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TWC/19/9
ORIGINAL: English
DATE: May 16, 2001

UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Nineteenth Session
Prague, June 4 to 7, 2001

TELECOMMUNICATIONS, EXCHANGEABLE SOFTWARE AND CONTACTS

Document prepared by the experts from the United Kingdom

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07/16	-	Evaluation of COY distinctness criterion	Laidig	24.04.89
07/14	A	Use of COY analysis for sugar beet	Law	26.04.89
07/13	V	Application of COY analysis to spring onion data	Laidig	10.04.89

07/11	V	Application of COY analysis to Leek in NL	van der Heijden	14.04.89
07/10	-	Global over-year tests for distinction	Gregoire	17.04.89
07/09	-	Comparison of distinctness methods in Denmark	Kristensen	15.05.89
07/08	-	Use of COY and MJRA when regressions are significant	Weatherup	18.01.89
07/06	-	Estimated minimum distances from small data sets	Talbot	28.02.89
07/03	-	Comparison of the COY analysis with the 2X1% method	Gregoire	30.01.89
06/11	V	Over years criterion distinctness on onion data	Laidig	24.05.88
06/10	-	Close pair comparison and COYD criterion	Talbot	02.05.88
06/08	-	Comparison of distinctness methods	Kristensen	15.04.88
06/07	-	Evaluation of COY distinctness criterion with data from 1985 to 1987	Laidig	09.03.88
06/06	A	Evaluation of COY criterion by regression in UK	Weatherup	15.04.88
05/05	A	COYD criterion after 3 years and 2 years of test	Weatherup	08.05.87
04/08	-	Evaluation of over-years COY distinctness criterion in UK	Weatherup	03.04.86
04/07	-	Interpretation of over-years results	Baltjes	01.05.86
04/06	A	Distinctness problems in grasses and sugar beet	Kristensen	26.03.86
04/05	-	Comments on use of COY criterion from member states	Weatherup	29.04.86
03/08	-	Simulation of the combined-over-years analysis	Baltjes	28.03.85
03/07	-	Experience in over-years distinctness criterion in UK	Weatherup	27.03.85
03/06	A	Experience in over-years distinctness criterion in UK	Weatherup	27.03.85
03/05	A	Over-year criterion (D) after two years of testing	Weatherup	14.03.85
03/03	-	Comparison of interpretation of DUS in different countries	Royer	05.02.85
02/05	A	Combined over-years criterion for distinctness on herbage crops	Weatherup	10.04.84

UNIFORMITY

18/02	A	Use of COY-D and COY-U approach in more than one location in forage crops	Gregoire	09.05.00
18/07	-	Design and Analysis of DUS special tests	Talbot	16.05.00
18/10	-	The combined-over-years- distinctness and uniformity criteria (revised paper TWC/15/7)	Talbot, Watson	19.05.00
18/12	V	Population standards in hybrids of outbreeding species	Roberts	?
15/15	-	Balanced alpha and beta risks tables (single sampling)	del Fresno	13.05.97
15/12	-	Testing of homogeneity of self-fertilized and vegetatively propagated species using off-types	Kristensen	13.05.97
15/07	-	Users notes for COYD and COYU procedures	Talbot, Watson, Weatherup	09.05.97
15/06	-	Use of COYD and COYU	Law	13.05.97
14/03	-	Testing of uniformity of self-fertilized and vegetatively propagated species using off-types	Kristensen	02.05.96
14/09	-	A tool to supply tables for document TWC/11/16 and to find correct population standards for different sample sizes and off-types	del Fresno	13.05.96

