



TWA/45/25

ORIGINAL: English

DATE: July 15, 2016

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL WORKING PARTY FOR AGRICULTURAL CROPS**Forty-Fifth Session
Mexico City, Mexico, July 11 to 15, 2016**

REPORT

*adopted by the Technical Working Party for Agricultural Crops**Disclaimer: this document does not represent UPOV policies or guidance*

1. The Technical Working Party for Agricultural Crops (TWA) held its forty-fifth session in Mexico City, Mexico, from July 11 to 15, 2016. The list of participants is provided in Annex I to this report.
2. The TWA was welcomed by Ms. Graciela Ávila Quezada on behalf of the Minister of Agriculture, Livestock, Rural Development, Fisheries and Food, Mr. José Eduardo Calzada Roviroso, and by Mr. Manuel Rafael Villa Issa, Director General, National Service of Seed Inspection and Certification (SNICS). A copy of the welcome address by Ms. Ávila Quezada is provided in Annex II to this report.
3. The session was opened by Mr. Tanvir Hossain (Australia), Chairman of the TWA, who welcomed the participants and thanked Mexico for hosting the TWA session.
4. The TWA received a presentation on plant variety protection in Mexico by Mr. Eduardo Padilla Vaca, Director of Plant Varieties Registry, SNICS, a copy of which is provided in Annex III to this report.

Adoption of the Agenda

5. The TWA adopted the agenda as presented in document TWA/45/1 Rev.

Short Reports on Developments in Plant Variety Protection*(a) Reports on developments in plant variety protection from members and observers*

6. The TWA noted the information on developments in plant variety protection from members and observers, provided in document TWA/45/22 Prov. The TWA noted that reports submitted to the Office of the Union after July 8, 2016, would be included in the final version of document TWA/45/22.
7. The TWA noted that Mr. Bert Scholte had been appointed as Head of the Department Variety Registration in the Naktuinbouw from November 1, 2016.

(b) Reports on developments within UPOV

8. The TWA received a presentation from the Office of the Union on latest developments within UPOV, a copy of which is provided in document TWA/45/16.

Molecular Techniques

9. The TWA considered documents TWA/45/2 and TWA/45/2 Add.

Developments in the Technical Working Parties

10. The TWA noted the developments in the Technical Working Parties (TWPs) and the Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular (BMT), as set out in document TWA/45/2, paragraphs 5 to 15.

Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular (BMT)

11. The TWA noted that the BMT, at its fifteenth session, held in Moscow from May 23 to 27, 2016, had been invited to develop a list of possible joint initiatives with the Organization for Economic Co-operation and Development (OECD) and the International Seed Testing Association (ISTA), including the development of a list of terminology (definitions) used by OECD, UPOV and ISTA for consideration at the Technical Committee (TC), at its fifty-third session, to be held in 2017.

12. The TWA noted that the BMT had:

- noted that the development of a joint document explaining the principal features of the systems of the OECD, UPOV and ISTA could only start after agreement by OECD and ISTA;
- noted that the development of a joint OECD/UPOV/ISTA document containing an inventory of molecular marker techniques used by crop could only start after agreement by OECD and ISTA;
- noted that OECD, ISTA and UPOV had different objectives and cooperation between the organizations in the use of molecular techniques would need to reflect that. However, the BMT agreed that it would be important to explore circumstances in which the same techniques and information could be used. In the first instance, it agreed that it would be more effective to explore such possibilities on the basis of real situations rather than at a theoretical and institutional level;
- welcomed the proposal by the Netherlands to organize a practical workshop in 2017, with support from UPOV, OECD and ISTA, to explore how molecular techniques might be applied in an efficient way for UPOV, OECD and ISTA purposes; and
- agreed that possible future collaboration between UPOV, OECD and ISTA might include the harmonization of terms and methodologies used for different crops and the possible development of standards, after the agreement by these organizations.

OECD/UPOV/ISTA Joint Workshop on Molecular Techniques

13. The TWA noted that a Joint OECD/UPOV/ISTA/AOSA (Association of Official Seed Analysts) Workshop on Biochemical and Molecular Methods had been held in Paris on June 8, 2016, and noted that the following recommendations of the Joint OECD/UPOV/ISTA/AOSA Workshop had been approved by the Annual Meeting of the OECD Seed Schemes, held in Paris on June 9 and 10, 2016:

- To develop a joint document explaining the principal features (e.g. DUS, variety identification, variety purity, etc.) of the systems of OECD, UPOV, AOSA and ISTA and, for mutual understanding, to repeat the joint workshop at relevant meetings of the OECD and ISTA;
- To carry out a joint inventory by UPOV, OECD, AOSA and ISTA of the use of molecular marker techniques, by crop, with a view to developing a document containing that information. The OECD will contribute to the document by sharing the ongoing list of molecular techniques used by National Designated Authorities (NDAs) and continuously collected by the Secretariat;

- To develop a list of terms and their definitions as used by OECD, UPOV, AOSA and ISTA and to make an attempt to harmonize these;
- To consider organizing another similar workshop in three years' time; and
- To consider replacing "internationally validated" by another term such as "internationally harmonized."

14. The Annual Meeting endorsed the proposal of the Netherlands to organize a practical workshop in 2017, with support of the OECD, UPOV and ISTA, to explore how molecular techniques might be applied in an efficient way for UPOV, OECD and ISTA purposes.

Presentation of information on the situation in UPOV with regard to the use of molecular techniques

15. The TWA noted that the TC, at its fifty-second session, had agreed a 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, as set out in document TWA/45/2, paragraph 23, and that, subject to agreement by the Administrative and Legal Committee (CAJ), at its seventy-third session, and the Consultative Committee, at its ninety-second session, the draft would be presented for adoption by the Council, at its fiftieth ordinary session to be held in Geneva on October 28, 2016.

TGP documents

16. The TWA considered documents TWA/45/3 and TWA/45/3 Add.

Matters for adoption by the Council in 2016

17. The TWA noted the revisions to documents TGP/7, TGP/8 and TGP/0 to be put forward for adoption by the Council at its fiftieth session, as set out in paragraphs 6 to 13 of document TWA/45/3.

Possible future revisions of TGP documents

18. The TWA noted that the proposals for future revisions of TGP documents to be discussed by the TWPs at their sessions in 2016 would be dealt with under separate documents.

New proposals for future revisions of TGP documents

19. The TWA noted the new proposals for revision of TGP documents to be discussed by the Technical Working Party for Fruit Crops (TWF) at its forty-seventh session in 2016 on "Duration of DUS tests in the fruit sector" and "Definition of 'recurved'", as set out in document TWA/45/3, paragraphs 17 to 24.

Program for the development of TGP documents

20. The TWA noted the program for the development of TGP documents, as set out in Annex III to document TWA/45/3.

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

21. The TWA considered document TWA/45/9 and received a demonstration from the Office of the Union of Version 1 of the web-based TG Template.

22. The TWA noted the issues addressed in response to the comments by Leading and Interested Experts that participated in the testing of the prototype of the web-based TG Template, as set out in paragraphs 21 and 22 of document TWA/45/9.

23. The TWA agreed that the period for Leading Experts to draft Test Guidelines using the web-based TG Template should start shortly after the respective TWP session.

24. The TWA noted that the TC had agreed the format of the Table of Characteristics in all Test Guidelines with a structure as set out in paragraph 16 of document TWA/45/9.

25. The TWA noted that the TC had agreed that guidance should be developed on the order of the methods of observation for a characteristic in the Table of Characteristics to indicate that the most commonly used method was displayed first.

26. The TWA noted that the development of Version 2 of the web-based TG Template would not start before 2018, subject to availability of resources, after Version 1 had been fully stabilized and tested.

27. The TWA noted that document TGP/7 would be revised to reflect the introduction of the web-based TG Template after Version 1 is fully stabilized and tested.

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

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

28. The TWA considered document TWA/45/10.

29. The TWA noted that the TC, at its fifty-second session, had agreed to request members of the Union to provide larger data sets to the United Kingdom for developing probability levels for the new method that would match results obtained using the previous probability levels, as set out in paragraph 20 of document TWA/45/10.

30. The TWA noted that the Office of the Union had issued UPOV Circular E-16/098 to invite UPOV members' experts to provide to the United Kingdom by May 27, 2016, data sets including at least 100 candidate varieties, with a possibility that data for those 100 varieties could be derived from several years.

31. The TWA noted the report by an expert of the United Kingdom on the results and further progress, including contribution of data sets, made at the thirty-fourth session of the Technical Working Party on Automation and Computer Programs (TWC).

32. The TWA noted the report from the expert from Denmark that the software provided by the United Kingdom had been tested and that a data set on oilseed rape varieties would be provided to support the development of probability levels for the new method of calculation of COYU.

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

33. The TWA considered document TWA/45/11.

34. The TWA considered the proposed guidance for examining DUS in bulk samples as presented in the Annex to document TWA/45/11, for inclusion in a future revision of document TGP/8.

35. The TWA noted that the TC had agreed to invite the Netherlands to develop guidance, with the inclusion of examples, for examining DUS in bulk samples, and agreed that the following criteria proposed by the TC were a good basis for inclusion in a future revision of document TGP/8 (see document TWA/45/11, paragraph 22):

(a) "the characteristic should fulfill the requirements of a characteristic, as set out in the "General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of new Varieties of Plants" (see document TG/1/3, Section 4.2.1);

(b) "there should be knowledge of the genetic control of the characteristic;

(c) "the suitability of the characteristic should be validated through an initial assessment of uniformity on individual plants;

(d) "information on plant-by-plant variation and differences between growing cycles should be provided (data from routine measurement of the characteristic from different years);

(e) "a full description of the method of assessment should be provided;

(f) "states of expression should be based on existing variation between varieties considering environmental influence."

36. The TWA agreed with the TWV that the proposed guidance did not present enough examples for examining DUS characteristics on the basis of bulk samples and that the drafter should be requested to further elaborate the proposal including more examples, as requested by the TC, at its fifty-second session. The TWA agreed that further development of guidance on bulk samples should be subject to the availability of appropriate examples with data from routine measurement of characteristics such as chemical content or 1000 seed weight.

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

37. The TWA considered document TWA/45/12 and noted the developments reported in that document.

38. The TWA noted that the expert from the United Kingdom in the practical exercise to determine the aspects in common and divergence among methods had provided information to the TWC on the reasons and situations in which example varieties, crop expert judgement and equal-spaced states would/would not be appropriate for transforming observations into notes.

39. The TWA agreed with the TWC that the study on the comparison of methods used for producing variety descriptions should continue to be developed to provide further information to explain the results obtained in the practical exercise.

40. The TWA considered the table presented in document TWA/45/12, Annex I, page 2, "Results by Method" with the notes attributed to the 31 candidate varieties using the methods described in the practical exercise. The TWA noted that candidate varieties were sorted by "average note by variety" values and agreed to propose sorting by values in the "over-years means" column to facilitate interpretation of results.

41. The TWA agreed with the TWC that participants in the practical exercise should provide a short description of the methods used to transform measurements into notes and examples where the methods would and would not be appropriate. The TWA noted the report by an expert from the United Kingdom that information had already been provided to the TWC.

42. The TWA received a presentation on "Genotype by Environment Interaction (GEI) - DUS test and data transformation into notes" by an expert from Italy. A copy of the presentation is provided in the Annex to document TWA/45/12 Add. The TWA agreed on the relevance of the information provided on genotype by environment interaction for possible future guidance on converting observations into notes and for producing variety descriptions.

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

43. The TWA considered documents TWA/45/13, TWA/45/13 Add. and TWA/45/13 Add.2.

44. The TWA received a presentation on "Assessing uniformity by off-types on the basis of more than one growing cycle. Drafting guidance" by experts from Germany and the United Kingdom by electronic means. A copy of the presentation is provided in document TWA/45/13 Add.

45. The TWA also received a presentation on "Practical experience of assessing uniformity by off-types on oilseed rape and cauliflower" by an expert from France. A copy of the presentation is provided in document TWA/45/13 Add.2.

46. The TWA, in conjunction with TWC experts via video link, considered the draft guidance as presented in Annexes I and II to document TWA/45/13 for inclusion in a future revision of document TGP/10, including the new proposed "Approach 3: Combining the results of two growing cycles".

47. The TWA agreed with the TWC that guidance should provide parameters for decisions on the most suitable approach based on experience from members. The TWA agreed to provide examples comparing the possible effect on uniformity decisions between Approach 3 and other approaches. The TWA welcomed the offers from France, Germany, the Netherlands, Poland and the United Kingdom to provide examples to be presented at its forty-sixth session.

48. The TWA agreed with the TWC on the importance of identifying whether differences in number of off-types between growing cycles were due to biological reasons or sampling variation and agreed that results from growing cycles using different lots of plant material should not be combined.

49. The TWA noted the concern expressed by some members that the assessment of uniformity on the basis of combining different growing cycles may not be consistent with existing guidance in document TGP/8, Part I, Section 1.2.2 and in particular 1.2.2.7 on independent growing cycles and agreed to further consider this issue on the basis of examples to be provided at its forty-sixth session.

50. The TWA agreed with the TWV that, in conjunction with the revision of document TGP/10 on "Assessing uniformity by off-types on basis of more than one growing cycle or on the basis of sub-samples", it would be important to review the guidance provided in document TGP/8: Part II: 8: "The method of uniformity assessment on the basis of off-types", Section 8.1.7 "Method for more than one single test (year)", because it did not reflect the practice within members of the Union.

51. The TWA noted the concern expressed by the representatives of ESA and CropLife about Approach 3, and noted the importance they attached to consistency in the approaches for the assessment of uniformity throughout all members of the Union.

Experiences on matters concerning variety descriptions

52. The TWA considered documents TWA/45/14, TWA/45/14 Add. and TWA/45/14 Add.2.

53. The TWA noted the purpose of the variety description developed at the time of the granting of the breeder's right (original variety description), and the status of the original variety description in relation to the verification of the conformity of plant material to a protected variety for enforcement of the breeder's right, as set out in document TWA/45/14, paragraph 28.

54. The TWA noted the presentations on "Matters concerning variety descriptions" received by the TWPs, at their sessions in 2015, as set out in document TWA/45/14, paragraph 7.

55. The TWA noted the comments by the TWPs, at their sessions in 2015, on matters concerning variety descriptions and the role of plant material used as the basis for the DUS examination, as set out in document TWA/45/14, paragraphs 8 to 26.

56. The TWA agreed that the description of a variety had limitations due to its link to the circumstances of the DUS examination but agreed that it was an important element of the plant variety protection system.

57. The TWA noted the following presentations made by experts on their experiences with regard to the role of plant material used as the basis for the DUS examination in relation to matters presented in document TWA/45/14, paragraph 31 (in alphabetical order):

Australia	Variety Descriptions in Australia
European Union	Updating Variety Descriptions - Outcome of the Survey
Germany	Development and Use of Variety Descriptions

58. The TWA noted that the presentations by the experts from the European Union and from Germany were available in Annexes I and II to document TWA/45/14 Add., and the presentation by the expert from Australia was available in the Annex to document TWA/45/14 Add.2.

Number of growing cycles in DUS examination

59. The TWA considered documents TWA/45/15 and TWA/45/15 Add.

60. The TWA noted that the TC, at its fifty-second session, had agreed to invite members of the Union to simulate the impact of using different numbers of growing cycles on DUS decisions using actual data and to report on their results at the TWP sessions in 2016 and at the fifty-third session of the TC. The TWA agreed that the simulation of impact of using different numbers of growing cycles on DUS decisions should take into consideration the quality of variety descriptions.

