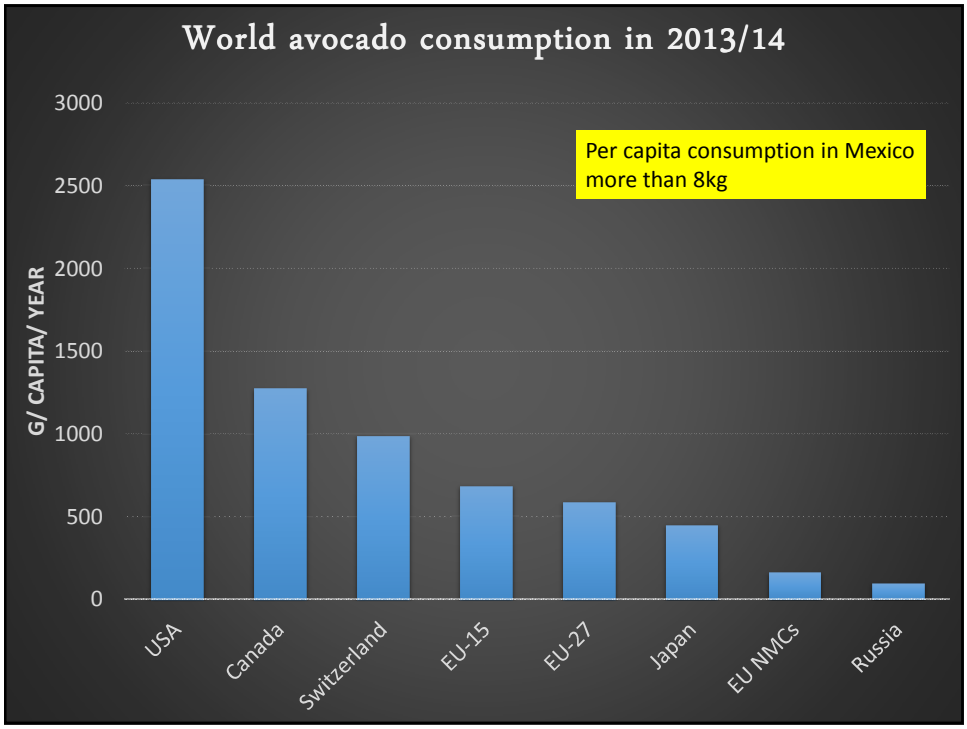
greencell

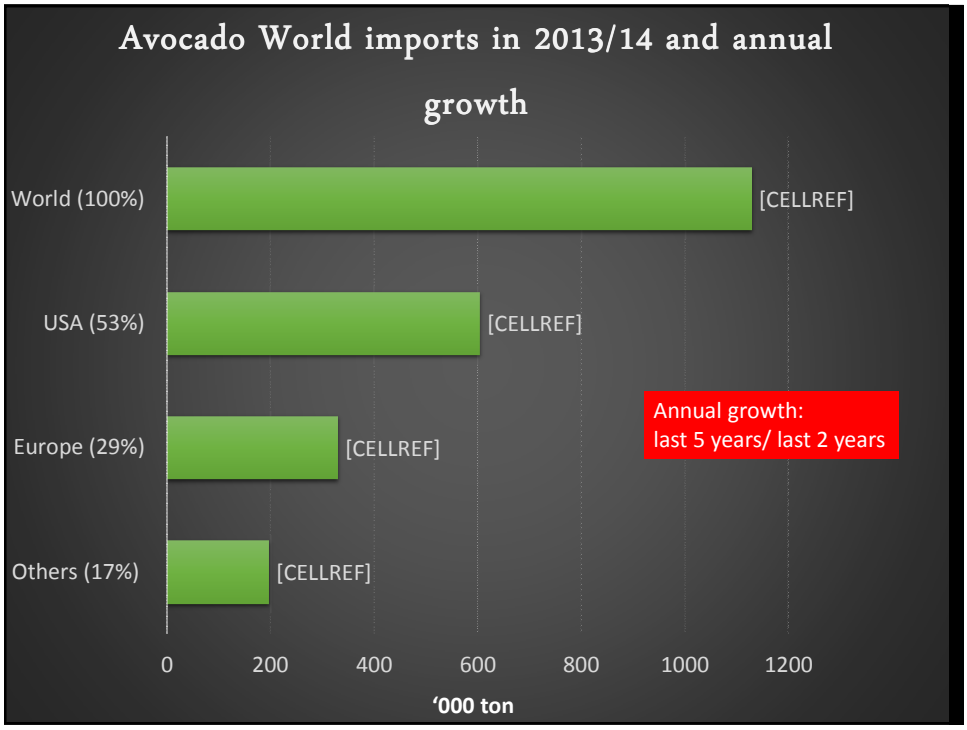


AVO UK Supplier Share of Trade (%)