14/11	-	Summary of the answers to the questionnaire addressed to the crop experts in order to know their opinion on the way of fixing the population standard for each crop	Blouet	29.05.96
13/09	A	Homogeneity criterion for visually assessed characteristics in turnip rape	Talbot	18.04.95
13/08	-	Homogeneity testing over more than one year	Kristensen	18.04.95
12/11A6	-	Comparison of two years uniformity tests in DK	Kristensen	12.04.94
12/11/A10	-	Testing of uniformity by two-stage sampling	Laidig	12.04.94
12/10	A	Use of COYU in the UK in 1993	Weatherup	12.04.94
11/10	-	Evaluation of over-years criterion for uniformity	Kristensen	17.06.93
11/09	-	Comparison of conclusions drawn from COYU analysis	Falkenberg	25.05.93
11/06	A	Use of COYU in the UK	Weatherup	11.05.93
11/02	-	The combined-over-years uniformity criterion	Talbot	11.05.93
10/09	-	Minimum sample size in self-pollinated and vegetatively propagated species	van der Heijden	19.05.92
10/07	-	Study of COYU levels	Fuchs	14.05.92
10/05	-	Testing homogeneity of self-fertilized or vegetatively propagated varieties	van der Heijden	11.05.92
9/11	-	Study of COYU levels in Denmark	Kristensen	29.05.91
9/08	-	Evaluation of COYU criterion	Laidig	22.05.91
9/06	A	COYU analysis applied to Italian ryegrass and red fescue	van der Heijden	17.05.91
9/05	A	Comparison between COYU criterion and present criterion in PRG varieties	Weatherup	03.05.91
8/08	-	Evaluation of over-years criterion for uniformity	Gregoire, Talbot	22.05.90
07/17	-	Comparison between COY uniformity decision and present UPOV criterion	Weatherup	25.04.89
07/12	-	Evaluation of over-years homogeneity criterion and significance evel	Laidig	17.04.89
07/04	-	Testing homogeneity of self fertil and vegetativ propag pecies	Laidig	30.01.89
06/09	-	The over-years uniformity criterion	Talbot	02.05.88
06/04	-	Testing homogeneity of self-fertilized plants	Weatherup	15.04.88
05/06	-	COY uniformity for cross-pollinated species	Talbot	15.05.87
04/10	-	Over-years uniformity criterion for cross-pollinated species	Talbot	30.04.86
04/09	-	Questionnaire on uniformity standards vege. propag. and self-pollinated species	Weatherup	30.04.86
03/10	-	Uniformity standards for cross-pollinated pecies	Talbot	29.03.85
02/03	-	Homogeneity comparison between UK and UPOV criterion	Weatherup	12.03.84

IDENTIFYING SIMILAR VARIETIES

17/12	A	Special application of DUS variety descriptions	Veress	29.07.99
15/13	A	Constructing a reference set of cultivars for testing distinctness	Keizer, van Eeuwijk	25.06.97
14/2	-	Application of Gower's similarity coefficient to detect most similar varieties	Pilarczyk	26.03.96
14/14	-	Similarity, clustering and dendrograms	Law	04.06.96
13/06	A	Evaluation of most similar variety	Weatherup	18.04.95
9/07	-	Calculating similarities between varieties using electrophoresis data	van der Heijden	17.05.91

9/02	-	Review of methods for determining the most similar variety	Weatherup	29.05.91
8/15	-	Identification of similar varieties	Campbell	07.08.90
8/11	-	Variety description identification of similar varieties	Campbell, Fuchs	21.05.90
8/07	-	Dissimilarity between varieties with non-continuous measurements	Weatherup	04.05.90
8/06	-	Methods for identifying similar varieties	Weatherup	09.04.90

SEQUENTIAL ACCEPTANCE SAMPLING

14/4	-	Acceptance probability curves to define an appropriate sample scheme	Gregoire	17.05.96
14/17	-	Qalstat software	Gregoire	04.06.96
13/17	-	Sequential analysis	Gregoire	18.04.95
12/11A9	-	Introduction to sequential acceptance sampling	Talbot	12.04.94
07/09	-	Evaluation of the most similar variety using generalised distances	Weatherup	23.01.89
06/05	-	Choice of most similar variety for description	Weatherup	5.04.88