61. The TWA received a presentation by an expert from the Netherlands, as reproduced in the Annex to document TWA/45/15 Add.

62. The TWA welcomed the offers from France, Germany, the Netherlands, Poland and the United Kingdom to simulate the impact of using different numbers of growing cycles on DUS decisions and the quality of variety descriptions using actual data and to report on their results at the TWA at its forty-sixth session.

Uniformity assessment

63. The TWA noted that document TWA/45/13 “Assessing uniformity by off-types on the basis of more than one growing cycle or on the basis of sub-samples” had been discussed under agenda item 5 “TGP documents” as set out in paragraphs 43 to 51 of this Report.

Proposal to the “Guide to the UPOV Code System” on the Principal Botanical Name for Inter-generic and Interspecific Hybrids

64. The TWA considered document TWA/45/18 and received a presentation by an expert from the European Union.

65. The TWA noted that the TC, at its fifty-second session, had agreed to invite the European Union to make a proposal to the TWPs, at their sessions in 2016, for a revision of the Guide to the UPOV Code System with regard to UPOV codes for hybrid genera and species.

66. The TWA considered the proposal to present the principal botanical name for UPOV Codes of hybrid genera and species indicating the parents in alphabetical order. The TWA noted the existence of different procedures among members of the Union and noted that, in some members of the Union, the information on parents of an intergeneric or interspecific hybrid variety were published with the female parent first. On that basis, the TWA agreed with the TWV that it would not be appropriate to revise the Guide to the UPOV Code System in relation to the principal botanical name for inter-generic and interspecific hybrids.

Impact of endophytes on DUS characteristics in grasses

67. The TWA received a presentation on the “Impact Analysis of Endophytes on the Phenotype of Varieties of *Lolium perenne* and *Festuca arundinacea*” by an expert from the Community Plant Variety Office of the European Union (CPVO), a copy of which is provided in the Annex to document TWA/45/24.

68. The TWA noted there had been no interaction between the endophytes studied and expression of the DUS characteristics on the crops studied. The TWA agreed that it would not be possible to make a general recommendation on the effect of endophytes in DUS characteristics due to the possibility of positive interaction between other endophytes and the expression of DUS characteristics.

69. The TWA noted the report that New Zealand would consider the requirement for endophyte-free plant material for DUS examination and welcomed the offer to make a presentation on the outcome of discussions to the TWA at its session in 2017.

70. The TWA welcomed the offer by the European Union to make a presentation on the outcome of discussions in the CPVO and the offer by Mexico to make a presentation on the impact of endophytes on DUS characteristics in grasses at its forty-sixth session.

Statistical methods for visually observed characteristics

71. The TWA considered document TWA/45/23.

72. The TWA noted that China had made a presentation at the thirty-fourth session of the TWC to describe the statistical methods used in the DUSTC software package for the analysis of distinctness and uniformity.

73. The TWA noted that the TWC had agreed that appropriate naming and drafting guidance on the method developed by experts from Denmark and Poland should be considered once further experience had been acquired and software was available to facilitate its use in DUS examination.

74. The TWA noted that the expert from France would make a report to the TWC, at its thirty-fifth session, to be held in 2017, on the study to develop software to implement the method developed by experts from Denmark and Poland.

Experiences with new types and species

75. No reports on experiences with new types and species were made during the forty-fifth session of the TWA.

Possible revision of the Test Guidelines for Rice

76. The TWA considered document TWA/45/21.

77. The TWA agreed to propose a full revision of the Test Guidelines for Rice (document TG/18/8) to be coordinated by Japan. The proposal made by IRRI, as presented in document TWA/45/21, would be taken into consideration.

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

Cassava (Manihot esculenta Crantz.)

78. The TWA considered documents TWA/45/19 and TG/CASSAV(proj.6).

79. The TWA considered the information provided by the Leading Expert in response to the request by the TC-EDC and agreed to propose the Test Guidelines for Cassava for adoption by the TC at its fifty-third session, on the basis of the changes to document TG/CASSAV(proj.6) presented in Annexes I and II to document TWA/45/19.

Urochloa (Urochloa)

80. The TWA considered documents TWA/45/20 and TG/UROCH(proj.9).

81. The TWA considered the information provided by the Leading Expert in response to the request by the TC-EDC and agreed to propose the Test Guidelines for Urochloa for adoption by the TC at its fifty-third session, on the basis of the changes to document TG/UROCH(proj.9) presented in Annexes I and II to document TWA/45/20 and the following additional changes:

Ad. 2	to read "The height of the plant should be measured in the center of the plant, from the first leaf below the flag leaf to the ground level, excluding the inflorescence."
Ad. 4, 5	to read "The assessment of the length of internode should be made in the middle third of plant; it does not refer to floral culm."

Discussion on draft Test Guidelines (Subgroups)

Barley (Hordeum vulgare L. sensu lato) (Revision)

82. The subgroup discussed document TG/19/11(proj.1), presented by Ms. Beate Rücker (Germany), and agreed the following:

Char. 1	- to check whether to specify colors observed (light/dark blue?) - to check whether to add state "black" and example varieties - to provide photos for all states of expression to demonstrate the range of variation
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Char. 10	- to be indicated with growth stages 70 to 80 - to check states of expression (7) and (9) to be renamed (reflexed?)
Char. 13	state (2) to read "six"
Char. 14	to read "none" (instead of "non")
Chars. 14, 15	to add explanation that these characteristics apply for number of rows 2
Char. 16	to replace "clearly" by "strongly"
Char. 17	to replace "lax" by "sparse"
Char. 19	- to check whether to add characteristic "Awn: length" or to replace current char. 19 by "Awn: length" - to provide data for deciding about appropriate characteristic
Char. 20	to be indicated as MS/A VG/A MG/A
Char. 27	- to check whether to replace the characteristic by "Lemma: base types" with states of expression "bevelled" and "non-bevelled" - to check whether the characteristic is linked to "Lodicule: size"
Char. 28	to check whether to replace example variety "Cierzo"
Chars. 29, 30	- to check whether Chars. 29 and 30 should be kept - to provide data for deciding about appropriate characteristics
Char. 31	to be deleted
Char. 32	to be deleted
Char. 33	- to check whether characteristic to be taken up - to read "Grain: length of rachilla compared to grain length"
Char. 34	to be deleted
Ad. 15	to read: "The attitude of sterile spikelets should be observed..."
Ad. 19	images to start from the bottom
Ad. 23	to keep second set of illustrations
Ad. 27	to keep second set of illustrations
Ad. 28	to be revised according to the Wheat Test Guidelines
TQ 5	- to add Char. 14 (used as grouping characteristic in 5.3) - to use full scale of notes for TQ 5.2 and 5.4

Castor Bean (Ricinus comunis L.)

83. The subgroup discussed document TG/RICIN(proj.2), presented by Mr. Adriaan De Villiers (South Africa), and agreed the following:

4.2.4	to read "For the assessment of uniformity of seed-propagated <u>in-bred lines and hybrid varieties...</u> "
5.3 (e)	to add color groups (same as TQ 5.5)
T.o.C.	to present characteristics in order of growth stage
Char. 4	to be deleted
Char. 5	to have states "few" to "many"
Char. 7	to read "Stem: width of internode"
Char. 8	- to be moved before Char. 1 - to read "Immature leaf: <u>intensity of anthocyanin coloration</u> "
Char. 9	- to be moved before Char. 1 - to add (+) and explanation as in Ad. 8
Char. 10, 14	to add example variety for state (3) "short"
Char. 11	to read "Petiole: width"
new char. after Char. 12	to add a new QN characteristic "Petiole: degree of waxiness" with states (1) weak, (2) medium, (3) strong
Char. 13	to read "Petiole: <u>intensity of anthocyanin coloration</u> "
Char. 15, 17	to add example varieties

Char. 16	to be deleted
Char. 21	to add (+) and illustration
Char. 22	to add (+) and illustration for “low” and “high” ratios
Char. 23	- to read “Leaf blade: main color” and to add (+) with explanation “To be observed on upper side” - to add example varieties - to add note 6 “purple” with example varieties
Char. 24, 25, 26	- to delete “...on lower side” and add (+) with explanation “To be observed on lower side”
Char. 24	- to add example varieties - to add two new states “yellow” and “whitish” with example varieties
Char. 25	to add example varieties
Char. 30	- to be indicated as PQ - to add (+) and illustration - to check shape types according to TGP/14
Char. 33, 35, 37, 39	to add example varieties
Char. 34	to read “Infructescence: density of capsules”
Char. 37	- to add colors pink and orange - to rename “reddish blue” to “purple”
new Char. before Char. 38	to add new QL characteristic “Capsule: spines” with (1) absent and (9) present
Char. 38	to replace “Fruit” by “Capsule”
new Chars.	- add new characteristic “Type of inflorescence” with states to be checked - proposals for new chars. to be sent to LE
8.1 (a)	to read “Observations on the <u>main</u> stem...”

Cotton (Gossypium L.) (Revision)

84. The subgroup discussed document TG/88/7(proj.2), presented by Mr. Antonio Escolano (Spain), and agreed the following:

2.3	to read “3 kg of delinted seed. If requested –In the case of hybrids and interspecific hybrid varieties, an additional 1 kg of seed of each component should be submitted, if requested.”
4.2.2	- to read “The assessment of uniformity for hybrid varieties depends on the type of hybrid variety and should be according to the recommendations for hybrid varieties in the General Introduction.” (to check according to standard wording)
T.o.C.	to reorder explanation labels ((a) should appear first)
Char. 3	to delete example variety “DP377” for note 3
Char. 4	to check whether to read “Petal: intensity of spot”
Char. 5	to read “medium yellow”
Char. 6	- to provide explanation of where observation should be made - to provide illustration - add VS
Char. 8	- to read “...of green color” - to check whether 9 notes observed
Char. 9	add example varieties “LD Frego” and “DBB11 B2RF” for state (4) lanceolate
Char. 11	- to read “Leaf: pubescence” - to add (+) and explanation “To be observed on lower side” - to add (*)
Char. 12	to add example variety “Guazuncho 3 INTA” and “DP 0935 B2R2” for state 1
Char. 13	to read “... <u>on</u> upper part”

Char. 14	to check whether observations should be made at an earlier stage (65-69)
Char. 17	to delete MS
Char. 18	- to check whether states to read “circular”, “narrow elliptic”, “broad elliptic”, and “ovate” - to check whether to be presented in grid (to facilitate understanding differences – states 2 and 3 seem to have same general outline and different ratio)
Char. 22	to check whether to add a fourth level “undefined”
Char. 23	check example variety “Intercott 670” for states 7 and 9
Char. 27	- to rename state “beige” as “light yellow” - reorder colors as follows: white, light green, light yellow, light brown, grey - example variety for note 2 to be provided
Char. 28	to check whether to reduce to 5 notes and add an explanation
Char. 31	to read “...strength”
Char. 35	- to check whether to specify other colors (e.g. green, brown) - add (*) - additional colors with example varieties to be provided - check the spelling of example variety “Alepo” (“Aleppo”?)
New char.	check whether to add new characteristic “Leaf: distribution of nectaries” with two states: “on the central vein” (1) and “on the central and lateral veins” (2); provide explanation and example varieties
8.1 (a)	- to be corrected as 8.1 (b) - to read “ Unless otherwise indicated, all Observations on the leaf and on the stem should be made where leaves are fully extended. Colour observations should be made early in the morning.” - to check whether to further precise the parts of the plant to be observed (e.g. upper or middle third of plant)
8.1 (b)	- to be corrected as 8.1 (a) - to read “ All Observations on the flower should be made on the first day of flowering in the morning.”
8.1 (c)	- to read “ Unless otherwise indicated, all Observations on the boll should be made at green maturity.” - to check whether this explanation is coherent with growth states 71 to 75 (is 8.1(c) necessary?)
8.1 (d)	- to read “ All Observations on the seed...” - to check whether 8.1(d) is redundant with growth stage 99
8.1 (e)	- to delete titles (start directly from “These characteristics...” - to delete duplication of “Standard Test Methods for Measurement...”
Ad. 10	to read “Observations should be made on the leaf from the fifth node from the top of the plant.”
Ad. 14	- to read “Observations should be made on the main stem” - to check whether to further specify where to be observed (middle third?)
Ad. 18	modify names of states to correspond to Char. 18 and reorder drawings 3 and 4
Ad. 24	to read “ The Time of opening is reached when 50% of the plants have at least one boll opened.”
9	- to delete the first reference to “American Society...” (repeated) - to sort references by author of publication (not by title) - check title of third reference “American Society for Testing and Materials (ASTM) (1995), Standard Test Methods for Measurement of Physical Properties of Cotton Fibers by High Volume Instruments (Designation: D5867-95).”
TQ 4.2	to be completed (select from standard wording in template)
TQ 5	to list all states of expression (including even notes) for 5.7, 5.9 and 5.10
TQ 6	to be completed with an example characteristic and levels of expressions

Elytrigia (*Elytrigia elongata* (Host) Nevski)

85. The subgroup discussed document TG/ELYTR(proj.6), presented by Mr. Alberto Ballesteros (Argentina), and agreed the following:

Common names	- to add Spanish common name "Agropiro" - to check whether <i>pontica</i> belongs to rush wheatgrass - English - to check whether to add "pontische Quecke", "stumpflütige Quecke" - German
1	to read "These Test Guidelines apply to all varieties of <i>Thinopyrum ponticum</i> (Podp.) Barkworth & D. R. Dewey <i>Elytrigia pontica</i> (Podp.) Holub."
3.3.3	to read "A: Single plant with 60 spaced plants separates by 1.5 m. "B: 2 replicate plots row plots with 6 m. long and 200 pl/m."
3.4.3	to be deleted (repeated)
5.3 (b)	to read "Leaf:..."
5.3 (c)	to read "Time of inflorescence..."
6.5	add explanation on (A) and (B)
T.o.C.	to present characteristics in chronological order (growth stages)
Char. 1	to be indicated as VG/VS
Char. 2	- to be observed at growth stages "29-31" - to be indicated as VS/A - to check whether Char. 2 to be used as a grouping characteristic
Char. 3	- to be indicated with (*) (grouping characteristic) - to be indicated as PQ - to add example varieties
Char. 4	states of expression to read "broad" (7) and "very broad" (9)
Char. 5	- to check whether to add (*) and explanation - to be indicated as VS/A
Char. 7	to add example varieties
Char. 8	to change to MS/A and to provide explanation
Char. 9	to read "Time of inflorescence..."
Char. 10	to provide an explanation
Char. 11	- to check whether only two colors observed in cultivated varieties - state "brown" to be indicated by note (2) - to check whether to delete Char. 11
New Char.	"Number of spikelets" with states (3) few, (5) medium, (7) many, QN, MS/A, 60-68
8	to remove all indications of growth stage for observation (already indicated in T.o.C.)
Ad. 1	- to read "Observations should be made on the angle formed between an imaginary vertical line and the region with higher density of leaves." - (7) to read semi-prostrate
Ad. 2	to read "Observations should be made at the base of the stems."
Ad. 4	to read "The flag leaf is the first leaf below the inflorescence. Measurements should be made at the broadest part."
Ad. 5	to read "Observations should be made on leaves at the upper third of the main stem."
Ad. 6	to read "The length of the longest stem should be measured from ground level to the base of the inflorescence."
Ad. 7	to read "The flag leaf is the first leaf below the inflorescence. Measurements should be made from the ligule to the end of the leaf blade."
Ad. 8	to check whether to add (+) and illustration
Ad. 9	- title to read "Time of inflorescence..." - to read "To determine the time of inflorescence emergence, observations should be made when 50% of the plants have reached stage of growth 49."
Ad. 11	to read "Observations should be made on seeds with no more than 35% humidity and harvested after the plant has completed its cycle."