UK Supermarkets	Sum of 2013 52 weeks	Sum of 2014 52 weeks	YOY Pound growth	YOY % change
ASDA	6 448 214	8 518 823	2 070 608	32.1%
Co-op	1 903 689	2 373 734	470 044	24.7%
Morrisons	6 626 262	8 606 117	1 979 854	29.9%
Ocado	2 057 067	2 685 698	628 631	30.6%
Sainsburys	22 377 283	27 338 143	4 960 859	22.2%
Tesco	25 260 108	31 436 090	6 175 982	24.4%
Waitrose	14 554 894	17 717 868	3 159 974	21.7%
Marks & Spencer	4 239 629	5 597 449	135 782	32.0%
Total Hard Discounters	5 877 998	9 501 914	3 623 915	61.7%
Total	89 345 144	113 775 836	23 205 649	27.3%


World avocado consumption in 2013/14
Per capita consumption in Mexico more than 8kg
G/ CAPITA/ YEAR
3000
2500
2000
1500
1000
500
0
USA
Canada
Switzerland
EU-15
EU-27
Japan
EU NMCs
Russia

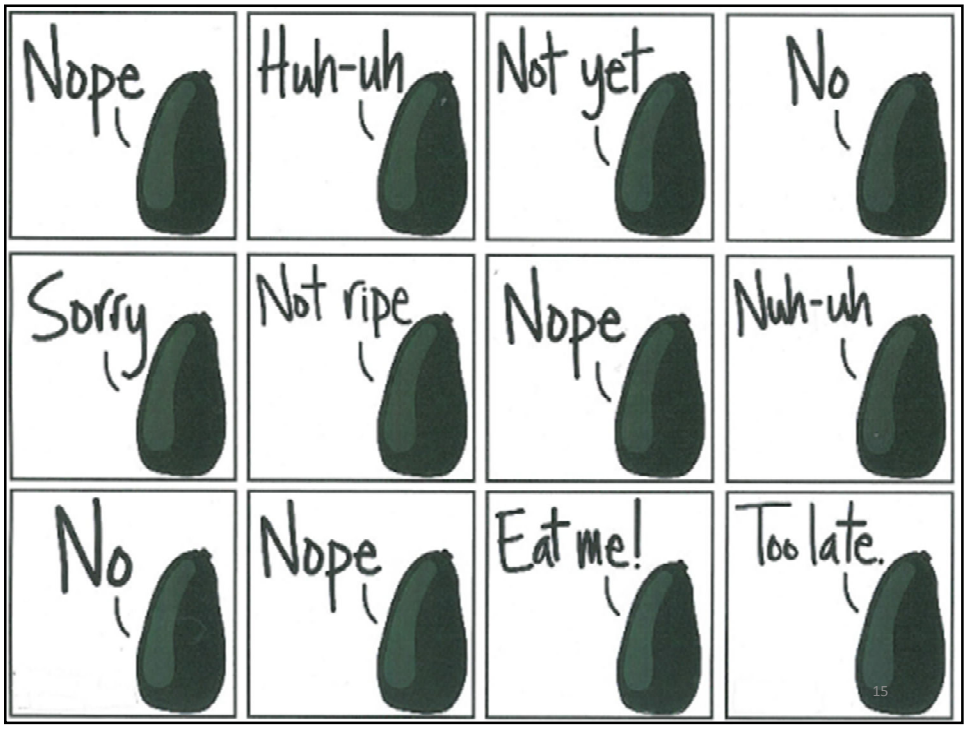

Avocado World imports in 2013/14 and annual growth
World (100%)
[CELLREF]
USA (53%)
[CELLREF]
Europe (29%)
[CELLREF]
Others (17%)
[CELLREF]
Annual growth:
last 5 years/ last 2 years
0
200
400
600
800
1000
1200
'000 ton

Domestic market development

- Various countries also have a strong internal market
  - Mexico consumes up to 50% of its production locally
  - Also true for
    - South Africa
    - Chile
    - Colombia
    - Indonesia
- This places pressure on growing export markets as not enough fruit is available
  - Supply and Demand

What drives local and international market development?

- Population getting to know avocados
  - Consumer education
- Availability not hampered by season
  - Global sourcing- 12 months supply
- Ripening of product (Ready-to-eat produce)


Nope
Huh-uh
Not yet
No
Sorry
Not ripe
Nope
Nuh-uh
No
Nope
Eat me!
Too late.
15


AVOCATS
PRÊTS À DÉGUSTER
Spisemodne Avocado
Indhold: 3 stk. - Nettovaegt: 450g
Str. 22-24
sort: Hass
oprindelse: Chile
Klasse 1
lot: L-032

Domestic Market

"Ready to eat"

Supermarket JUMBO

Convergence vs divergence

- Most fruit crops are moving from having a few select varieties to a range of new and mostly unknown varieties

Golden Delicious
Granny Smith
Royal Gala

Golden Delicious
Granny Smith
Royal Gala
Pink Lady
Jazz apple
Fuji
Braeburn
Gala
Red Delicious
Starking
Top Red

Convergence vs divergence

- Avocados are one of a few, if not the only crop, where the drive is towards 1 cultivar in the market

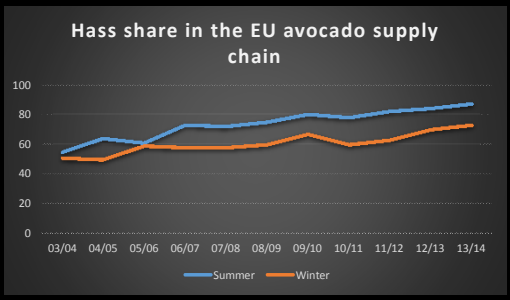
HASS

Convergence vs divergence

- Avocados are one, if not the only crop, where the drive is towards 1 cultivar in the market

HASS

In the USA, Hass dominates the market with > 95% market share, supported by a Hass avocado board only granting market access to Hass for import into the USA; also promoting Hass avocado, and not only avocado as a crop



Sources of new avocado material

- Active breeding and selection of avocado fruiting and rootstock cultivars are limited to a few state-owned research facilities and universities
  - Israel
  - California
  - Mexico?
- Very few private entities (Westfalia) actively selecting and testing
- Chance finds the major source

What makes avocado releases successful?