BIOCHEMICAL AND MOLECULAR DATA

18/08	-	Comments on the sixth session of the working group on biochemical and molecular techniques and DNA profiling in particular (BMT), Angers, France, March 1 to 3, 2000	Law	16.05.00
16/13	A	Most similar variety : comparisons of morphology, pedigree and molecular	Law, Cooke	18.05.98
15/16	A	Identification of ryegrass cultivars by means of AFLP markers	-	27.05.97
14/15	-	The use of the analysis of molecular variance (AMOVA) for distinction studies	Dillman	29.05.96
14/18	-	Statistical analysis of molecular marker data	Talbot	04.06.96
13/15	-	Application of statistical analysis to small sample electrophoretic tests	Howath	18.04.95
9/07	-	Calculating similarities between varieties using electrophoresis data	van der Heijden	17.05.91
8/03	-	Common data structure for electrophoretic data	Gregoire	20.04.90
07/15	-	Computer program for analysing electrophoresis data in Germany	Laidig	07.04.89
07/02	-	Review of statistical practice in analysis of electrophoresis data by computer	Gregoire	23.01.89

IMAGE ANALYSIS

18/03	-	Image and image analysis	Gregoire	09.05.00
16/11	V/O	Digital images in plant variety variety testing	van der Heijden	18.05.98
16/10	V	Visor - a plant variety image database	Horgan, Talbot,Davey	18.05.98
13/18	-	Answers to questionnaire on IA	van der Heijden	8.04.95
13/16	-	Image recognition system for plant variety testing	van der Heijden	18.04.95
13/10	V	Plant variety color assessment using a still video camera	Horgan, Talbot, Davey	18.04.95
12/09	O	Application of image analysis to varietal characterisation	Gandelin	07.04.94

12/06	-	Image analysis in variety testing	van der Heijden,	30.03.94

VISUALLY SCORED DATA

17/14	-	Application of a threshold model on a number of UPOV characteristics	Thissen	20.08.99
17/06	-	Handling visually assessed data	Meyer	27.05.99
15/14	A	Revised document on analyzing visually observed data in two grass species	van Eeuwikj	05.06.97
14/12	-	Threshold models for visually-observed data	van Eeuwijk	4.06.96
13/14	V	Biometrical evaluation of visually observed characteristics in French beans	Laidig	18.04.95
11/13	-	Handling of visually assessed characteristics	Laidig	17.06.93
10/08	-	Handling of visually observed characteristics	Laidig	19.05.92
05/04	-	Logical order of states of expressions	Weatherup	17.02.87

MISCELLANEOUS

18/09	-	Types of characteristics and their scale levels	Meyer	18.05.00
18/11	-	Telecommunications, exchangeable software and contacts	Talbot	22.05.00
17/02	A	Efficiency of IB design in DUS trials	Pilarczyk	17.03.99
17/03	-	UPOV DUS & VCU computer systems	Pilarczyk	10.05.99
17/04	-	Developments in telecommunications	Talbot	28.05.99
17/05	O	Flores : image database for ornamentals	van der Heijden	28.05.99
17/09	-	DUST for Windows	Watson	02.06.99
16/06	-	UPOV TWC WWW Information pages	Talbot	16.05.98
16/05	-	Email bulletin board for varieties and seeds technical matters	Talbot	16.05.98
15/11	-	UPOV and the Internet	Talbot	07.05.97
15/04	A	Spatial dependence in spaced plant herbage trials	White	29.04.97
13/04	A	Checking for outliers in herbage DUS data	Weatherup	06.04.95
9/10	-	Between centre standardization of variety descriptive scores	Kristensen	29.05.91
9/09	-	Variety testing by breeder	Adriansen	20.05.91
07/07	-	Deriving variety scores from continuous measurements	Talbot	31.01.89
06/03	-	Non parametric statistics for DUS testing	Baltjes	23.03.88
06/02	-	Promoting statistics	Baltjes	29.02.88
04/12	-	Variety description	Law	22.05.86
03/09	-	Exchange of variety descriptions	Law	28.03.85
02/04	-	Standardization of entries	Duyvendak	10.04.84