9	- to check punctuation (e.g. add comas to separate parts of each reference) - last reference: to change "pág. 622" to "p. 622"
TQ. 5	- to add all states of expression and notes to characteristics 5.1 and 5.3 (to present the full scale of notes) - if Char. 2 is used as a grouping characteristic, add to TQ 5
TQ. 6	to add example

Field Bean (Vicia faba L. var. minor) (Revision)

86. The subgroup discussed document TG/8/7(proj.2), presented by Ms. Cheryl Turnbull (United Kingdom), and agreed the following:

Common names	to include "Haba" as a Spanish common name
3.1.2	to be deleted
new 4.2.3	to read "In the case of measurements, uniformity should be assessed using an appropriate statistical method."
4.2.3	- to be renumbered as 4.2.4 - to read " <u>In the case of visual observation, uniformity is assessed on the basis of off-types.</u> For the assessment of uniformity of seed-propagated varieties, a population standard..."
4.2.4	to be deleted
5.3 (b)	to be deleted
6.5	to check whether indications of (S) and (W) should be moved to 6.4
Chars. 1, 2, 5, 21	to read "...color"
Char. 1	to name states of expression (1) "light", (2) "light to medium", (3) "medium", (4) "medium to dark", (5) "dark"
Char. 2	to delete (*)
Char. 3	to remove growth stage indication
Chars. 6, 7, 14	to underline "Only varieties with..."
Chars. 6, 7	to delete "(if present)"
Char. 9	to name states of expression "narrow" note (1) to "broad" note (5) (see explanation on 5 notes scale in Char. 1)
Char. 10	- to delete parenthesis after "width" - to name states of expression "low" note (1) to "high" note (5)
Char. 13	state (1) to read "towards apex"
Char. 14	to read "absent to weak"
Char. 15	to add example varieties
Char. 16	to be indicated as MS/MG
Char. 17	to name states of expression "few" note (1) to "many" note (5)
Chars. 18, 19	to be indicated as MS/VG
Char. 20	to be deleted
Char. 21	- to read "intensity" in small letters - states (2) and (4): to replace "/" by "to" - to add the following example varieties: "Blanca bona", "Volantin" for note 1; "Palacio", "Fabina" for note 3; "Vitabon", "Tiffany" for note 5
Char. 22	- to add space after "Pod:" - to use scale of 5 notes and renumber current states of expression - to add state (5) "pendulous"
Char. 23	naming of states of expression to be checked

Char. 24	- to check whether to replace state "beige" by appropriate color - to check whether to additional colors (light, dark brown) - to check whether states to be presented in order: green, yellow, grey, black
Char. 26	to use 9 notes scale
8.1(d)	to check whether to read "Observation on seeds should be made on dried seed."
Ad. 10	to remove grid and present illustrations in single row
Ad. 20	to check whether to remove grid (no shapes considered)
9	to replace symbol by "-" in references "Bould..." and "Link..."
TQ 5.1	to present all states of expression (full scale with even notes)
TQ 6	to add example

Oats (Avena sativa L. & Avena nuda L.) (Revision)

87. The subgroup discussed document TG/20/11(proj.2), presented by Mr. Antonio Escolano (Spain), and agreed the following:

2.3	to read "Panicles: 120"
3.4.3	to read: "The assessment of the characteristic 'Seasonal type' should be carried out on at least 300 plants. "If tests on panicle rows are conducted, at least 100 panicle rows should be observed."
6.4	to add key on how varieties are indicated (w/s types)
6.5	to add sample size for uniformity (A, B) as in chapter 4.2.2
T.o.C.	to move indication of types (w/s) before the example varieties
Char. 3	scale to read: (1) "absent or weak", (2) "weak to medium", (3) "medium", (4) "medium to strong", (5) "strong"
Char. 8	- to check existence of varieties with notes (1) and (2) - to check whether to be combined with Char. 7
Char. 11	to have states (7) "semi-drooping" and (9) "drooping"
after Char. 11	to check whether to reinstate Char. "Orientation of branches"
Char. 13	to add explanation on how to be observed (intensity or area or combined)
Char. 14	to add (+) and explanation
Char. 15	to be indicated as MS/B VG/B
Char. 17	to add (+) and explanation
Char. 19	to check whether scale to read: (1) "absent or weak", (2) "weak to medium", (3) "medium", (4) "medium to strong", (5) "strong"
Char. 21	to check whether scale to be reduced to three notes
Char. 22	- to check whether to add other example varieties for "spring type" - example variety "Rapidena" to be indicated as "winter"
Ad. 3, 19, 20, 21	to use five note scale
Ad. 4	- to improve illustration - to check whether to read "to be recorded on the leaf where the strongest expression is observed"
Ad. 6	to check whether to read "...is reached when..."
9	to include literature
TQ 5	to provide full scale of notes (even notes) in 5.2, 5.3, 5.5, 5.6 and 5.7
TQ 6	to add example

Quinoa (Chenopodium quinoa Willd.)

88. The subgroup discussed document TG/CHENO(proj.3), presented by Mr. Erik Lawaetz (Denmark), and agreed the following:

Common names	English common name to read "Quinoa" (only) and delete other common names
4.2.2	to check whether to use population standard 5%
T.o.C.	- general remark: to check whether to add more (*) - example variety "Carina" to read "Red Carina"
Char. 1	- formatting: to have states of expression and word "color" at heading in small letters - to add example varieties - to replace example variety for state (5) "Carmen" by "Red Carina"
Char. 2	to read "Foliage: glaucosity" (delete "intensity of")
Char. 3	to check whether to be replaced by "Leaf: angle of base" and to check naming of states of expression
Char. 4	to read "Leaf: dentation" and to provide illustrations
Char. 5, 6, 8, 17	- to add example varieties
Char. 5	- to delete (+)
Char. 7	- to read "Plant: height at beginning of flowering" (and to underline "at beginning of flowering") - to delete indication of "VG"
Char. 8	to replace example variety "Carmen" by "Red Carina"
Char. 10	to add state of expression "purple" with note (5)
Char. 12	to check whether to be deleted
Char. 13	- to check whether to be deleted - to delete "very" from states (1) and (5)
Char. 14	- states to read "straight" and "curved" - to add intermediate state and to be indicated as QN - to add (+) and explanation
Char. 15	- to check whether to use botanical names for states of expression - to check whether there is an intermediate state - to check whether to combine Char. 15 and 16
Char. 16	to check whether to replace "lax" by "sparse"
Char. 17	- to add example varieties - to delete (+) and explanation to add state "green" - to check example variety "Riobamba"
Char. 18	- to read "Plant: height at maturity" (and to underline "at maturity") - to check whether to add example varieties
Char. 19	to be deleted
Char. 20	- formatting: to have states of expression in small letters - to be indicated as MS
Char. 21	- to check whether to add (+) and explanation - to add example varieties
Char. 22	to add explanation "To be observed after removing the perigonium"
Char. 23	- to check whether to be indicated as QN (genetic background) - to check whether to add (+) and explanation - to be indicated as VG - to check whether to be done on submitted seed
Ad. 3, 4, 5, 11	to become 8.1(a)
Ad. 5	illustrations to be moved to Ad. 3
Ad. 10	to read "To be observed in the middle part of the stem"
Ad. 13	to update legend as states of expression in Char. 13 ("absent or weak", "strong")

Ad. 18	to check whether to delete “to be observed at maturity of plants” (redundant with growth state indicated – 12)
Ad. 20	illustration to be provided
Ad. 20	to check whether to improve explanation
Ad. 22	to delete illustration
8.2	to check whether to improve image quality (text visibility) and get third party acceptance
9	reference “Jacobsen...”: to add “pages”

Red Clover (Trifolium pratense L.)

89. The subgroup discussed document TG/5/8(proj.1), presented by Mr. Adriaan de Villiers (South Africa), and agreed the following:

Common names	to correct spelling of Trebol in Spanish (to add a graphic accent to read “Trébol”)
3.3.4	to delete paragraph 3.3.4
3.4.1	to read “...at least 3000 plants, <u>density above 450 plants per square meter which...</u> ”
5.3	to check whether to add other grouping characteristics (e.g. TQ Char. 10, 22, 23?)
T.o.C.	to add growth stages key
Char. 1	to reword state (2) to read “orange yellow”
Char. 2	- to be indicated with “C” (special test) - to remove indication on method of observation (VS)
Char. 3, 4	to reduce scale to 5 notes only
Char. 6	- to remove underline (the characteristic is not repeated in the TG) - to read “Plant: growth habit” and add explanation that observations should be made without vernalization - to remove (*)
Char. 7	to remove (*)
Char. 8	to add VS/A
Char. 9	- to read “foliage” - to use scale “sparse” to “dense” - to read “Plant: density of foliage” and to add (+) and explanation on time of assessment (in vegetative phase) - to be indicated as VS/A (only)
Char. 11	to reduce scale to 5 notes
Char. 12	to use scale from “few” to “many”
Char. 13	- to check whether to use scale “sparse” to “dense” - to check whether to be moved after Char. 4 - to check whether to be indicated as “C” and to delete (b)
Char. 14	to spell “color”
Chars. 17, 18, 25, 26	- characteristic to be checked before inclusion in Test Guidelines (uniformity assessment) - to replace MS/B by MS/A
Char. 20	- to read “Leaf: intensity of markings” - to be indicated as VS/A - to confirm whether VG is used
New char.	to check whether to introduce new characteristic “Plant: natural height in aftermath” indicated as VG/B with explanation
8.1	to indicate the leaf to be observed for Chars. 17, 18, 22 and 23
8.1(b)	- to check whether to clarify “mean flowering date” (same as Ad. 24 “Time of flowering”?) - to check whether to delete “unless otherwise indicated”

Ad. 6	to use 9 notes scale
Ad. 10	this explanation also applies to Chars. 11, 12, 13 and 14 (check whether to add explanation in 8.1)
Ad. 21	- to delete grid - to improve background of photographs
Ad. 24	to read "The observation should be made when 3 flowers per plant are open on at least 50% of the plants."
TQ 4.2	to be completed
TQ 5	to display all states of expression and even notes (5.2 to 5.5)
TQ 6	to be completed

Scorpion Weed (Phacelia tanacetifolia Benth.)

90. The subgroup discussed document TG/PHACE(proj.4), presented by Ms. Bogna Kowalczyk (Poland) and agreed the following:

Common names	to include English common name "California Bluebell"
Char. 1	to delete example variety "Polyphaci"
Char. 4	- to have notes (1), (2) and (3) - to be indicated as VG (only)
Chars. 5, 6	to add (*)
Char. 7	to be deleted
Char. 8	- to add (+) and explanation "To be observed on leaves from the middle part of the main stem" - to add (*)
Char. 9	- state 2 to read "blue violet" - to add state "red violet" with note (3)
Char. 10	- to add (*) - to add example varieties - to add example variety "Vega" for note (5)
Char. 11	- to delete example variety "Titan" - to add example variety for state "long" - to add (*)
Char. 12	to add (*)
Char. 13	to be deleted
Char. 15	to read: "Seed: intensity of brown color" with states "light" to "dark"
Ad. 4	to read "... from the base of <u>plant</u> to the top..."
Ad. 7, 13	to be deleted
9	to add coma after "AT" (reference: Meyer)
TQ 4.2.1	to read "(a) Population"; "(b) Synthetic variety"; "(c) Other (please provide details)"
TQ 4.2.2	to delete empty box 4.2.2
TQ 4.2.3	to be renumbered 4.2.2 and to delete current 4.2.3
TQ 5	to display all states of expression and notes (5.2, 5.3 and 5.6)

Soya Bean (Glycine max (L.) Merrill) (Revision)

91. The subgroup discussed document TG/80/7(proj.2), presented by Mr. Alberto Ballesteros (Argentina), and agreed the following:

Common names	to add "Soya" in Spanish
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2.2	to write "seed" in low case
4.1.4	to complete missing number of plants to be observed ("...or parts of plants taken from each of <u>20</u> plants..")
4.2.2	- to indicate type of propagation (self-pollinated?) - to have population standard (0.5% = 4 off-types allowed)
5.3	- to remove underline - to spell "color"
T.o.C.	to check whether to order characteristics in chronological order (growth stages) instead of botanical order (current)
Char. 1	- to use 9 notes scale with states from absent or very weak to very strong - to remove asterisk - to add explanation
Char. 2	- to read "Plant: growth type" - to add additional state of expression "semi determinate to indeterminate" - to indicate growth stage 66 to 89 - to be indicated as VS/MS - to improve explanation
Char. 3	- to have growth stages 66 to 80 - to read "semi erect" (to add space) - to read "Plant: attitude of branches"
Char. 4	- to remove underline and spell "color" - to check whether to add example varieties for the different states of expression - to add state "light brown" and to replace state "brown red" by "dark brown"
Char. 5	to be deleted
Char. 6	to be indicated as MG/MS
Char. 7	- to check whether VS is appropriate (observation on 300 plants) - to check coherence with states of expression in Ad. 7 - to check whether to have states (1) "ovate"; (2) "trullate"; (3) "lanceolate"; (4) "elliptic" - to indicate which leaf to be observed (e.g. third leaf from top of plant)
Char. 9	- to spell states of expression in small letters - to add semi-colon to read "Flower: color"
Char. 10	- to to be indicated as PQ - to combine states 1 and 2 and to read "light yellowish brown"
Char. 11	to be deleted
Char. 12	to be indicated as VG
Char. 13	- to check whether to use different approach to describe seed shape (e.g. split in two characteristics: shape in cross-section and shape in longitudinal section) - state 2 to read "obloid"
Char. 14	- to read "Seed: color of testa" - to add (+) and explanation that "Observations should exclude hilum" - to add state "red" or "purple"
Char. 15	- to remove underline - to add (+) and explanation - to be indicated as VG \ QN
Char. 16	to have states (1) "absent" and (9) "present"
Char. 17	- to be indicated as PQ - to check whether to clarify color "light black" (dark grey?) - to check whether to separate "imperfect" (presence of different colored "halo") as a different characteristic - to ckeck colors black, brown, grey, imperfect yellow, imperfect black, light brown, yellow
Char. 18	to check whether to be indicated as QL
Char. 19	- to remove italics - to read "Time of beginning of flowering"

Char. 20	- to read "Time of maturity" - to check whether to add (+) and explanation - to check whether to keep only Char. 20 or 21
Char. 21	to add (+) and explanation
8	to add growth stages key
Ad. 3	to read "semi-erect" (to add hyphen)
Ad. 4	to check whether to read "Observations should be made on the middle third of plant."
Ad. 7	to check whether to improve grid (state "trullate" has broadest part below middle and medium ratio; state "elliptic" has broadest part at middle" and medium ratio; state "ovate" has low ratio)
Ad. 8	to check whether to read "Observations should be made on leaves in the middle third of plant."
Ad. 19	to check whether to read "Time of beginning of flowering is when 50% of plants have at least one open flower."
9	- to sort references in alphabetical order - reference "Taylor...": to check whether to delete "MAY – JUNE" - reference "Pioli...": to add name of publication - reference "Dorrance...": to check whether to complete reference
TQ 4.2	to be completed
TQ 6	to read "Flower: color" (with colon and small "c")

Wheat (Triticum aestivum L. emend. Fiori et Paol.) (Revision)

92. The subgroup discussed document TG/3/12(proj.5), presented by Ms. Virginie Bertoux (France), and agreed the following:

3.4.3	- to delete "To read: 3.4.2" - to renumber following paragraphs to 3.4.4 and 3.4.5
4.2.4	to be deleted
6.5 (6)	- to delete double "(a)" - to add references to sample sizes "A" and "B"
T.o.C.	Winter and spring types to be separated by semicolon. Winter types to be placed before the semicolon and prefixed by "(w)" and the spring types placed after the semicolon and prefixed by "(s)" (see: TGP/7, Annex 3, GN28, 3.2.2).
Char. 6	- to check whether example variety Dollar to be replaced by "LCS Star" or whether to be replaced by another example variety already proposed
Char. 7	- delete growth stage 50 - to check whether to replace Maxwell (w) by Accor (w) for note 1 - to check whether Sertori (w) is a winter or spring type and whether to propose a new example variety for note 5
Chars. 14, 18	to check whether to replace KWS Flint (s) by another example variety for all characteristics concerned
Char. 24	to add MG/A as third method of observation
Ad. 18	to add notes and states of expression
Ad. 27	to read: "... according to its <u>their</u> descriptions..." to read "... (as a rule they should have normally exceeded stage 75) ..."
9	to read "...Catalogue..." to present reference "Zadoks..." in separate row
TQ 4.2.2	to add boxes to provide information on items (a) and (b)
TQ 5	to display even notes in 5.1 and 5.3
Annex, Part II	to check formatting of table; to add column for "Spanish"
Annex, Part II, Char. Glu-B1	to reintroduce example varieties Zollernspelz and Schwabenkorn for bands 6.1 + 22 (see document TWA/44/23 "Report")

Annex, Part III, chapter 5 to reintroduce last table from the previous version of the Test Guidelines

Guidance for drafters of Test Guidelines

93. The TWA received a presentation by the Office of the Union on the tutorials for the following different user roles of the web-based Test Guidelines template:

- Leading Expert drafting tutorial
- Interested Expert comments tutorial
- Leading Expert checking tutorial.