- Genetic makeup
- Marketing as driving force

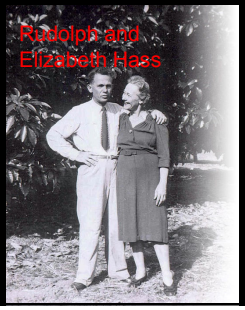
Historic cases of avocado cultivar protection and release

- UPOV database as of 18 July 2015
  - 73 cultivars of avocado protected internationally
  - in 14 countries
  - Approx. 156 country specific PBR protections for avocado were in place
  - Only 16 occurring in more than one country
  - Both South Africa and the USA, had 27 protected cultivars, Australia 17 and Mexico 16

Historic cases of avocado cultivar protection and release

Avocado cultivar

- Protection of avocado plant material was feasible by 1930 in the USA (patent)
- By 1935, 2 avocados were protected by plant patent, one being '**Hass**'
  - Hass was a chance find of a seedling tree on a compost heap



Avocado cultivar

Historic cases of avocado cultivar protection and release

- Protection of avocado plant material was feasible by 1930 in the USA (patent)
- By 1935, 2 avocados were protected by plant patent, one being '**Hass**'
  - Hass was a chance find of a seedling tree on a compost heap
- By 1944, the 'Hass' cultivar was released in California for propagation; no protection were in place at that time outside the USA
- Many of the early Hass growers were small producers, who marketed through a packer that became a specialist in Hass with tailor-made merchandising and promotion.

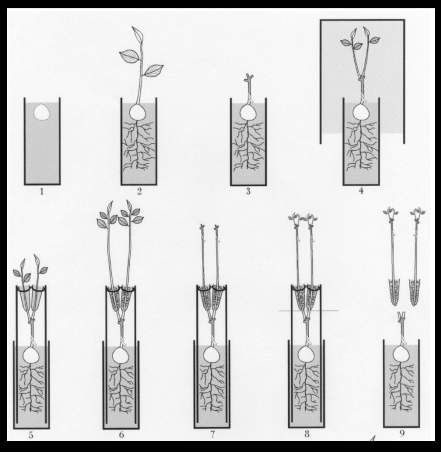
  "no new cultivar makes it on its own - it needs a sponsor, "political" support, and a handler who will learn its eccentricities and back it up"

- Only in late 1960's 'Hass' became a dominant cultivar in the California avocado industry

Avocado rootstock

Historic cases of avocado cultivar protection and release

- Double grafting needed to clonally propagate avocado rootstocks – difficult (Frolich/Allesbeste method)



Historic cases of avocado cultivar protection and release

Avocado cultivar

- South Africa, early 1980's, a healthy tree on seedling rootstock was discovered in a root rot infested orchard at Westfalia
- This tree, later labelled "**Merensky 2**", was surviving
- The selection was distributed internationally for testing; in late 1990's, a PBR application for 'Merensky 2' was lodged in RSA
- Later, the US patent for 'Merensky 2' was granted (US Patent PP15309 P3) and protection in other UPOV countries followed
- By 2011, > 1 million trees of the 'Merensky 2' cultivar were sold, and by 2014, this number reached the 2 million mark
- Presently, 'Merensky 2' is the leading clonal rootstock in the USA, Spain, South Africa and Chile

Historic cases of avocado cultivar protection and release

- Until recently, the most important commercial avocado cultivars were a result of testing and releasing of **chance seedlings** and not products of structured and controlled breeding programs
- 'Hass' itself was a chance seedling
- So was 'Fuerte'
- & 'Pinkerton'
- & the rootstock 'Merensky 2'