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EXCHANGEABLE SOFTWARE

CZECH REPUBLIC

Program Name	Function	Programming Language	Available From
FTAB-MAX	Spreadsheet with statistical functions, for example: * Finding most similar varieties, based on euclidian distance from a target variety in a standardised multidimensional space; * Multidimensional grouping of varieties (hierarchical sorting) based on categorical descriptor values. Stops when distinction of all entries is reached; * Least Squares Analysis of nonorthogonal data, including least significant differences for average number of reps; * Simple statistics of specified rows or columns; * Multidimensional distinctness of measured variables of replicated entries (combined over environments); * Correlation matrices with indicated significance; * Two-dimensional scatter diagrams.	Compiled BASIC	Dr E. Schwarzbach Brno

DENMARK

Program Name	Function	Programming Language	Available From
	Denmark uses SAS on Pcs for calculation of data from both DUS and VCU trials. Administrative data are stored and retrieved from a database developed in FOXPRO (Dbase IV-like) on Pcs. Macros in SAS are available which convert SAS datasets to files which can be read by DUST and related programs. Procedures using SAS can be copied by other SAS users.	SAS	K. Kristensen Denmark
SAS-SUMMARY	Calculates summary measures.		
SAS-ANOVA SAS-GLM	Calculates analyses of variance, variety means and SLD values.		
SAS-PLOT	Residual plots and plots of standard deviations against plot number and/or means.		
SESENS	Convert SAS-files to ascii-files which can be used as input for UNIF3 (Fortran uniformity program supplied by M Talbot).		
SESSELV	Convert SAS-files to ascii-files which can be used as input for TVAL and TSUM (Fortran distinctness programs which are part of the DUST program supplied by S T C Weatherup).		

GERMANY

Program Name	Function	Programming Language	Available From
SAS - COY - D	Distinctness tests for candidate varieties with 3, 2 or 1 year of trial results. Calculation of ANOVA summary statistics, MJRA, LSD-values, outlier checking, residual plots, summary table of distinctness results, similar varieties. Options: long range LSD values, robust estimate of error mean square.	SAS	Bundessortenamt, Hanover
SAS - COY - H	Homogeneity test for candiate varieties with 3 and 2 years of trial results. Functions and output as described in document TC/30/4 (COY-U).	SAS	Bundessortenamt, Hanover
VERA	Generates randomized designs for variety trials with up to 225 entries: complete blocks, with entries arranged in groups (e.g. maturity), split plots (2 factors), split plots where subplots are arranged in an alpha design.	SAS	Bundessortenamt, Hanover

JAPAN

Program Name	Function	Programming Language	Available From
KIRI	General data base software which contains information on applications (such as name and address of applicant, genera and species of variety, proposed denomination, date of application etc.) and registration (denomination, date of registration, characteristics of registered variety etc.).	C	Seeds and Seedlings Division, MAFF,TOKYO

THE NETHERLANDS

Program Name	Function	Programming Language	Available From
Hand held terminal	Programs on hand held terminals Husky FS/2 for field observations with checks on data.	MS-DOS Turbo Pascal VAX Fortran	Gerard Middendorp CPRO-DLO, PO Box 16 6700 AA Wageningen The Netherlands
CIS	Oracle database with applications for DUS and VCU trials data storage and analysis.	Designer 2000	Gerard Middendorp CPRO-DLO
Genstat Procedures	A suite of dedicated procedures for analysis of variety data from the CIS database.	Genstat 4.1	Gerard Middendorp CPRO-DLO
SCIL-Image	Image analysis package with C-command interpreter, menu's, easily expandable large library of imaging functions.	C	Gerie v.d Heijden CPRO-DLO

POLAND

Program Name	Function	Programming Language	Available From
POWT3	Analysis of categorial data; the difference between all pairs of varieties are tested.	FORTRAN F1	W.Pilarczyk COBORU Poland
POWT5	Analysis of variance for cumulative observations over a period of time. Program can be used, for example, for the analysis of heading dates and for so called "dynamics of flowering".	FORTRAN F1	