94. The TWA noted that the tutorials were available online on the TG Drafters' webpage of the UPOV website and that a copy was reproduced in the Annex to document TWA/45/17.

95. The TWA noted that further comments by users of the web-based TG Template could be sent to the Office of the Union.

Variety denominations

96. The TWA considered document TWA/45/4.

97. The TWA 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), as set out in document TWA/45/4, paragraphs 5 to 13.

98. The TWA noted that a revision of document UPOV/INF/12/4 (document UPOV/INF/12/5), in relation to changes of registered variety denominations, had been adopted by the Council, at its forty-ninth ordinary session.

99. The TWA noted that the mandate and the composition of the WG-DST had been expanded to prepare recommendations for the CAJ concerning a possible revision of document UPOV/INF/12 and that it had become the Working Group on Variety Denominations (WG-DEN).

100. The TWA noted that the first meeting of the WG-DEN had been held in Geneva, on March 18, 2016.

Information and databases

(a) UPOV information databases

101. The TWA considered document TWA/45/5.

UPOV Code System

102. The TWA noted the developments concerning UPOV codes, as set out in document TWA/45/5, paragraph 8.

103. The TWA noted the invitation to check the amendments to UPOV codes, the new UPOV codes or new information added for existing UPOV codes, and the UPOV codes used in the PLUTO database for the first time, as provided in the Annexes to document TWA/45/5. The TWA noted that any comments were to be submitted to the Office of the Union by October 7, 2016.

PLUTO Database

104. The TWA noted the summary of contributions to the PLUTO database from 2012 to 2015 and the current situation of members of the Union on data contribution, as presented in Annex II to document TWA/45/5.

105. The TWA noted that the CAJ, at its seventy-second session, had agreed that the WG-DEN should consider proposals for the expansion of the content of the PLUTO database to include all recognized varieties, including those that had not been, or were no longer, registered/protected.

106. The TWA noted that the WG-DEN, at its first meeting, had agreed to defer the consideration of the matters concerning the possible expansion of the content of the PLUTO database to include all recognized varieties, including those that had not been, or were no longer, registered/protected until its second, or a subsequent, meeting.

107. The TWA noted the information concerning the training courses "Contributing data to the PLUTO database", held in Geneva in September and October 2015, as set out in document TWA/45/5, paragraphs 22 to 24.

(b) Variety description databases

108. The TWA considered document TWA/45/6.

109. The TWA noted the developments reported in document TWA/45/6 and, in particular, that:

(a) the TC, at its fifty-second session, had agreed to invite members of the Union to make presentations at the forthcoming session of the BMT on how databases containing molecular data might be developed in UPOV; and

(b) the outcome of discussions during the BMT on how databases containing molecular data might be developed in UPOV would be reported to the TC at its fifty-third session.

(c) Exchange and use of software and equipment

110. The TWA considered document TWA/45/7.

Document UPOV/INF/16 "Exchangeable Software"

111. The TWA noted that the Council, at its forty-ninth ordinary session, held in Geneva, on October 29, 2015, had adopted document UPOV/INF/16/5 "Exchangeable Software".

112. The TWA noted that the TC, at its fifty-second session, had agreed to propose the revision of document UPOV/INF/16/5 to include information on the use of software by members of the Union, which would be reported to the CAJ at its seventy-third session and, if agreed by the CAJ, a draft of document UPOV/INF/16/6 "Exchangeable Software" would be presented for adoption by the Council at its fiftieth ordinary session.

Document UPOV/INF/22 "Software and equipment used by members of the Union"

113. The TWA noted that the Council, at its forty-ninth ordinary session, held in Geneva, on October 29, 2015, had adopted document UPOV/INF/22/2 "Software and equipment used by members of the Union".

114. The TWA noted that the TC, at its fifty-second session, had agreed to propose the revision of document UPOV/INF/22/2 to include information on the use of software by members of the Union and, if agreed by the CAJ, a draft of document UPOV/INF/22/3 would be presented for adoption by the Council at its fiftieth ordinary session.

(d) Electronic application systems

115. The TWA considered document TWA/45/8.

116. The TWA 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*

117. The TWA agreed that the following draft Test Guidelines should be submitted to the TC for adoption at its fifty-third session, to be held in Geneva from April 3 to 5, 2017, on the basis of the following documents and the comments in this report:

Subject	Relevant document(s)
*Cassava (<i>Manihot esculenta</i> Crantz.)	TWA/45/19 and TG/CASSAV(proj.6)
*Scorpion Weed (<i>Phacelia tanacetifolia</i> Benth.)	TG/PHACE(proj.4)
*Urochloa (<i>Urochloa</i>)	TWA/45/20 and TG/UROCH(proj.9)
*Wheat (<i>Triticum aestivum</i> L. emend. Fiori et Paol.) (Revision)	TG/3/12(proj.5)

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

118. The TWA agreed to discuss the following draft Test Guidelines at its forty-sixth session:

Barley (<i>Hordeum vulgare</i> L. <i>sensu lato</i>) (Revision)
Castor Bean (<i>Ricinus comunis</i> L.)
Cotton (<i>Gossypium</i> L.) (Revision)
Elytrigia (<i>Elytrigia elongata</i> (Host) Nevski), (<i>Agropyron elongatum</i> (Host) P. Beauv.)
Field Bean (<i>Vicia faba</i> L. var. <i>minor</i>) (Revision)
Ginseng (<i>Panax ginseng</i> C.A. Mey) (Revision)
Oats (<i>Avena sativa</i> L. & <i>Avena nuda</i> L.) (Revision)
Quinoa (<i>Chenopodium quinoa</i> Willd.)
Red Clover (<i>Trifolium pratense</i> L.) (Revision)
Rice (<i>Oryza sativa</i> L.) (Revision)
Soya Bean (<i>Glycine max</i> (L.) Merrill)
Tea (<i>Camellia sinensis</i> (L.) Kuntze) (Revision)

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

(c) *Possible Test Guidelines to be discussed in 2018*

120. The TWA agreed that it should consider the development or revision of Test Guidelines for the following at a future session:

Finger millet (<i>Eleusine coracana</i> (L.) Gaertn.)
Rape Seed (<i>Brassica napus</i> L. <i>oleifera</i>) (Revision)
Rye (<i>Secale cereale</i> L.) (Revision)
Sunflower (<i>Helianthus annuus</i> L.) (Revision)
Triticale (x <i>Triticosecale</i> Witt.) (Revision)

* possible final draft Test Guidelines

(d) *Participation in discussions of Test Guidelines from other TWPs*

121. The TWA agreed to propose that the following experts be added as interested experts to the following draft Test Guidelines being discussed by the Technical Working Party for Vegetables (TWV), subject to the deadlines agreed in document TWV/50/32 "Report", Annex IV:

Subject	Interested experts (countries/organizations) ²
*Brown Mustard (<i>Brassica juncea</i> (L.) Czern.)	DE, ES, GB, QZ
Turnip (<i>Brassica rapa</i> L. var. <i>rapa</i> (L.) Thell.)	DE, FI, GB, NZ, QZ
Pea (<i>Pisum sativum</i> L.) (Partial revision: disease resistance explanations for <i>Fusarium oxysporum</i> f. sp. <i>pisi</i> race 1 (Ad. 51), <i>Ascochyta pisi</i> race C (Ad. 60))	AR, AU, BR, CA, CZ, DE, DK, ES, FR, IT, JP, NZ, PL, QZ, ZA, CLI

Date and place of the next session

122. At the invitation of Germany, the TWA agreed to hold its forty-sixth session in Hannover, from June 19 to 23, 2017, with the preparatory workshop on June 18, 2017.

Chairperson

123. The TWA agreed to propose to the TC that it recommend to the Council to elect Ms. Cheryl Turnbull (United Kingdom), as the next chairperson of the TWA.

Future program

124. The TWA agreed 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 (document to be prepared by the Office of the Union)
 - (b) Variety description databases (document to be prepared by the Office of the Union and documents invited)
 - (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 and documents invited)
8. Uniformity assessment by off-types (documents to be prepared by France, Germany, the Netherlands, Poland and the United Kingdom)
9. Experiences with new types and species
10. Impact of endophytes on DUS characteristics in grasses (documents to be prepared by the European Union, Mexico and New Zealand and documents invited)

² for name of experts, see list of participants

11. Regional set of example varieties in Wheat for South America (document to be prepared by Brazil)
12. Number of growing cycles in DUS examination (documents to be prepared by France, Germany, the Netherlands, Poland and the United Kingdom)
13. Minimum distance between varieties (documents to be prepared by the European Union and the Republic of Korea)
14. Use of disease and insect resistance characteristics in DUS examination (documents to be prepared by Australia, Brazil, the European Union and France)
15. Matters to be resolved concerning Test Guidelines adopted by the Technical Committee (if appropriate)
16. Discussion on draft Test Guidelines (Subgroups)
17. Recommendations on draft Test Guidelines
18. Guidance for drafters of Test Guidelines
19. Date and place of the next session
20. Future program
21. Adoption of the Report on the session (if time permits)
22. Closing of the session

Visit

125. On July 13, 2016, the TWA visited the International Maize and Wheat Improvement Center (CIMMYT). The TWA was welcomed by Ms. Isabel Vianey Peña Mendoza, Institutional Relations for Latin America, and received three presentations: “CIMMYT – An overview”, presented by Mr. Bram Govaerts, Regional Representative for Latin America; “CIMMYT Global Program for Wheat”, presented by Mr. Matthew Reynolds, Distinguished Scientist, Global Program for Wheat; and “Working with the Private Sector”, presented by Mr. Arturo Silva Hinojosa, Lead, International Consortium for the Improvement of Maize. The presentations are reproduced in Annex IV to this report. The TWA visited CIMMYT’s germplasm bank and was welcomed by Mr. Thomas Payne, Head, Genetic Resources Center. The TWA also visited castor bean and quinoa trials at the Autonomous University of Chapingo, and was welcomed by Mr. Augustín López Herrera, Professor Researcher, and Ms. María Antonieta Goytia Jiménez, Director General of Administration.

126. The TWA adopted this report at the end of the session.

[Annexes follow]

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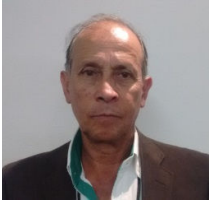
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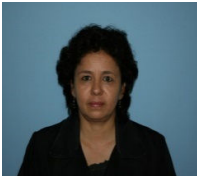
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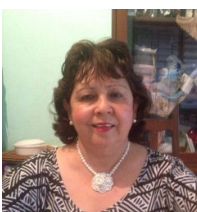
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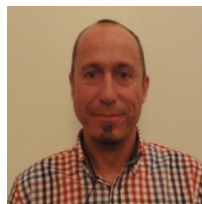
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(tel. : +32 2 743 28 60 fax : +32 2 743 28 69 e-mail : bertscholte@euroseeds.eu)
[via WebEx]

INTERNATIONAL SEED FEDERATION (ISF)



Szabolcs RUTHNER, Regulatory Affairs Executive, Chemin du Reposoir 7, 1260 Nyon, Switzerland
(tel.: +41 22 365 4420 fax: +41 22 365 4421 email: s.ruthner@worldseed.org)
[via WebEx]



Amy D. CURTIS (Ms.), Soybean & Cotton Patent Scientist, Monsanto US, 1551 Highway 210, 50124 Huxley IA, United States of America
(tel.: +1-515-597-5809 fax: +1-515-597-5899 e-mail: amy.curtis@monsanto.com)

III. OFFICER



Mr. Tanvir HOSSAIN, Chair

IV. OFFICE OF UPOV



Leontino TAVEIRA, Technical/Regional Officer (Latin America/Carribbean), International Union for the Protection of New Varieties of Plants (UPOV), Chemin des Colombettes 34, 1211 Geneva 20, Switzerland
(tel.: +41 22 338 8426 fax: +41 22 733 0336 e-mail: leontino.taveira@upov.int)



Rosa SANCHEZ-VIZCAINO (Ms.), Administrative Assistant, International Union for the Protection of New Varieties of Plants (UPOV), Chemin des Colombettes 34, 1211 Geneva 20, Switzerland
(tel.: +41 22 338 9153 fax: +41 22 733 0336 e-mail: rosa.sanchezvizcaino@upov.int)

[Annex II follows\

ANNEX II

WELCOME ADDRESS PRONOUNCED BY
MS. ÁVILA QUEZADA, EXECUTIVE SECRETARIAT, SAGARPA

- Leontino Rezende Taveira, Regional Officer for Latin America and the Caribbean, from the International Union for the Protection of New Varieties of Plants (UPOV).
- Mr. Tanvir Hossain, Chairman of the Technical Working Party for Agricultural Crops; Welcome to our country.
- Ph. D. Manuel R. Villa Issa, General Director of National Service of Seed Inspection and Certification (SNICS).
- Distinguished Researchers and Growers, Ladies and Gentlemen who come from other countries and Mexico, Good morning everyone.

On behalf of the Minister of Agriculture, Livestock, Rural Development, Fisheries and Food, Mr. José Eduardo Calzada Rovirosa, please receive a warm welcome and our acknowledgement to research institutions and authorities who organized this meeting. It is a great honor for Mexico to host the forty-fifth session of the Technical Working Party for Agricultural Crops. It is beginning today and will count with experts and authorities from twenty countries and representatives from three International Organizations (ISF, CPVO, UPOV). This is the sixth time that our country is the host of a TWP from UPOV (the first one was on 2001; the fifth one on 2010).

Undoubtedly, this meeting will offer the opportunity to share knowledge and experiences that will strength the plant breeders' rights system in our country and at international level. Plant breeder's rights make stronger productive activities and promote transfer and generation of new technologies for the agricultural sector competitiveness.