Corporate Structure

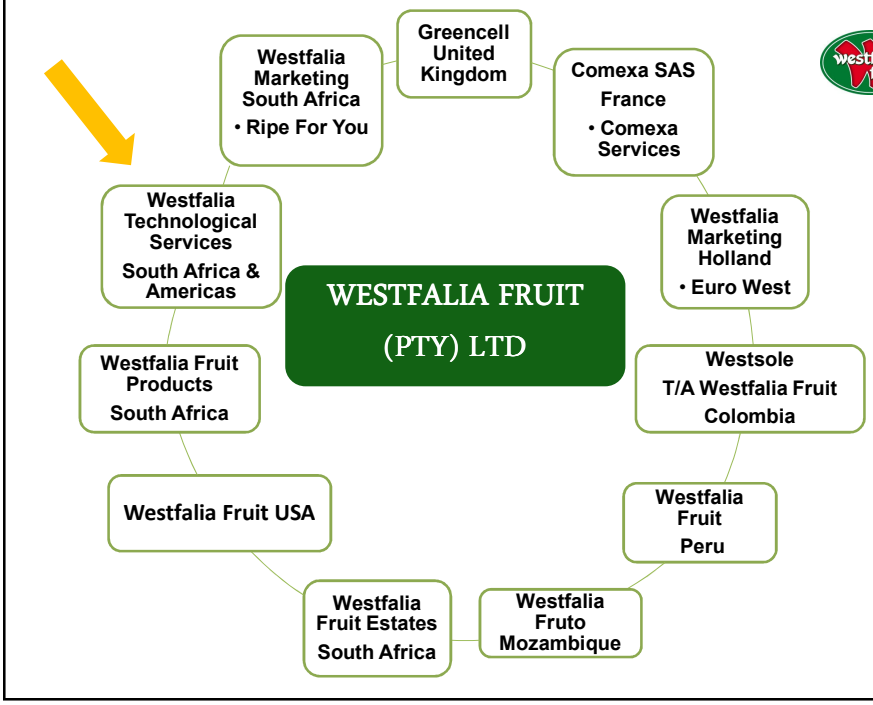
A vertically-integrated bio-resource company….

Hans Merensky Holdings (Pty) Ltd is the parent company of Westfalia Fruit and Merensky Timber.

Westfalia Fruit (Pty) Ltd is a multinational, 12-months-of-the-year supplier of fresh subtropical fruit and related products to international markets

Westfalia grows avocados in its own 2000ha of orchards and processes and packs related products in its factories

Merensky Timber (Pty) Ltd engages in forestry (120 000ha), sawmilling, manufacturing, nurseries, marketing, research and development and production of high-quality timber for furniture, paneling, joinery, laminating and construction.



The WTS Strategic Objective

Provide a

competitive edge in avocado technology

and guide technical support for

national and international

expansion of avocado production and trade

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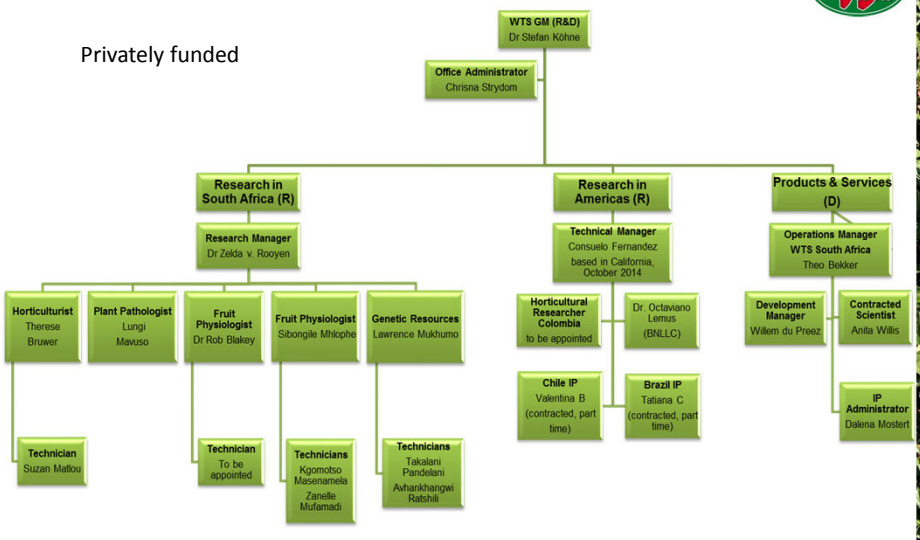
WTS Team

Privately funded



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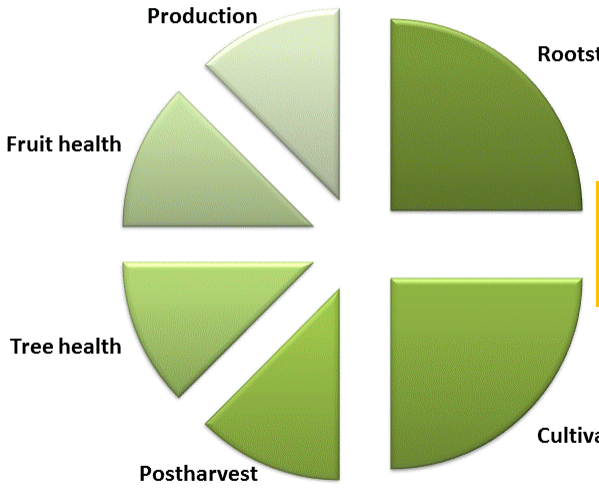
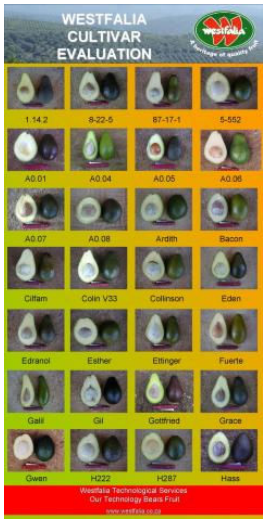
WTS research review