SLOVAKIA

Program Name	Function	Programming Language	Available From
ANALIST 1.1	Identification of wheat varieties using Image Analysis of 16 morphometrical parameters of wheat seeds, compare morphometrical parameters of tested sample with standard parameters of reference varieties (from catalogue), compute the similarity of varieties and ranking of varieties by level of homology of their shapes.	PASCAL 6.0	Mr.Lubomír Horváth Fax:0042 07 821763 Slovakia
ANALIST 2.1	Identification of bean varieties using Image analysis of 16 morphometrical parameters of bean seeds, compare morphometrical parameters of tested sample with standard parameters of reference varieties (from catalogue), compute the similarity of varieties and ranking of varieties by level of their homology of shapes.	PASCAL 6.0	
ANALIST 3.1	Identification of individual species of plant seeds and admixtures in tested samples using 5 morphometrical parameters.	PASCAL 6.0	
SPECTRUM 1.1	Identification of varieties using electrophoresis and densitometric data. Standardization of electrophoretic spectra by 3 reference bands, compute relative homology of tested and catalogized spectra and ranking of spectra by level of relative weighted homology.	CLIPPER 5.0	

UK

Program Name	Function	Programming Language	Available From
DUST	General program for analysis of data from DUS trials. Includes facilities for COY analysis and a wide range of multivariate analysis techniques. The software package is currently available in a DOS-based version (DUST9) and in a Windows 95/NT version (DUSTNT). For more details see next page.	FORTRAN 90	Dr S Watson DARD BELFAST

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The DUST Software Package

The DUST system was developed specifically to meet the needs of DUS (Distinctness, Uniformity and Stability) testing stations for software to organise, analyse and report data from DUS field trials. DUST is in routine use at several DUS centres for the management of data from trials of grasses, legumes, vegetables and fodder crops. It incorporates many of the UPOV-recommended statistical procedures for these crops.

The DUST package handles data through the stages of collection, storage, single-year summary, and multi-year summary. As well as providing the UPOV-recommended procedures it includes facilities for:

- identifying most similar varieties based on observations from a number of characters;
- producing variety descriptions.

The DUSTNT system will run on Pentium PCs. The minimum specification of PC needed to run the software is a 486 DX processor with 36 mbyte of memory.

For further information and details of availability please contact:

Dr Sally Watson
Biometrics Division
Department of Agriculture and Rural Development for Northern Ireland
Newforge Lane, Belfast BT9 5PX, UK
Tel: (44) 2890 255 292
Fax: (44) 2890 681 216
Email: sally.watson@dardni.gov.uk

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DESIGN OF SAMPLING SCHEMES WHEN TESTING FOR OFF-TYPES

This Java program allows a user to explore the consequences of various sampling strategies when assessing a population of plants for off-types on the basis of a sample of the plants drawn at random from the population.
The user provides information on :

- the percentage of off-types in the population that is considered to be the maximum acceptable;

- the typical numbers of plants that might be drawn as samples from the population.

The program calculates the probability of accepting the population of plants on the basis of the number of off-types found in the sample. For each of the typical sample sizes that has been specified by the user, the program calculates the probability of accepting the plants if 1,2,3... off-types are allowed in the sample.
The program assumes that the probability of an off-type occuring is small, i.e. not more than 1%.

Java program can be seen on WebPage

Please note that to run the program you need a Web browser with the Java-enabled option switched on.

This Java applet was written by Julien Rouault and maintained by Adrian Roberts - *(adrian@bioss.ac.uk)*

COYD/COYU PROCEDURES

The recommended statistical procedures for assessing distinctness and uniformity in cross-pollinated species are formally set out in UPOV document TC/33/7 with the title "Combined-over-years distinctness and uniformity criterion (revision of document TC/30/4)".
Here we provide notes on the procedures in a WWW-accessible format using the SMART on-line training system.
The reader can step through the pages by clicking on the appropriate buttons in the control bar at the top of the page. The left and right arrows take the user backwards or forwards one page. The contents and references pages can be found by clicking on the appropriate bar.
To begin, chose one of the topics below :

Combined-over-years distinctness criterion (COYD
Combined-over-years uniformity criterion (COYU)

SMART THE COMBINED-OVER-YEARS DISTINCTNESS CRITERION

SUMMARY

To distinguish varieties on the basis of a measured character we need to establish a minimum allowable distance between varieties so that a pair of varieties showing a difference greater than the minimum might be regarded as `distinct' in respect of that character. There are several possible ways of establishing minimum distances from Distinctness, Uniformity and Stability (DUS) trials data. Here is described what is known as the Combined-Over-Years Distinctness (COYD) criterion.