In Mexico, the varieties registry dates back to 55 years, when the Seed Law created some Institutions that we have nowadays, such as the National Institute of Agricultural, Livestock and Forestry Research (INIFAP) which is the main public breeder of plant varieties in Mexico, and the National Service of Seed Inspection and Certification (SNICS) which is a body from the Ministry of Agriculture, to whom corresponds variety registry and the implementation of an efficient system of plant breeders' rights.

When the Federal Law of Plant Varieties was enacted, Mexico moved forward to the harmonization of the criteria for plant variety protection. The accession to the UPOV Convention in 1997 was one more step in relation to the development of technical guidelines for varieties registry; especially in species where Mexico is center of origin and diversity. As a result of the support from different institutions, breeders and farmers, it has been built and strengthened our capacities on plant variety protection.

Under SNICS leadership, terms for granting titles were reduced, with the cooperation of national and international research institutions; it has been strength the enforcement and there have been solved infringements to protected varieties, particularly on ornamental plants, which have generated royalty payments to the breeder. Hence, Mexican Law provides protection to those who obtain and develop new plant varieties; this scheme is a necessary condition in order to promote investment, research and technological development in Mexico.

I would like to thank all participants for sharing their knowledge in benefit of breeders, farmers and society. I wish you a successful meeting. Thank you very much for your kind attention.

[Annex III follows]

PRESENTATION ON PLANT VARIETY PROTECTION IN MEXICO




NATIONAL SERVICE OF SEED INSPECTION AND CERTIFICATION

45th Session of The Technical Working Party for Agricultural Plants (TWA-45)

Plant Breeders' Rights System in Mexico





Mexico City, July 11, 2016



Background

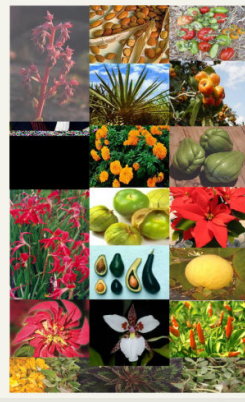


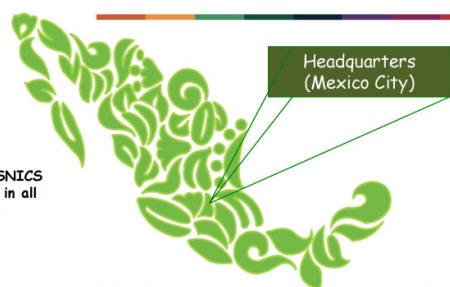
SNICS -Body of the Ministry of Agriculture (SAGARPA)
-Created by Seed Law (1961)

Mission
To establish and keep updated the system to regulate and promote seed, plant varieties registry and plant genetic resources issues, collaborating to increase agricultural productivity and its competitiveness, according to international standards.

SNICS' Competences

- Seed testing, inspection and certification
- Plant breeders' rights
- Plant genetic resources



Until 2014-2015 SNICS had 38 delegates in all the country

↓

Because of some governmental budget adjustments, 17 SNICS Delegates were fired at the beginning of 2016



→ **So, how SNICS will be prepared for the future challenges?**
By Law, a National System on Seeds will enter in force in short term, also an official program named "National Policy on Seeds" will start in medium term. Mexican law on PBR'S will enacted according to UPOV 91 (TPP Trade Agreement).

THE NATIONAL PLAN ON AGRICULTURE 2016 - 2030


Plant Breeders' Rights

- PVP Law (1996)
- 1978 Act (UPOV member since 1997, #34)
- Protection to all genera and species
- Farmer privilege (exception to PBR)
- Information provided by the own breeder
- Cooperation CPVO, FR, NL (DUS testing results)

Plant Breeders' Rights

- Plant Variety Committee
 - technical working groups
 - specialists for each genus or species (including breeders and growers)
 - agreements between SNICS and several research and academic institutions
- Reference collections: agricultural crops, Opuntia (cactus pear and xoconostles), avocado, strawberry and rose.



Plant Breeders' Rights

	PBR	National List
Documents and Fees:	<ul style="list-style-type: none"> Application /DUS Test/ Payment: (USD \$800)* / Power of Attorney. A Renewal is necessary (USD\$166) 	<ul style="list-style-type: none"> Application /DUS Test/ Payment: (USD \$15) / Power of Attorney No renewal is necessary
Technical requirements:	<ul style="list-style-type: none"> Distinctness /Uniformity / Stability /Denomination / Novelty (First sale) 	<ul style="list-style-type: none"> Distinctness / Uniformity / Stability / Denomination / Novelty if it is not necessary.
Scope:	<ul style="list-style-type: none"> To exploit in an exclusive way a Protected Plant Variety (15 and 18 years) 	<ul style="list-style-type: none"> To have a Plant Varieties Data Base with DUS test results.
Objetive:	<ul style="list-style-type: none"> To protect PB'R, according to UPOV 78 Convention 	<ul style="list-style-type: none"> Seed Certification Programs and safeguard of Native Plant Varieties.

- Awareness
- Meetings, workshops, diffusion
- Verification and investigation of administrative infringements
- Measures to prevent infractions
- Penalties (\$6.5 to 40 thousand US dollars)

Enforcement

Training

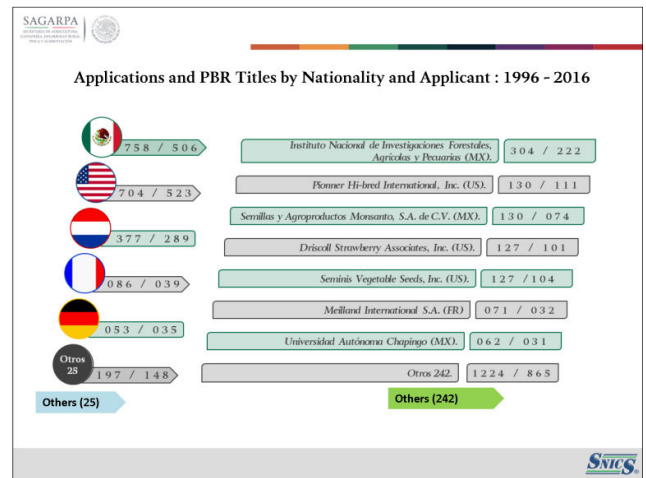
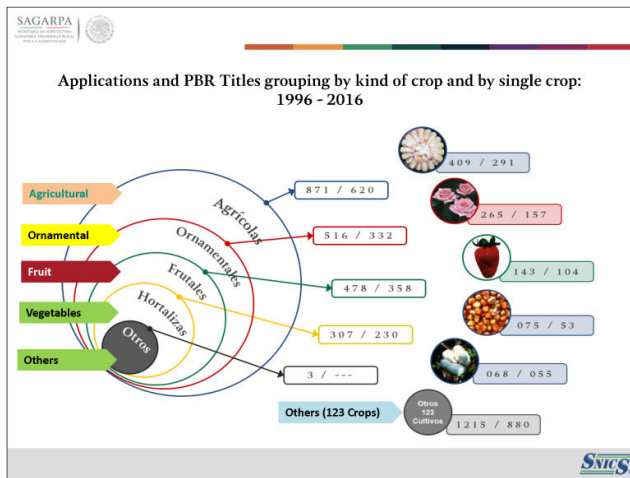
11 International DUS Workshops (2005 – 2015); more than 500 technicians coming from 16 Latin American countries have received specialized training (DUST).

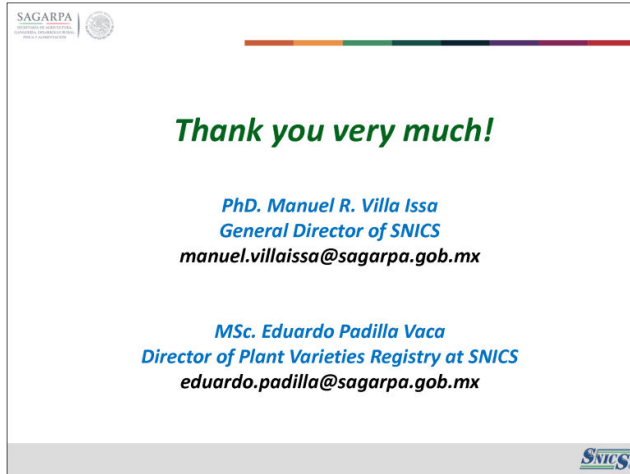
UPOV- Mexico

- TWP's Venue: TWA (2001), TWC (2002), TWV (2006), TWO&TWF (2010)
- Presidency of the Council (2003-2006)
- TWF Chairperson (2006-2008)
- Technical Committee, Vice-President (2011-2013)
- Technical Committee, President (2014-2016)
- Test Guidelines: cactus pear, avocado, dahlia, tagetes, husk tomato, amaranth, papaya, hawthorn, dragon fruit, pecan nut...

Nowadays....

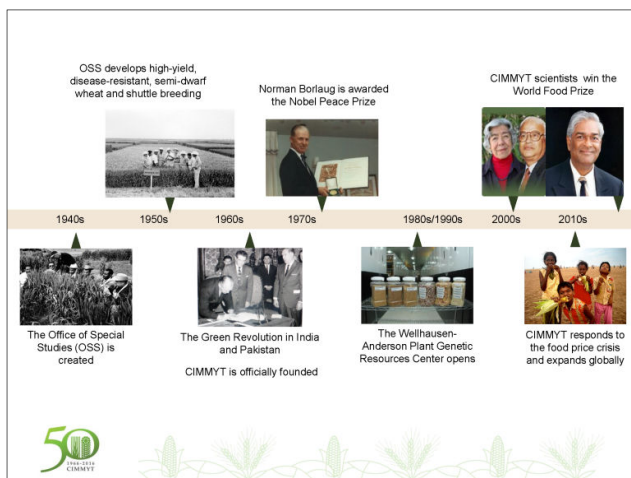
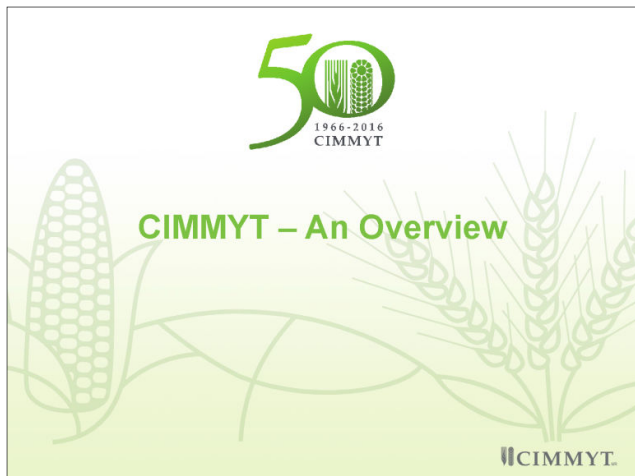
- **Jatropha**
- **Papaya (Rev)**





[Annex IV follows]

PRESENTATIONS MADE BY THE INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER (CIMMYT)

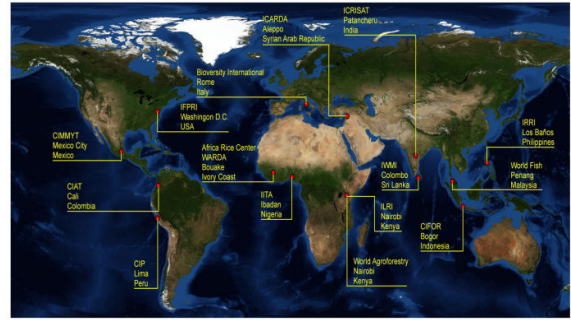


Maize Helps Feed the World

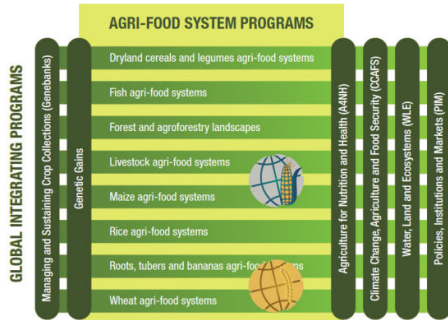
- Preferred staple food to **900 million** people living on less than \$2 a day
- Maize provides **15-56% of total calorie intake** in sub-Saharan Africa, Latin America and Asia
- 184 million hectares worldwide



CIMMYT is Part of the CGIAR



CGIAR: Working Within Agri-food systems



CIMMYT's Ambitions



We will remain a research institution that provides high quality scientific knowledge, innovation and expertise

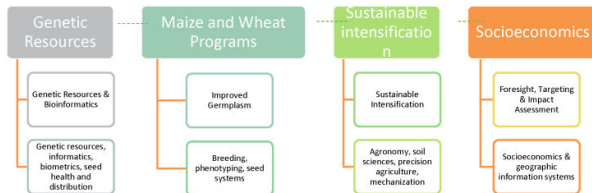
We will strengthen our impact through partnerships

We will recommit to capacity building in agricultural research for development

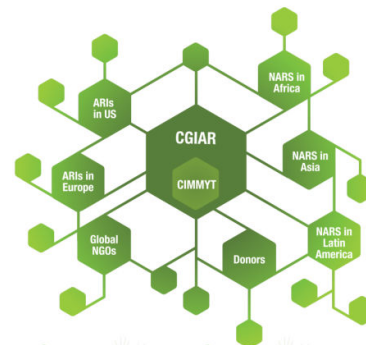
We will be One CIMMYT



Scientific Excellence



Impact through Partnerships



Capacity Building

50,000 days
training given
each year

Technical courses
Farmers' days
Workshops
PhD/MSc students

More than 10,000
scientific and
professional alumni
around the world



Basic Wheat Improvement Course,
Ciudad Obregón, Mexico, March 2015



Farmers Mela, Jabalpur, India,
September 2014



CIMMYT Around the World

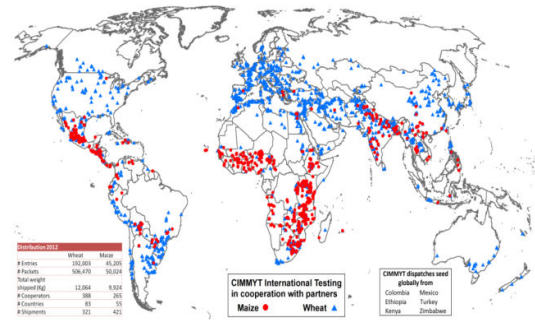


The Germplasm Bank

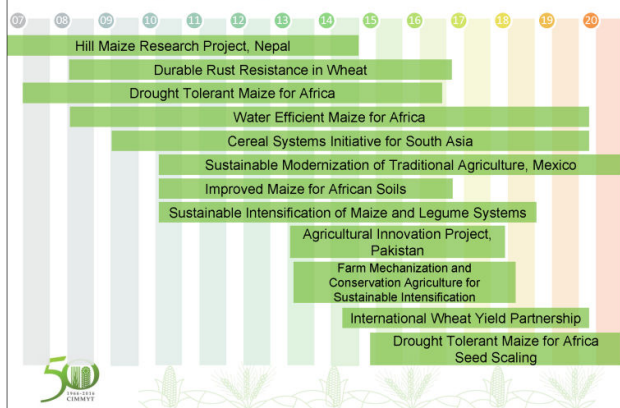
- Wellhausen-Anderson Plant Genetic Resources Center, established in September 1996 with funding from the government of Japan.
- ISO-certified
- 28,000 entires of maize and 138,000 of wheat
- CIMMYT seed is made freely available: 500,000 packets of seed are sent to more than 600 partners each year



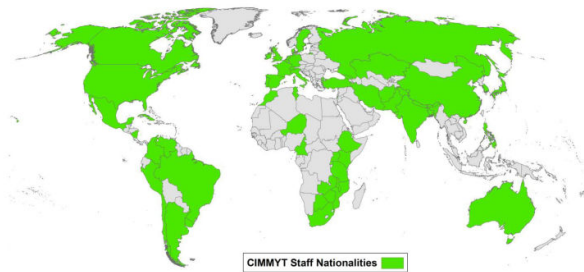
Global Seed Distribution Network




Major Projects 2007 - 2020




CIMMYT 1200 Staff From Over 50 Countries






Africa



52,000 tons drought-tolerant maize seed produced in 2014 due to CIMMYT support

1000 quality protein maize demonstration days held in Ethiopia in 2014

40,000 farmers attended sustainable intensification trainings



New MLN screening and **doubled haploid facilities** opened for public and private use

Mechanization options to increase incomes of **35,000 farmers** by as much as 50%



Latin America



Over **40** innovation hubs in Mexico and Guatemala. **400,000** hectares under sustainable intensification in Mexico



200,000 farmers participating (21% women)



2,000 wheat lines identified for heat and drought tolerance

16 tons of basic hybrid seed distributed to 23 local seed companies and two national agricultural research centers

Expansion into Central America



South Asia



Improved tools for **1,300** mechanized service providers, covering 26,000 farm households

Area under conservation agriculture expanded to **210,000** ha

200,000 farmers trained in sustainable intensification



10 wheat rust resistant wheat cultivars commercially released

US \$3.4 billion added to wheat output of China 1982-2011

Network of 35 small- and medium-scale seed companies supported



New Opportunities



- Big Data
- Breeding by design
- Empowering local startups
- Value chains for nutrition
- ICT for agricultural development and innovation
- Forward-looking and learning
- Open-access



Thank you
for your
interest!