50% of time and effort on rootstock and cultivar development

Team: Horticulturalists Fruit Physiologists Plant Pathologists

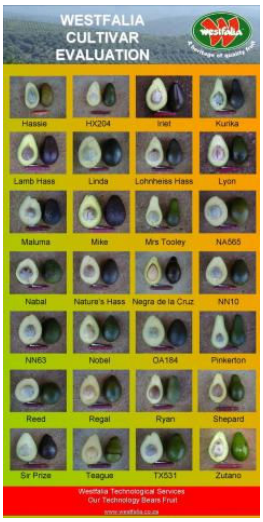
Avocado Cultivar Research



WTS has been involved in the collection, conservation, evaluation and development of avocado genetic material for over 40 years

Aim:

- Find avocado cultivars with superior quality / productivity when compared to present commercial cultivars
- Extend the season for year-round avocado supply



Cultivar Research : Hass Benchmark

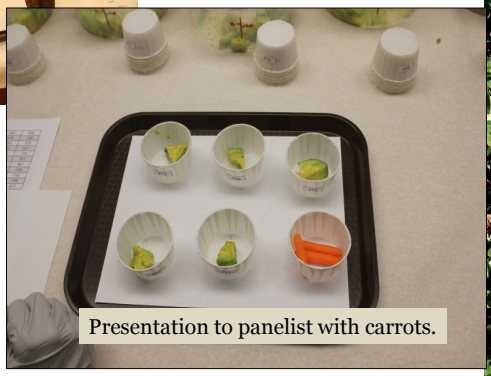
Hass

- Hass is the benchmark in avocados
- Worldwide, Hass is the leading avocado in the export/import trade
- Hass is an 'open' cultivar, i.e. can be grown and traded freely
- WTS has tested dozens of new avocado cultivars, in an attempt to 'beat' or complement Hass
- Good progress was made, and two superior new avocados were selected

Comparative Trials

3 phase testing and development; up to 20 years from initial selection to protection

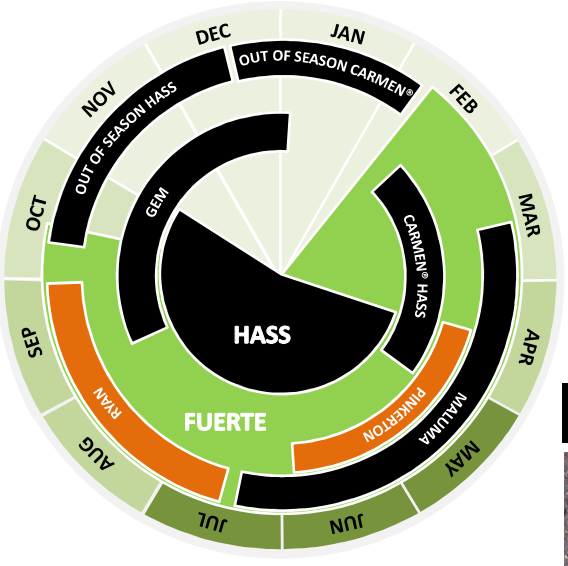
Setting up bites of avocado for tasting.



Presentation to panelist with carrots.

Organoleptic testing

Extend avocado harvest season in Southern Africa



Carmen®-Hass

Hass

Gem®

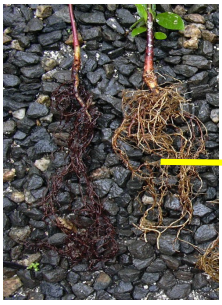
Avocado rootstock research

WTS rootstock breeding & selection program has been running

for ca. 40 years

Variability in avocado tree performance due to root rot !
Wanted: uniform superior tree health and yield, through clonal rootstock

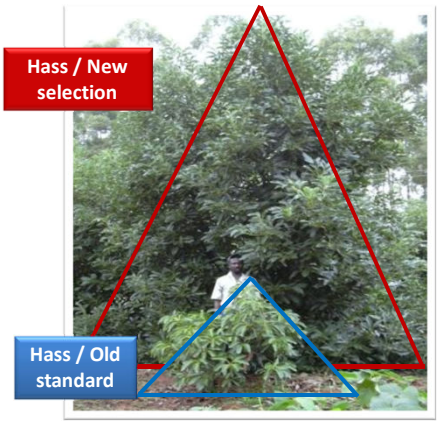
Rootstock development – phase 1



Healthy seedling selections cloned

Rootstock development- phase 2

Huge influence of rootstock on productivity, susceptibility to root rot disease and tolerance of difficult soil and water conditions



- Trees planted (same day) in the field under very high root rot pressure
- Monitor tree health and yield
- Select the best rootstock and take into commercial testing