The COYD method involves:

- for each character, taking the variety means from the two or three years of trials for candidates and established varieties and producing over-year means for the varieties;
- applying the technique of analysis of variance to the variety-by-years table in order to calculate a least significant difference (LSD) for comparing variety means;
- if the over-years mean difference between two varieties is greater than the LSD then the varieties are said to be distinct in respect of that character.

The main advantages of the COYD method are:

- it combines information from several seasons into a single criterion in a simple and straightforward way;
- it ensures that judgements about distinctness will be reproducible in other seasons; in other words, the same genetic material should give similar results within reasonable limits from season-to-season.
- the risks of making a wrong judgement about distinctness are constant for all characters.

THE COMBINED-OVER-YEARS UNIFORMITY CRITERION

SUMMARY

When the uniformity of plants of a variety is to be judged on the basis of measurements then the standard deviation (SD) can be used to summarise the spread of the observations. A new variety can then be tested for uniformity by comparing its SD with that of reference varieties. However, uniformity is often related to the expression of a character. For example, in some species varieties with larger plants tend to be less uniform in size than those with smaller plants. If the same standard is applied to all varieties then it is possible that some may have to meet very strict criteria while others face standards which are easy to satisfy.

The Combined-Over-Years Uniformity (COYU) criterion addresses this problem by adjusting for any relationship that exists between uniformity, as measured by the plant-to-plant SD, and the expression of the characteristic, as measured by the variety mean, before setting a standard.

The technique involves ranking reference and candidate varieties by the mean value of the character. Each variety's SD is taken and the mean SD of the varieties most similar, i.e. those varieties which are ranked with it most closely, is subtracted. This procedure gives for each variety a measure of its uniformity expressed relative to that of comparable varieties.

The results for each year are combined by forming a variety-by-years table of adjusted SDs and applying an analysis of variance. The mean adjusted SD for the candidate is compared with the mean for the reference varieties using a standard t-test.

COYU, in effect, compares the uniformity of a candidate with that of the reference varieties most similar in relation to the character being assessed. The main advantages of COYU are that all varieties can be compared on the same basis and that information from several years of testing may be combined into a single criterion.

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DATABASE MANAGEMENT SYSTEMS IN USE

Name	Hardware - OS	Data used	Interface
Oracle	Vax II - VMS (NL) Dec Alpha - VMS (UK) Sequent - Dynix (UK) Sun - Solaris (UK) Axil - Solaris (FI) PC - Windows NT (F,UK)	Variety (F, FI, NL, UK) Seed Cert (FI, NL, UK) Administrative (F, NL, UK) Photo/slides/herbarium (NL)	Fortran,Pascal,Cobol,C, SQL/NT Servers, Developer 2000, VBA, Access, WP packages
Informix	Hewlett-Packard - HP UX (D)	Admin+Technical (D)	Fortran, C, SAS; VBA links to Word/Excel
dBase III+	PC - Dos (ES) PC (SK)	Technical (ES, SK) Admin (ES, SK)	Assembly Language only
Fox Pro 2	PC - Windows(CZ)	Admin+variety (CZ)	MS Office, dBase,Fortran
Visual Fox Pro	PC - Windows NT(CA) PC - Windows (DK)	Admin (CA) Admin+variety (DK)	WordPerfect,MS Office FoxExpress
RDB	VAX 4300 - VMS (F)	Admin+Technical (F)	-
IDSMA	ICLS39 VME (PL)	Admin+Variety (PL)	COBOL Application Master
Progress	Axil - Solaris (FI)	Admin (FI)	Sylk
MS Access	PC - Windows (D, F, SK, UK)	Technical (D, F, SK, UK) Admin (F, SK, UK)	-
MS Excel	PC - Windows (HU)	Admin+Tech+Variety (HU)	VBA

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