An Outspoken Visionary

"The seriousness or magnitude of the world food problem should not be underestimated. Recent success in expanding wheat, rice and maize production in Asian countries offers the possibility of buying 20-30 years of time."

- Norman Borlaug, 1969



Did we use this time to get ready for the next Green Revolution?

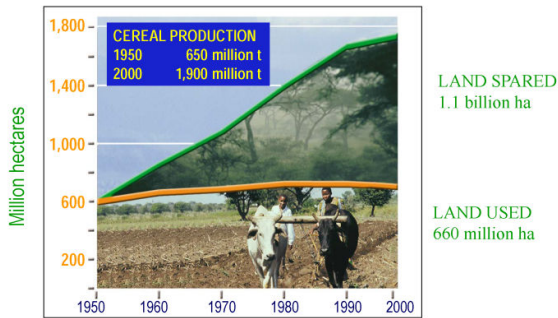
CIMMYT

Green Revolution

- 1st Green Revolution: Haber-Bosch N-fertilizer
- S-Asia early 60s - mass starvation
- Semi-dwarf, input responsive photo-insensitive wheat and rice varieties
- 5 fold Yield increase
- Agronomy Revolution
- Production grew faster than population
- Wheat and rice became cheaper
- India and Pakistan doubled wheat and rice production from 1963 to 1970
- Hundreds of million people saved from starvation
- Dr. Borlaug Peace– Noble Price Laureate in 1970

CIMMYT

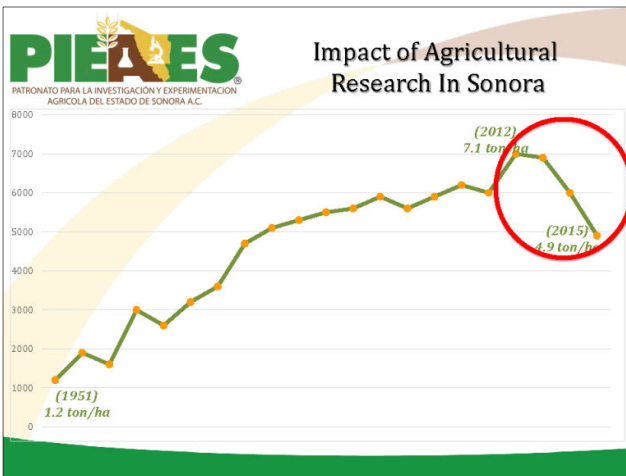
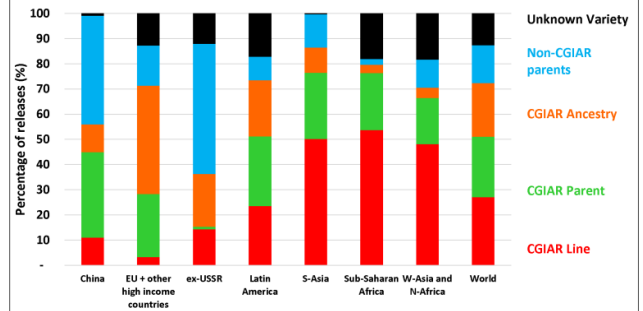
World Cereal Production—Areas Saved Through Improved Technology, 1950-2000



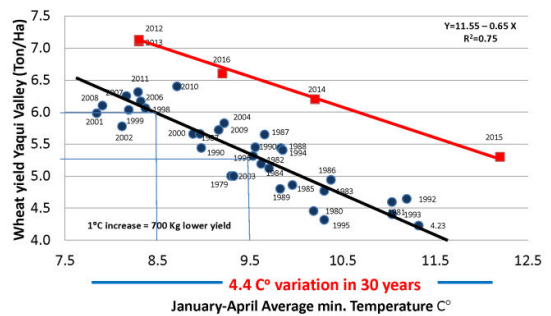
Borlaug, 2004 Source: FAO Production Yearbooks and AGROSTAT

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Spring bread wheat releases by region and origin 1994-2014



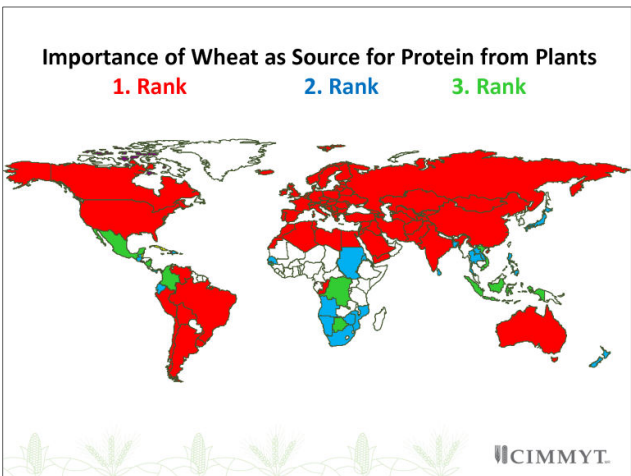
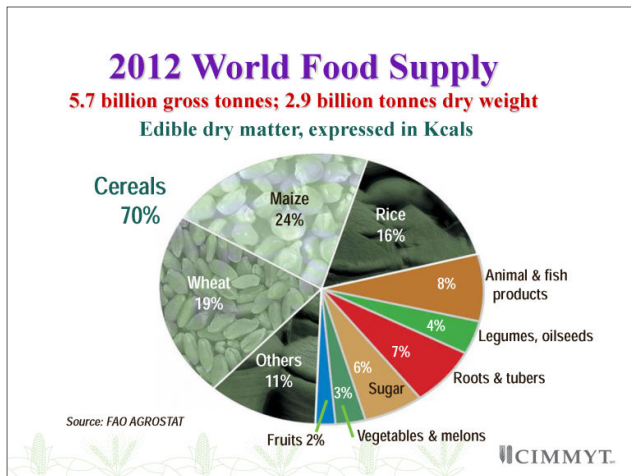
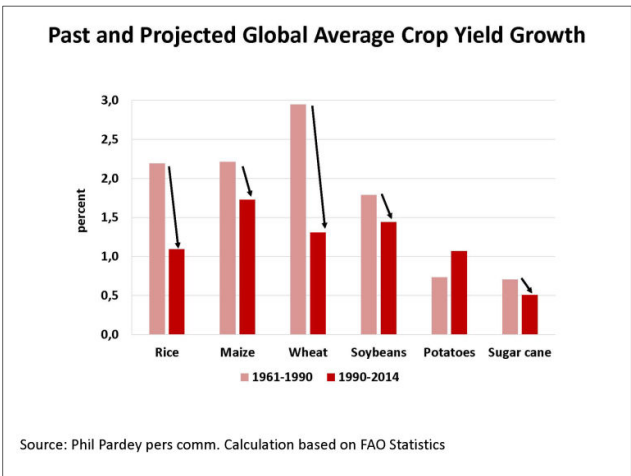
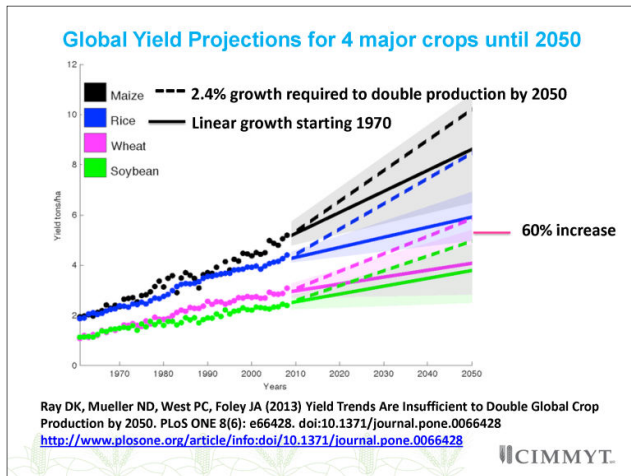
Adapting to Climate Change: Heat Tolerant Wheats prove their Value in Farmers' Fields in Mexico

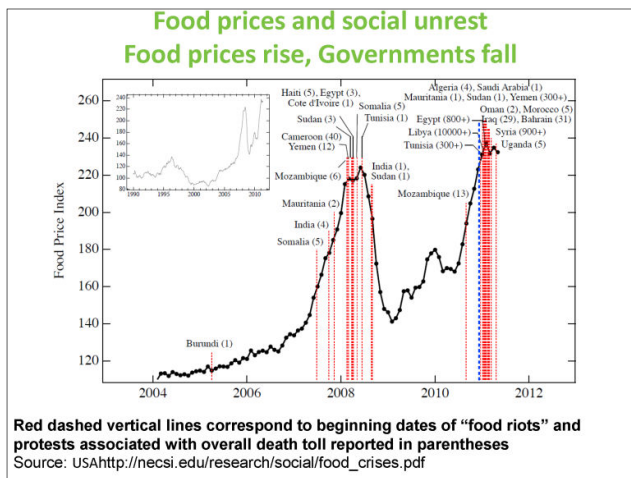
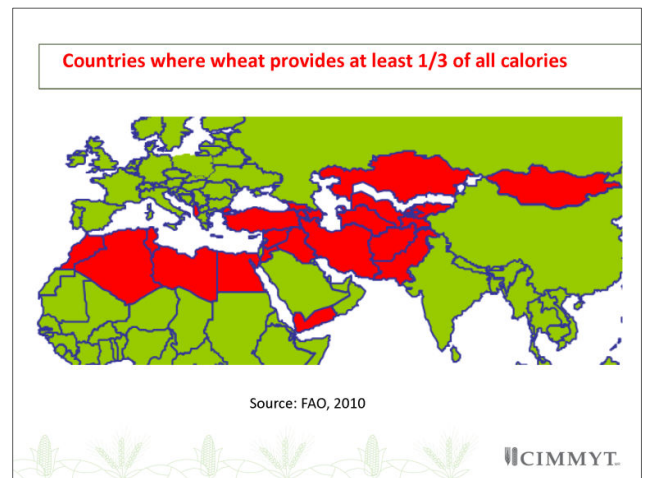
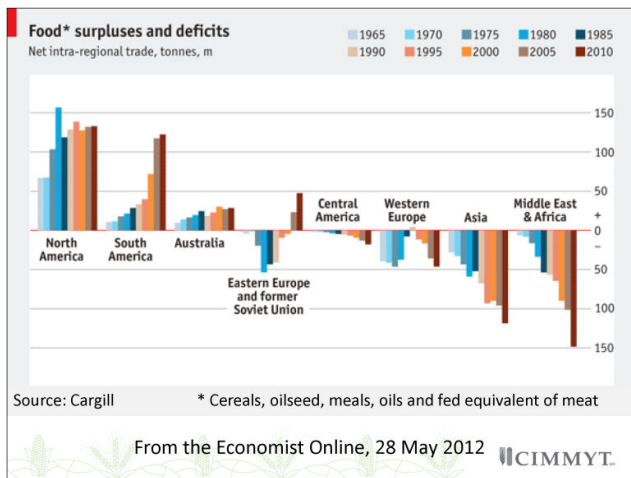
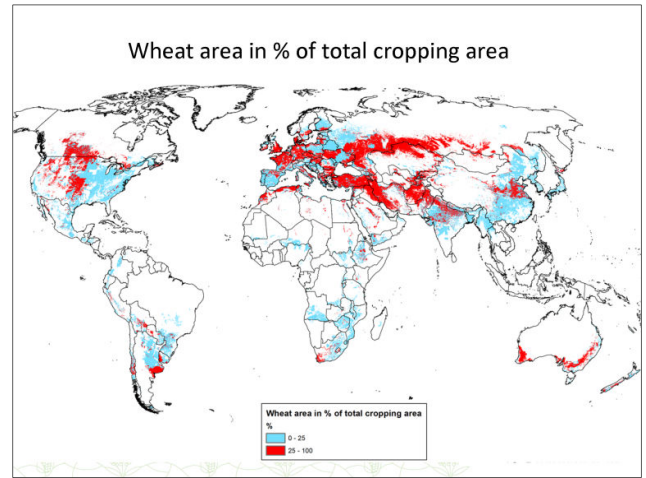
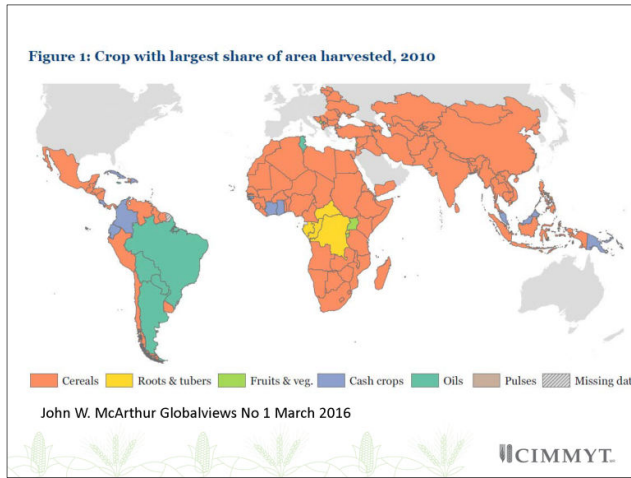


Source: H.-J. Braun and I. Ortiz-Monasterio, CIMMYT



“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life”. FAO, 1996





UN Millennium Development Goals
Great Progress

The percentage of people living on less than \$1.25 /day fell from 47% in 1990 to 22% in 2010

Globally, the proportion of undernourished people decreased from 23% in 1990 to 15% in 2010