Rootstock development- phase 3

Test material on large scale to test feasibility for commercial release

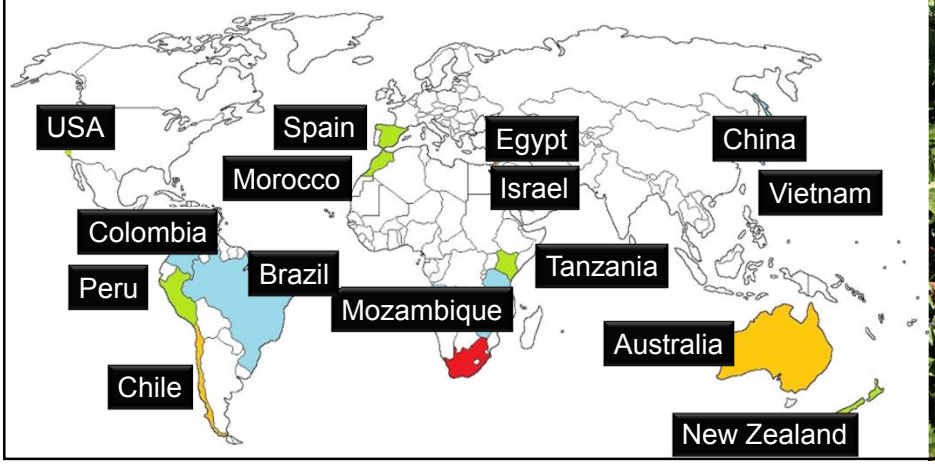
Phase 1 to 3 may take up to 25 years before material is commercially released

- Trees planted (same day) in the field under commercial management
- Monitor tree health and yield
- See if new rootstock selections give any advantage over current commercial standard
- **Material is only NOW protected by PBR**

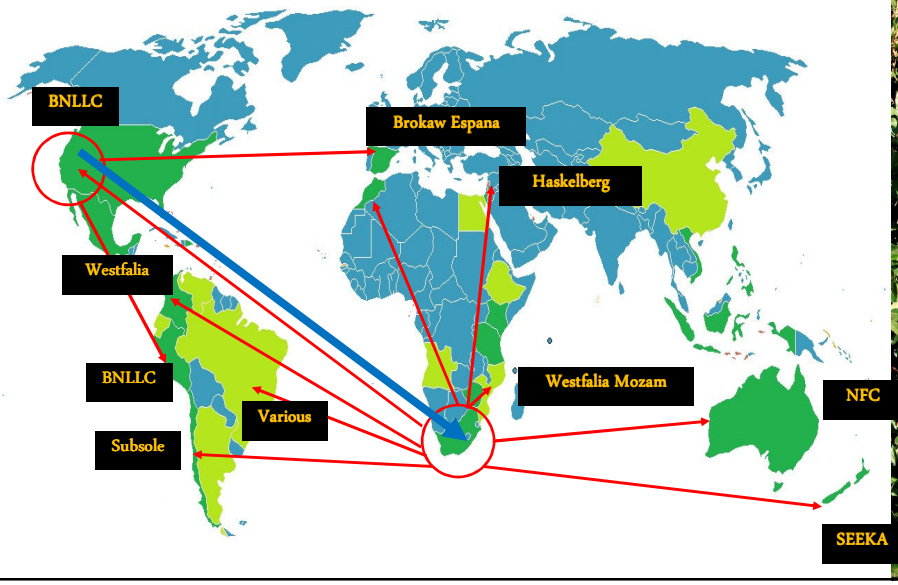
Intellectual Property (IP)

INTERNATIONAL EXPANSION AROUND WESTFALIA MANAGED IP

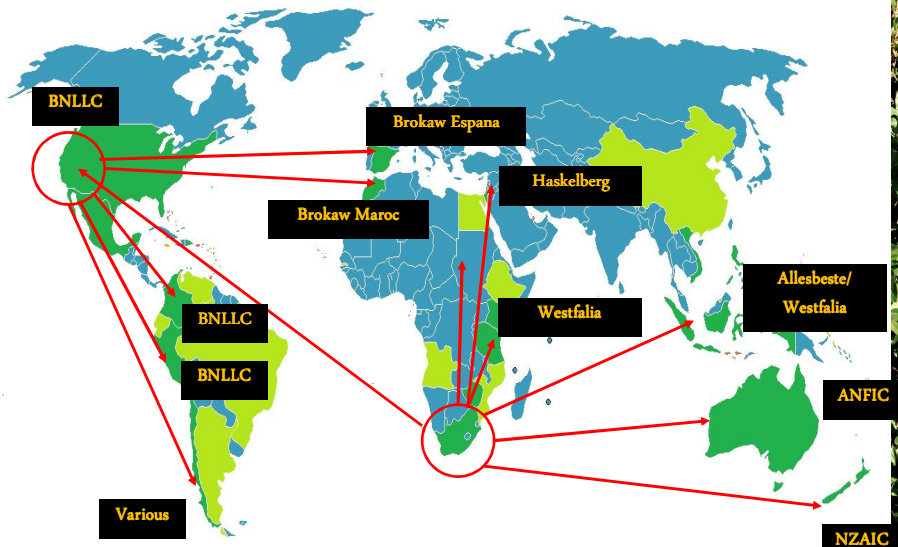
Technical hubs - basis for Westfalia's future supply of fruit. Central and South America, Southern Africa, Egypt and Vietnam have been identified as key regions.