CIMMYT

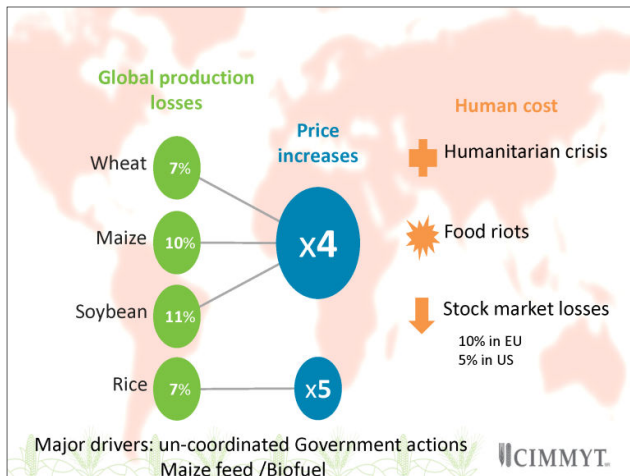
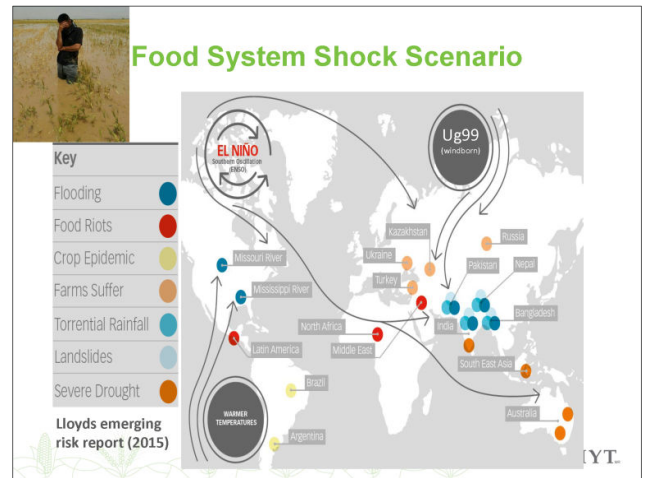
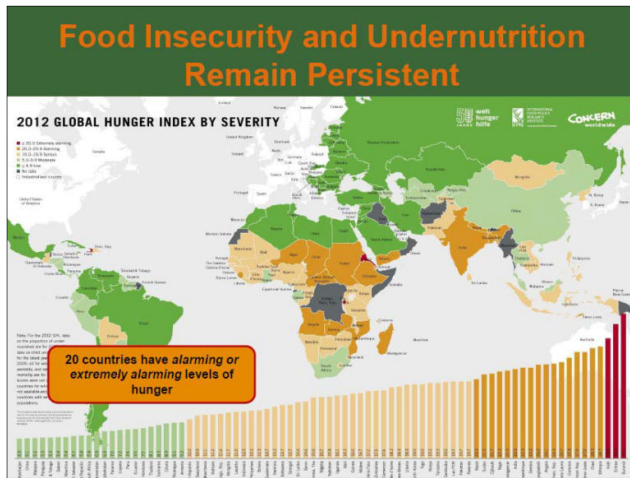
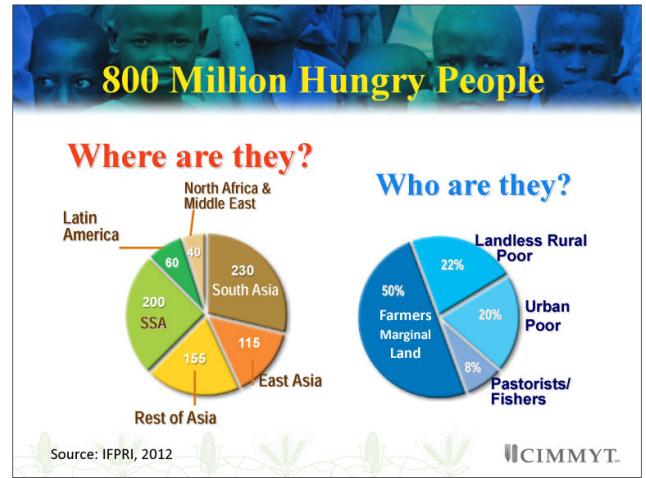
In Percent ...

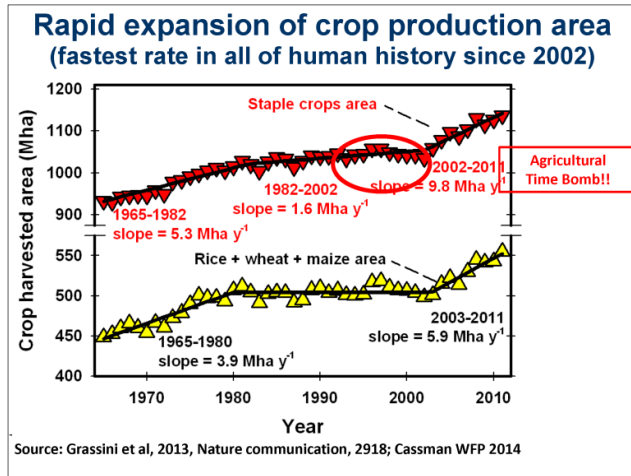
In 2014, 1.2 billion people were still living in extreme poverty and 0.8 billion were hungry – Food deficit of 40 million tons of cereal equivalents

Today, more people in South Asia and Sub-Saharan Africa live with less than \$1.50 /day than the entire population at beginning of the Green Revolution

The number of people living on less than \$2 /day is the same as in 1981

180 million children under age of 5 are malnourished – in Africa 40% of all children under 5





Soil loss, an unfolding global disaster

- 30% of the world's arable land lost to erosion or pollution in the last 40 years.
- Erosion rates from ploughed fields averages 10-100 times greater than rates of soil formation.
- It takes about 500 years to form 2.5cm of topsoil under normal agricultural conditions.



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Humanity's Greatest Challenges

- **Food security for 9-10 billion by mid-century**
 - Accessible, affordable, adequate nutrition
 - To survive or flourish?
- **Sustainable food systems**
 - Meet demand
 - Improve environmental quality and conserve natural resources
 - Contribute to economic development and vibrant societies
- **Zero population growth, then orderly decline**

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The Big Questions

- What is production potential on every hectare of existing farmland? Size of exploitable yield gaps?
- Rate of climate change and expected impact on food production; potential for mitigation and adaptation?
- Reduction in food demand that can be expected from behavioral changes in diets and reduction in food waste?
- Pathways from agricultural research to improved nutrition?
- How to more effectively prioritize investments in agricultural research and development?
- How to capture benefits of globalized trade and free markets for low income, agrarian, developing countries?

• Adopted from K.Cassman, WFP 2014

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What do we want from agricultural research?

- More food and non-food per unit of land, water, labor and capital
- Lower unit-costs of production and marketing
- Adaptation to climate change
- Reduced poverty and malnutrition
- Appropriate response to diet transition (more meat with increasing income)
- **Stability in production & prices**

- ? Biofuel
- ? GMO



What do we want from food and agricultural systems?

- Food Security and good nutrition
- Efficient and Sustainable Resource Use
- Reasonable incomes for farmers
- Reasonable prices for consumers
- Meeting Non-food Demands
- Support of general economic growth
- Youth employment



Food Waste and Loss

- 30 – 50% of all food either lost or wasted
- For vegetables and fruits waste can reach 70%
- In rich countries, biggest waste at home, restaurant and supermarket
- In poor countries biggest losses harvest, transportation to market and improper storage
- Of all options to increase food supply, a reduction of waste had biggest impact
- National Geographic, May 2014



CIMMYT.

We have the means, we have the capacity to eliminate hunger from the face of this earth. We need only the will.

John F. Kennedy

Agricultural R&D is not the problem but the solution for our future

CIMMYT.

En iyi Ekmek buğday ekmeği The best bread is made of bread wheat



CIMMYT.

For a first approximation, wheat is the staple food of mankind and its history is that of humanity Economist, Dec 20, 2005

No man qualifies as a statesman who is entirely ignorant of the problems of wheat (Socrates, 400 B.C.)

To a hungry person god appears in the form of bread (Mahadmi Gandhi)

Acorns were good until bread was found (Francis Bacon)

Avoid those who don't like bread and children. (Suisse)

A table without bread on it is just a piece of wood (Russia)

CIMMYT.

Here ends ppt

Following slides sent to Graham Moore and Helen Lucas

CIMMYT.

An Outspoken Visionary

"The seriousness or magnitude of the world food problem should not be underestimated. Recent success in expanding wheat, rice and maize production in Asian countries offers the possibility of buying 20-30 years of time."

- Norman Borlaug, 1969



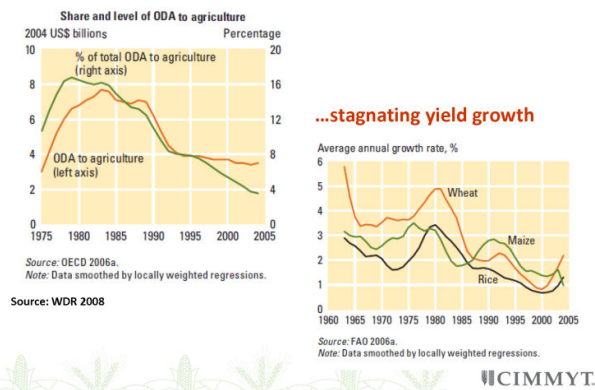
Did we use this time to get ready for the next Green Revolution?

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Wheat production in the South and North Two different worlds?

	Developed Countr.	Developing Countr.
Wheat Area mIn ha	95	125
Average yield kg/ha	3	3
Production mIn tons	330	390
Average farm size ha	40- > 5000	1 - 4
Rainfed area mIn ha	90	75
Irrigated area mIn ha	5	55
Max average Yield t/ha	8 (UK, WW)	7 (Egypt, SW)
Consumption		
Food	50%	85%
Feed /Seed /other	50%	15%

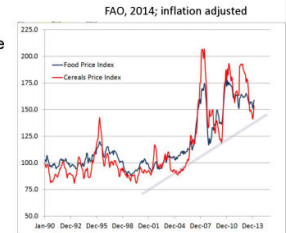
Stagnating investments in agricultural R&D...



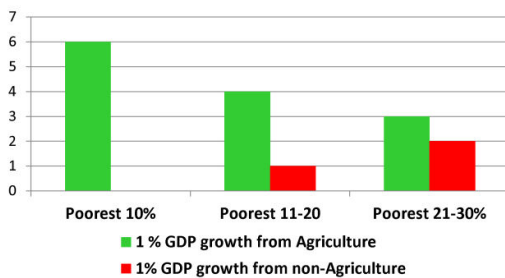
Impact of Higher Food Prices on Poverty

Several World Bank studies:

- Food price increase 2005 to 2007 may have pushed 100 to 150 million people back into poverty (< 2 \$ / day).
- This corresponds to a set back of 7 to 10 years of poverty reduction.
- Adaptation phase:** spurred productivity increases in developing countries; yet far from reversing the negative impact

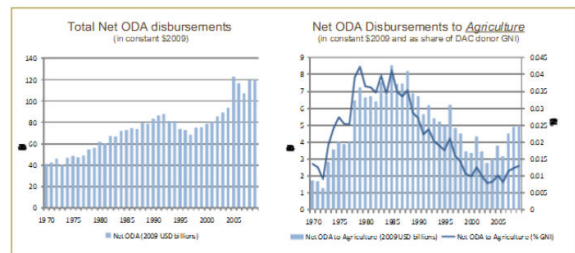


Impact of a 1% GDP growth from agriculture and non-agriculture on overall expenditures of the poor

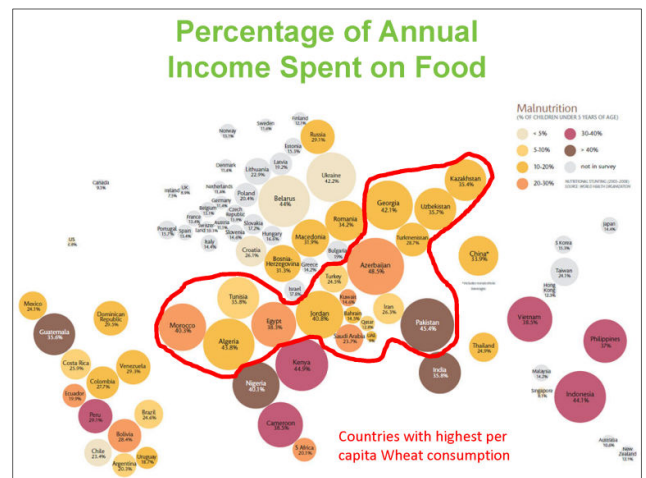
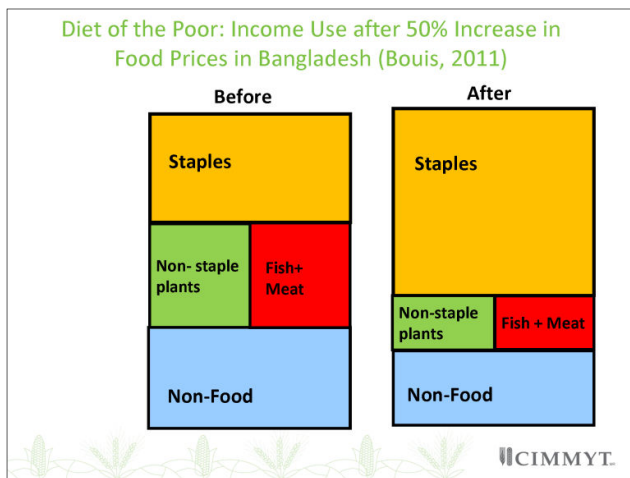
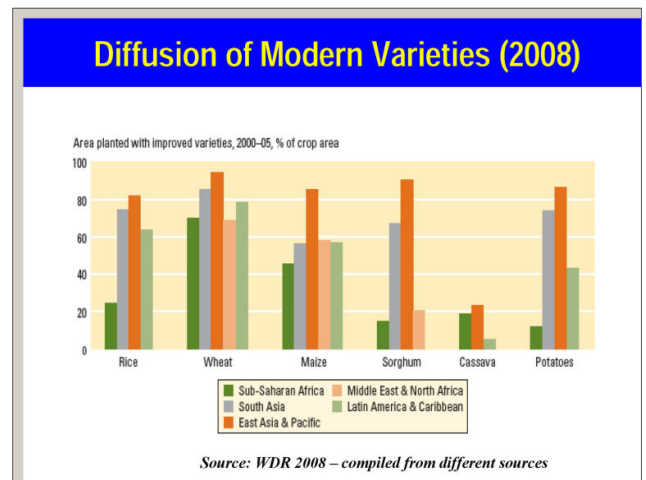
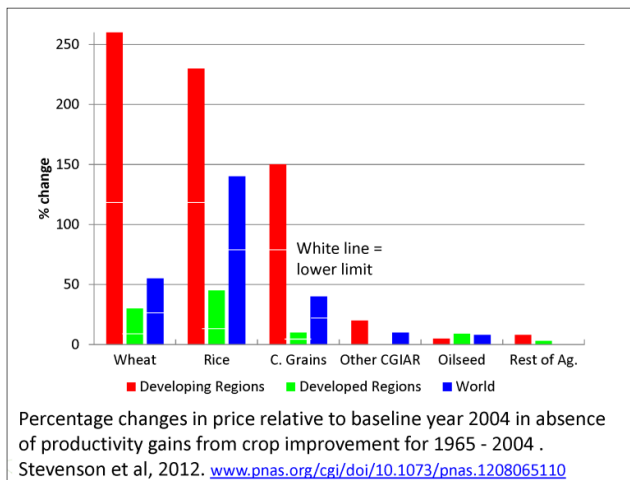
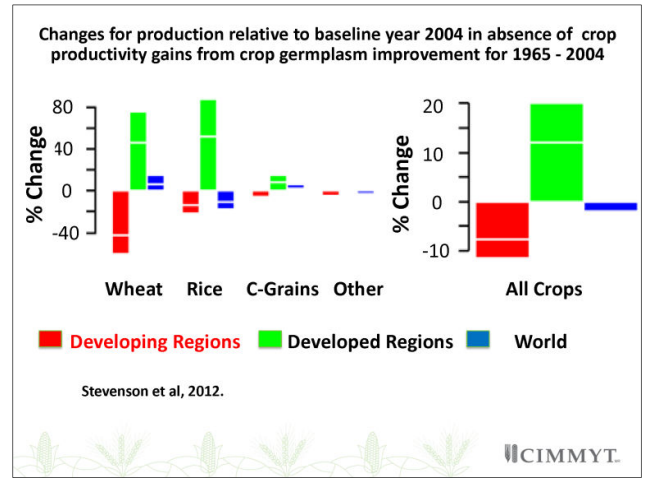
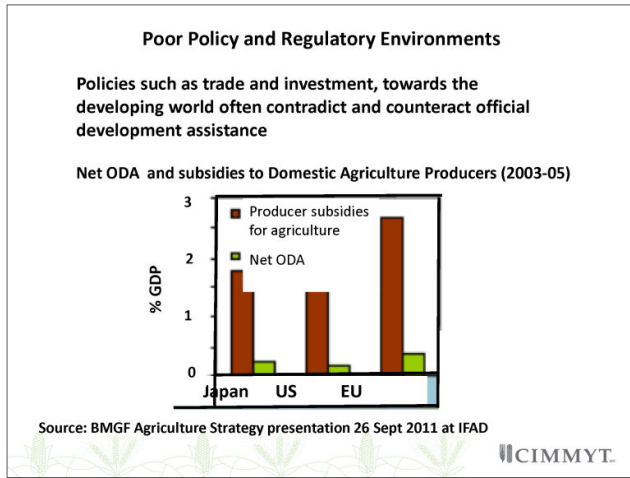