Licensing & commercialisation: GEM®

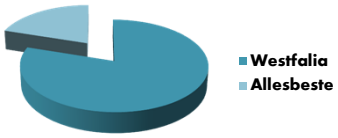


Licensing & commercialisation: Dusa®

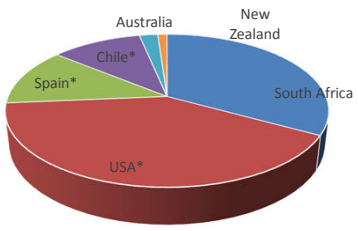


Licensing & commercialisation: Dusa®

National Dusa® sales by nurseries



International Dusa® sales by country



COUNTRY	# TREES SOLD '11	# TREES SOLD '13
South Africa	102 200	119 600
USA*	98 100	147 300
Spain*	31 100	44 500
Chile*	12 100	39 100
Australia	2 300	8 000
New Zealand	3 700	4 000
TOTAL	249 500	362 500

*Brokaw Nursery LLC: the largest international Dusa® licensee

Licensing & commercialisation: Dusa®

Partnerships and nurturing of relationships very important

Top: Brokaw Nursery, Saticoy, California.
Right: Large new Hass plantings on Dusa ® in Ventura county, California.

Offering something different

MARULA

AMARULA AND THE MARULA SYNERGY

BACKGROUND – Amarula Brand

- Currently 2 brands in the Amarula profile
  - **Amarula cream liquor**
  - **Amarula gold liquor.**
- Amarula cream is available in more than 100 countries across the world and is one of South Africa's largest export brand.
- Developed in 1983 as a clear spirit liquor and then in 1989 transformed to a cream liquor.
- In 2013 Amarula gold was introduced to the market, a Marula liquor without a cream base.

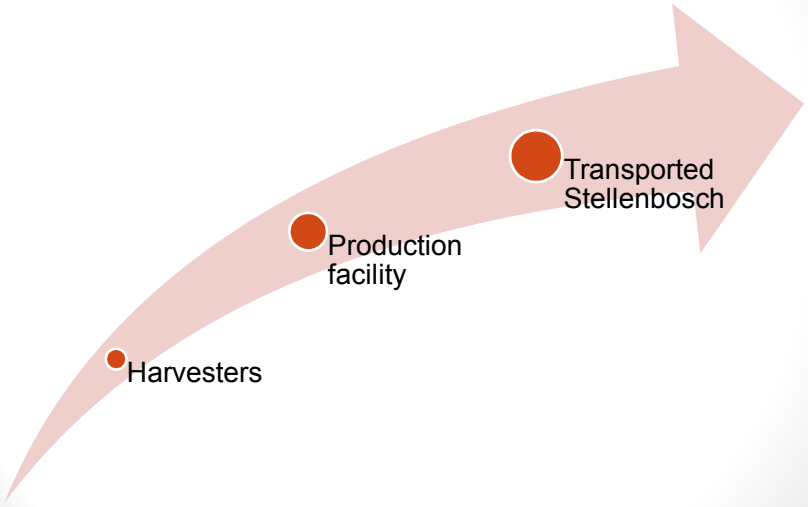
Marula to Amarula journey

Harvest and De-Stoning → Fermentation and Distilling → Ageing process → Blending and Bottling

De-stoning Plant– Mirma Products

- Established in 1994 by Thys Slabbert in Phalaborwa as a Marula processing plant.
- 1998 JV with Distell for the supply of Marula fruit pulp to be used in the production of Amarula cream.
- Current factory has 6 full time employees and 77 seasonal workers.
- 2015 - 3500 tons of fruit was processed.

Marula Supply Chain



Harvesting Process

- **Collect fruit from 16 villages in 3 regions**
- Southern region – Acornhoek (4 communities) – 10%
- Central region – Ba-Phalaborwa (8 communities) – 85%
- Northern region – Bochum (4 communities) – 5%

Harvesting and the Rural Community

- No commercial farming.
- Harvesters from small cooperatives.
- Estimated 750 harvesters per season.
- 52 collection points with the rural communities.
- Cash VS collection transaction.
- Open market system no application requirement to supply fruit.
- Area and purchase price negotiated on a formal structure that involves the traditional leaders of the three areas.
- Commercial value of the harvest above R2 million per season.

Mirma Products - Social Impact

- Mirma Development has in the last 5 years:
  - Built Edenburg Clinic that attends to 1 200 patients per month.
  - Built Kheyi village crèche – 85 pupils.
  - Sunk and equip 3 boreholes in the areas of Dumphries, Kheyi and Bochum.
  - Built flush toilets and jungle gyms at Maseke, Majeje and Mashishimale day care centres.
  - Did 24 outreach days that included soup kitchens, sweets parcels and water bucket hand-outs to 24 different school and hospitals in the harvest regions.
  - Research partners with various universities regarding product development around the Marula.

Sustainability of the Marula

- Mirma products impact on the total Marula harvest.
  - Currently 489 rural villages in Limpopo.
  - 65% of these villages have Marula trees in the geographical area of a 0-25km.
  - Total of 317 villages have access to Marula fruit in their living environment - Mirma product collects fruit from 16 of these villages (5%).
  - High density area of Bochum 76 villages – Mirma collects from 4 of them and less than 5% of their possible harvest.
  - Ba-Phalaborwa harvest to Mirma products less than 20% of the possible harvest in the area.

Limpopo and the Marula

- Region is 123 900 km_2
- 89% of Limpopo population live in non-urban areas.
- 54.6% of the population is female.
- Rural ladies use their natural surrounding to supplement their income e.g. Marula drinks, Mopani worms, clay brick making ext.
- The necessity to develop other retail products like Amarula cream on large scale so that rural communities can benefit sustainably from what nature provides them.