Source: Ligon and Sadoulet, 2007 in Worldbank 2008 : World Development Report

Agriculture Development Assistance: The Lost Decades



Source: BMGF Agriculture Strategy presentation 26 Sept 2011 at IFAD



World Food Supply: We will have to double it by 2050

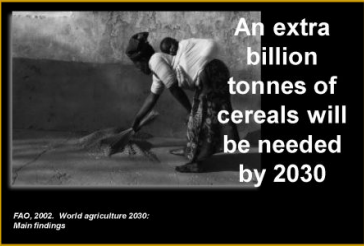



- 75% of future growth must come from lands already in use
- Most of the production growth must occur in countries where it is consumed, including in marginal areas where many of the poor reside
- Limited potential for land expansions, except in the Americas and Sub-Saharan Africa
- Irrigation expansion crucial to meeting food demand




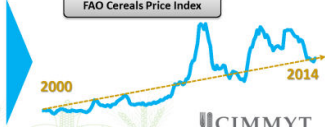
The world needs wheat

1 in 8 people in the world (868 million) are undernourished



FAO, 2002. World agriculture 2030: Main findings

Cereals prices have risen by an average of **6% per year** since 2000



Source: Thomas 2014, Borlaug 100

Thank you!

Dr. Hans Braun
Director Global Wheat Program
Email: h.braun@cgiar.org


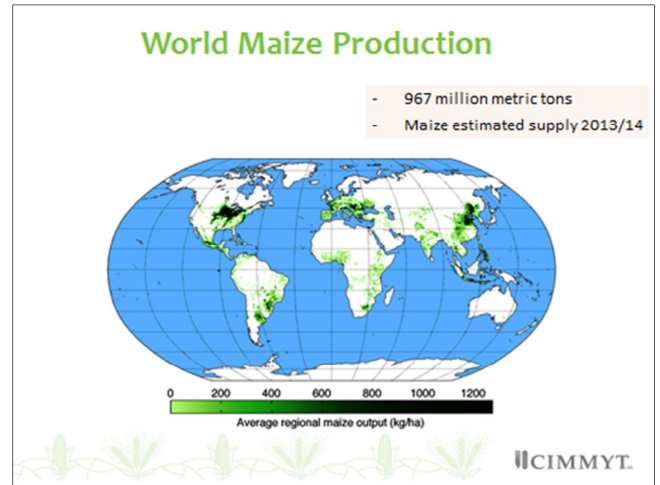
Dr. Matthew Reynolds
Head Wheat Physiology
Email: m.reynolds@cgiar.org



Working with the Private Sector

Reaching Unreached Farmers Through Collaboration with Small and Medium Sized Seed Companies:
What Are We Doing?

Arturo Silva H.
IMIC Lead LatAm

Maize Consumption is Rising Faster Than Yield!

Yield +38%


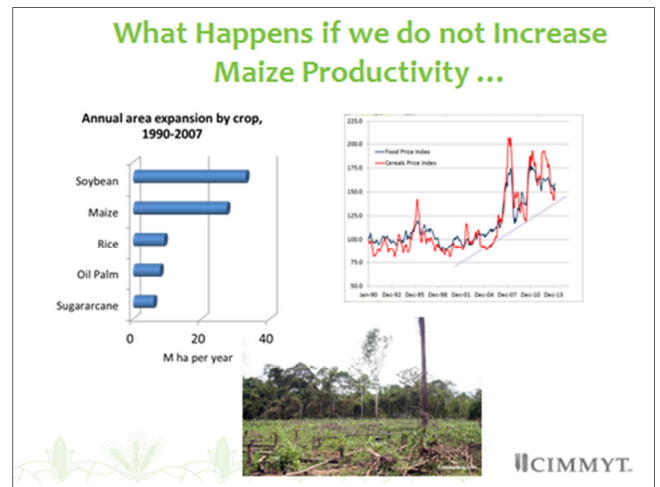
Average yield: 3.7 t/ha (1990) vs 5.1 t/ha (2010)

Food 30%	Biofuel 10%
Feed 70%	Food 30%
	Feed 60%

Consumption +77%

In order to meet global demands, we will need **to double maize production** by 2050.

Source: UNEP

Maize in the Developing World (1/2)

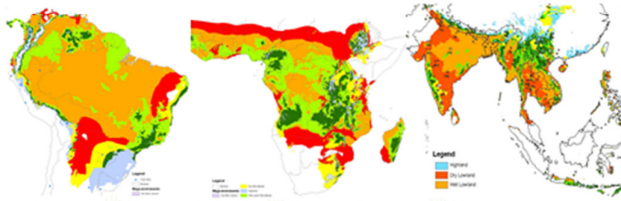



- 170 countries globally growing maize; 50% of the area is in the developing world
- Preferred staple food for 900 million poor people (<2 USD per day)
- Provides 15-56% of total calorie intake in Sub-Saharan Africa, Latin America and Asia



Maize in the Developing World (2/2)

- Different types of maize: tropical maize ≠ temperate maize
- Multinationals focus on high potential (dark green) or irrigated markets, PROVIDED they are commercially connected (eg not Angola)
- Tropical areas receive less than 5-7% of the private R&D investment in the developed/temperate world.

Maize in the Developing World



- + Ecologies are diverse
- + Diverse germplasm needs
- + Smaller markets
- + Difficult traits (drought, heat, waterlogging, certain diseases)
- = Comparative advantage of smaller seed companies with diverse products

#CIMMYT

Demand for CGIAR Maize Germplasm (CIMMYT & IITA)

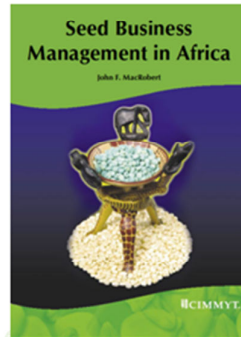


#CIMMYT

Without Successful Seed Businesses, Excellent Germplasm has Little Impact



- New germplasm
- Drought Tolerant
 - Disease resistant



#CIMMYT

Time to the Market / Time to Impact

- More rapid variety registration
- More rapid seed scale-up
- Wider scope = more farmers



The sooner the farmers have access to improved varieties, the greater their opportunity to increase productivity.

#CIMMYT

Supporting Seed Companies for Improved Adoption of Maize Products

Equity



Large Medium Small

≠

Equality



Large Medium Small

#CIMMYT

Improved Maize Seed to the Market Our Model for Partnership with Seed Companies

Support Services	NARS	Multinational	Regional	Large Nationals	Medium Nationals	Small Nationals
Breeding populations	Yes	Yes	Yes	Yes	Yes	Yes
Varieties for testing	Yes	Yes	Yes	Yes	Yes	Yes
Variety Registration	Yes	No	No	Yes	Yes	Yes
Breeders' Seed	Yes	Yes	Yes	Yes	Yes	Yes
Pre-basic Seed	Yes	No	No	No	Yes	Yes
Basic Seed	No	No	No	No	No	Yes
Certified Seed	No	No	No	No	No	No
Demonstrations	Yes	No	No	No	Yes	Yes
Field Days	Yes	No	No	No	Yes	Yes
Capacity Building	Yes	Yes	Yes	Yes	Yes	Yes

#CIMMYT

Partnerships with Seed Companies in Asia

- 35 seed companies as partners
- Client-oriented product development
- Collaborative testing
- Capacity building
- CGIAR/NARS alliance = research department for SMEs that reach many diverse markets not targeted by multilaterals



CIMMYT

Community Based Seed Production in Micro-Environments... Nepal



CIMMYT

Partnerships with Seed Companies in Mexico 68 NARS & SME partners, 155 testing sites



CIMMYT

Why Work with so Many Seed Companies?

- Competition spurs faster delivery
- Diverse products for diverse markets
- Some seed companies will not be able to successfully grow; others will
 - 50 tons ... 30 tons ... 40 tons
 - 50 ton ... 100 tons ... 200 tons ... 500 tons

CIMMYT

Accountability for Impact: Seed Road Maps

In the past:
Number of improved crop varieties generated



Today:
Demonstrated impact in farmers' fields



Mr. Lozane with C2H0511 seed production in Mozambique (Photo: Ken Rice)



Mr. Faceira with pilot C2H03000 hybrid seed production in Angola



Community Seed Production of ZM309 in Zimbabwe, 2009



Agri-seeds stock of ZM401 in Zimbabwe, 2010

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Target Seed Market Definition

Seed Market Potential



- Identify areas of greatest immediate potential
- Distinguish market profiles:



- Compare with current and projected sales of our partner seed companies

CIMMYT

Take Home Messages

- Tropical maize environments are diverse; many farmers have no access to improved seed
- Alliance of NARS/CGIAR/SME has become successful in not only producing excellent varieties but also ensuring that they get to farmers.



[Annex V follows]

LIST OF LEADING EXPERTS

**DRAFT TEST GUIDELINES TO BE SUBMITTED
TO THE TECHNICAL COMMITTEE IN 2017**

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

before August 26, 2016

Species	Basic Document(s)	Leading expert
*Cassava (<i>Manihot esculenta</i> Crantz.)	TWA/45/19 and TG/CASSAV(proj.6)	Mr. Simeon Kibet (KE), Mr. Fabricio Santos (BR)
*Scorpion Weed (<i>Phacelia tanacetifolia</i> Benth.)	TG/PHACE(proj.4)	Ms. Bogna Kowalczyk (PL)
*Urochloa (<i>Urochloa</i>)	TWA/45/20 and TG/UROCH(proj.9)	Mr. Fabricio Santos (BR)
*Wheat (<i>Triticum aestivum</i> L. emend. Fiori et Paol.) (Revision)	TG/3/12(proj.5)	Ms. Virginie Bertoux (FR)

* possible final draft Test Guidelines

DRAFT TEST GUIDELINES TO BE DISCUSSED AT TWA/46
(* indicates possible final draft Test Guidelines)

Guideline date for Subgroup draft to be circulated by Leading Expert: **March 10, 2017**

Guideline date for comments to Leading Expert by Subgroup: **April 7, 2017**

New draft to be submitted to the Office of the Union
before May 5, 2017

Species	Basic Document	Leading expert	Interested experts (countries/organizations) §
*Barley (<i>Hordeum vulgare</i> L. <i>sensu lato</i>) (Revision)	TG/19/11 (proj.1)	Ms. Beate Ruecker (DE)	AU, AR, CA, CZ, DK, ES, FI, FR, GB, JP, IT, NL, NZ, KR, PL, QZ, SK, CLI, ESA, ISF
Castor Bean (<i>Ricinus communis</i> L.)	TG/RICIN(proj.2)	Mr. Adriaan de Villiers (ZA)	AR, AU, BG, BR, FR, IT, MX, QZ, UA, ESA, ISF, Office
*Cotton (<i>Gossypium</i> L.) (Revision)	TG/88/7(proj.2)	Mr. Jesús Mérida (ES)	AR, AU, BR, CN, CO, ES, JP, KE, MX, QZ, TZ, US, VN, ZA, CLI, ESA, ISF, Office
*Elytrigia (<i>Elytrigia elongata</i> (Host) Nevski), (<i>Agropyron elongatum</i> (Host) P. Beauv.)	TG/ELYTR(proj.6)	Mr. Alberto Ballesteros (AR)	CZ, HU, MX, PL, QZ, ESA, ISF, Office
*Field Bean (<i>Vicia faba</i> L. var. <i>minor</i>) (Revision)	TG/8/7(proj.2)	Ms. Cheryl Turnbull (GB)	AR, AU, CA, CO, CZ, DE, DK, ES, FR, GB, IT, MX, NL, PL, QZ, ZA, CLI, ESA, ISF, Office
Ginseng (<i>Panax ginseng</i> C.A. Mey) (Revision)	TG/224/1	Mr. Wonsig Lee (KR)	JP, ISF, Office
Oats (<i>Avena sativa</i> L. & <i>Avena nuda</i> L.) (Revision)	TG/20/8(proj.2)	Mr. Antonio Escolano (ES)	AR, AU, BR, CA, CN, CO, CZ, DE, DK, ES, FI, FR, GB, IT, JP, KR, NL, NZ, PL, QZ, SK, UY, ZA, ESA, ISF, Office
Quinoa (<i>Chenopodium quinoa</i> Willd.)	TG/CHENO(proj.3)	Mr. Erik Lawaetz (DK)	AR, BR, CA, CL, CO, ES, FR, IT, MX, NL, NZ, QZ, ZA, ESA, ISF, Office
Red Clover (<i>Trifolium pratense</i> L.) (Revision)	TG/5/8(proj.1)	Ms. Robyn Hierse (ZA)	AR, AU, BR, CA, CZ, DE, DK, ES, FI, FR, GB, IT, JP, NZ, PL, QZ, SK, UY, ZA, CLI, ESA, ISF, Office
Rice (<i>Oryza sativa</i> L.) (Revision)	TG/16/8	Mr. Yoshiaki Takamatsu (JP)	AR, AU, BR, ES, FR, IT, KE, KR, MX, QZ, CLI, ISF, Office
Soya Bean (<i>Glycine max</i> (L.) Merrill) (Revision)	TG/80/7(proj.2)	Mr. Alberto Ballesteros (AR)	AR, AU, BR, CA, CN, CO, ES, FR, IT, JP, KR, NL, PY, QZ, SK, US, UY, VN, ZA, CLI, ESA, ISF, Office
Tea (<i>Camellia sinensis</i> (L.) Kuntze) (Revision)	TG/238/1 Corr.	Mr. Simeon Kibet Kogo (KE)	AR, BR, JP, ISF, Office

§ for name of experts, see list of participants

DRAFT TEST GUIDELINES TO POSSIBLY BE DISCUSSED IN 2018

Species	Basic Document(s)
Finger millet (<i>Eleusine coracana</i> (L.) Gaertn.)	New
Rape Seed (<i>Brasica napus</i> L. <i>oleifera</i>)	TG/36/6 Corr.
Rye (<i>Secale cereale</i> L.)	TG/58/6
Sunflower (<i>Helianthus annuus</i> L.)	TG/81/6
Triticale (<i>xTriticosecale</i> Witt.)	TG/121/3

[End of Annex V and of document]