Possibilities within the Marula

- Pulp:
  - Fruit juice
  - Vinegar
  - Various retail products as Marula infused yogurts, relish ext.
- Nuts
  - Marula oil
  - Nut cake
- Kernels
  - Charcoal production
- Skins
  - Archar production
- There is currently enough fruit to sustain a number of commercial viable enterprises within a commercial food and cosmetic processing industry.
- Fruit available not only in Limpopo but in Mpumalanga, North-West and Northern parts of KZN.

Mirma product – Research Development

- We have monitored and are still monitoring 5 Marula trees in 5 different areas:
  - Rainfall.
  - Climate – weekly.
  - Size of tree in trunk and canopy – every 6 months.
  - Amount of fruit harvested per year – every year.
  - Additional factors like fire, hail storms, ext. are documented.
- The fruit from these trees are then documented for:
  - Harvest time start to end.
  - Kg quantity of the harvested.
  - Average size of the fruit harvested.
  - Brix's of the fruit harvested.
- All this data is then accumulated and used in various methods. We then determine what influence the weather and natural surroundings has on the fruit production of the Marula tree.

Thank you

[Annex VI follows]

ANNEX VI

LIST OF LEADING EXPERTS

DRAFT TEST GUIDELINES TO BE SUBMITTED TO THE TECHNICAL COMMITTEE IN 2016

All requested information to be submitted to the Office of the Union

by October 9, 2015

Species	Basic Document(s)	Leading expert(s)	Interested experts (States/Organizations)[1]
Avocado rootstock (*Persea* Mill.)	TG/PERSE(proj.2)	Mr. Alejandro Barrientos-Priego (MX)	AU, BR, IL, NZ, QZ, ZA, Office
*Coconut (*Cocos nucifera* L.)	TG/COCOS(proj.4)	Mrs. Machado (BR)	CN, ID, MX, MY, OM, PH, TH, VN, Office

[1] for name of experts, see List of Participants

DRAFT TEST GUIDELINES TO BE DISCUSSED AT TWF/47
(* indicates possible final draft Test Guidelines)

(Guideline date for Subgroup draft to be circulated by Leading Expert: August 5, 2016
Guideline date for comments to Leading Expert by Subgroup: September 2, 2016)

New draft to be submitted to the Office of the Union
before September 30, 2016

Species	Basic Document(s)	Leading expert(s)	Interested experts (States/Organizations) [2]
Apricot (*Prunus armeniaca* L.) (Revision)	TG/70/4 Rev., TWF/46/23	Mr. Venter (ZA)	CN, ES, FR, HU, IL, JP, KR, MA, NZ, RO, QZ, Office
Argania (*Argania spinosa* (L.) Skeels)	New	Ms. Ibtihaj Belmehdi (MA)	IL, Office
Blueberry (*Vaccinium angustifolium* Aiton; *V. corymbosum* L.; *V. formosum* Andrews; *V. myrtilloides* Michx.; *V. myrtillus* L.; *V. virgatum* Aiton; *V. simulatum* Small) (Revision)	TG/137/5(proj.1)	Mr. Nik Hulse (AU)	BR, CA, JP, NZ, PL, PT, QZ, RO, ZA, Office
Chestnut (*Castanea sativa* Mill.) (Revision)	TG/124/4(proj.2)	Mr. Takeshi Esaki (JP)	CN, ES, FR, HU, KR, NZ, QZ, ZA, Office
Black Walnut (*Juglans nigra* L.)	TG/JUGLA(proj.2)	Ms. Victoria Colombo (ES)	CN, KR, QZ, ZA, Office
Date Palm (*Phoenix dactylifera*)	New	Mr. Rashid Al-Yahyai (OM)	AU, BR, IL, MA, MX, TN, Office
Macadamia *(Macadamia integrifolia* Maiden et Betche, *Macadamia tetraphylla* L.A.S. Johnson) (Revision)	TG/111/4(proj.1)	Mr. Nik Hulse (AU)	BR, KE, MX, ZA, Office
Papaya (*Carica papaya* L.) (Revision)	TG/264/2(proj.7)	Mr. Alejandro Barrientos-Priego (MX)	BR, CN, IL, JP, KE, MY, OM, PH, QZ, TH, VN, ZA, CIOPORA, Office
Pear Hybrids (*P. xbretschneideri* Rehder; *P. xlecontei* Rehde; *P. ussuriensis* Maxim.)	TG/PYRUS(proj.1)	Mr. Chris Barnaby (NZ)	AU, BR, CN, DE, ES, FR, HU, JP, MA, QZ, RO, ZA, Office
Pistachio (*Pistacia* L.)	New	Ms. Urszula Braun-Mlodecka (QZ)	IT, MX, ZA, Office
Physic Nut (*Jatropha curcas* L.)	New	Mr. Alejandro Barrientos-Priego (MX)	BR, IL, QZ, Office
*Walnut (*Juglans regia* L.) (Revision)	TG/125/7(proj.3)	Ms. Dong Pei (CN)	ES, FR, HU, JP, KR, QZ, ZA, Office

[End of Annex VI and of report]

[2] for name of experts, see List of Participants