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HARMONIZATION OF VARIETY DESCRIPTIONS IN OIL SEED RAPE

Document prepared by experts from Germany

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1.   At the thirtieth session of the Technical Working Party for Agricultural Crops, held in Texcoco, Mexico, from September 3 to 7, 2001, it was proposed to undertake further studies about the degree of harmonization of variety descriptions in different crops as was presented in document TWA/30/16 for barley. First results for oilseed rape were pre   sented in document TWA/30/12.

2.   The aim of this study is to analyze the environmental influence on the states of expression of characteristics in winter oilseed rape. Variety descriptions were kindly provided by Denmark, France and the United   Kingdom as shown in Table 1. Descriptions from Denmark, France and Germany refer to two individual years at 5 locations: FR   -1, FR -2, DE -1, DE-2 and DK -1. Descriptions from United Kingdom refer to the mean description over two years from one location, wh   ich were developed in different testing cycles. Descriptions were available for 214 varieties in total. The variety descriptions from the different countries included characteristics as shown in Table 2.

Table1:   Number of varieties included in the stu   dy. 67 varieties were in common at 5
           locations over 2 years.

Country	2000	2001	XX[*]
DE-1, DE -2	196(67)	214(67)	
FR-1, FR -2	154(67)	127(67)	
DK-1	164(67)	165(67)	
UK-1			61

*) descriptions from different testing cycles

Table 2:   Characteristics included in the variety descriptions from France, Germany, Denmark and United Kingdom

UPOV-No.			Characteristic	DE	DK	FR	UK
G	1	*	Seed:erucic acid	X	X	X	X
	2		Cotyledon:length	X	X		
	3		Cotyledon:width	X	X		
	4	*	Leaf:green co lor	X	X	X	X
G	5	*	Leaf:lobes	X	X		
	6	*	Leaf:number of lobes	X	X	X	X
	7	*	Leaf:dentation of margin	X	X	X	X
	8		Leaf:length	X	X		
	9		Leaf:width	X	X		
	10		Leaf:length of petiole	X	X		
G	11	*	Time of flowering	X	X	X	X
	12	*	Flower:color of pe tals	X	X	X	X
	13		Flower:length of petals	X	X	X	
	14		Flower:width of petals	X	X	X	
	15		Production of pollen	X	X	X	
	16		Plant:height	X	X		X
	17	*	Plant:total length including side bra nches	X	X	X	
	18		Siliqua:length	X	X		
	19		Siliqua:length of beak	X	X		X
	20		Siliqua:length of peduncle	X	X		
	21		Tendency to form inflorescences in year of sowing for spring sown trials	X	X		X

3.   As a first step, the standard deviation was calculated over all descriptions for 214 varieties and 21 characteristics. A summary is shown in Table 3. No variation was observed between the descriptions for Seed: erucic acid and Leaf: lobes. Variation of seed erucic acid in one variety can clearly be explained as data error. The state of expression o   f leaf lobes is for all 214 varieties "present". Only 91% of varieties have a fully harmonized description for the qualitative characteristic "Production of pollen". Most of the variation is caused by different descriptions for varieties with segregation in this characteristic. Therefore better harmonization should be possible by considering this situation in the Test Guidelines. An acceptable degree of harmonization was found in characteristics 4, 14, 15, 17, 18, 19 and 20. For all other characteristi cs, variety descriptions are influenced much more by environmental effects. Before descriptions from other years or locations are used for any selection approach, they must be evaluated carefully. No harmonization of descriptions was observed for "Leaf: dentation of margin", "Flower: color of petals" and "Tendency to form inflorescences in year of sowing." The characteristics will be discussed later in more detail.

Table3:   Frequency distribution of standard deviations (SD) for 214 varieties   (3 to 11 descriptionsforeachvariety)

		FrequencydistributionofSD									Summaryin%		
		0,25	0,50	0,75	1,00	1,25	1,50	1,75	2,00	>2,00	<0.50	<0.75	<1.00
1	Seed:erucicacid	213	0	0	0	0	0	0	0	1	**100**	**100**	**100**
2	Cotyledon:length	13	48	74	58	15	6	0	0	0	29	63	90
3	Cotyledon:width	12	74	58	52	11	6	1	0	0	40	67	92
4	Greencolor	12	56	94	47	4	1	0	0	0	32	76	**98**
5	Leaf:lobes	214	0	0	0	0	0	0	0	0	**100**	**100**	**100**
6	Numberoflobes	3	35	71	72	23	6	4	0	0	18	51	85
7	Dentationofmargin	0	1	13	95	73	26	6	0	0	**0**	**7**	**51**
8	Leaf:length	4	46	58	59	22	15	5	4	1	23	50	78
9	Leaf:width	10	42	62	58	29	6	6	0	1	24	53	80
10	Lengthofpetiole	5	44	62	61	23	10	7	1	1	23	52	80
11	Timeofflowering	23	58	78	33	10	11	0	0	1	38	74	90
12	Colorofpetals	1	0	1	52	137	20	3	0	0	**0**	**1**	**25**
13	Lengthofpetals	1	16	80	76	31	8	0	1	1	8	45	81
14	Widthofpetals	8	82	90	27	4	2	1	0	0	42	84	**97**
15	Productionofpollen	195	0	0	0	0	2	4	4	9	**91**	**91**	**91**
16	Plant:height	3	23	52	66	43	21	5	1	0	12	36	67
17	Plant:totallength	19	63	84	37	10	0	1	0	0	38	78	**95**
18	Siliqua:length	23	55	87	36	6	3	3	1	0	36	77	**94**
19	Lengthofbeak	25	72	85	19	8	4	0	1	0	45	85	**94**
20	Lengthofpeduncle	39	92	59	20	3	0	1	0	0	61	89	**98**
21	Tendencyinfloresc.	11	7	7	8	7	17	19	23	115	**8**	**12**	**15**

4.   Forfurtherevaluationofthevaria   tionwithintheprovidedsetofvarietydescriptions,an analysis of variance was carried out for 67 varieties for which data were available from 5 locations and 2 years. A linear model was used to calculate the following effects: variation causedbydif ferencesbetweenvarieties;variationcausedbylocation,includingenvironmental and "observer" effects;variationcausedbyyears,variationcausedbyinteractionbetweenyear andlocation; aswellaslocationandvariety. Themeansquaresforeachs   ourceofvariation arepresentedinTable4.

Table4: ANOVA Source of variation expressed as mean squares (67 varieties, grown at 5 locationsin2000and2001)

	Characteristic	Year	Location	Yearxloc.	Variety	Var.xloc.
1	Seed:erucica cid	0,000 ns	0,000 ns	0,000 ns	0,060	0,000 ns
2	Cotyledon:length	0,046 ns	**12,063**	0,086 ns	3,838	0,689
3	Cotyledon:width	7,941	4,823	3,251	3,128	0,656
4	Greencolor	1,465	**13,044**	5,261	3,060	0,533
5	Leaf:lobes	0,000 ns	0,000 ns	0,000 ns	0,000 ns	0,000 ns
6	Numberoflobes	4,727	9,210	0,564 ns	4,205	1,096
7	Dentationofmargin	0,992 ns	**92,221**	0,629	3,564	0,319
8	Leaf:length	7,093	3,414	0,774 ns	2,679	0,876
9	Leaf:width	2,254	0,470 ns	1,452	3,449	0,884
10	Lengthofpe tiole	2,224	0,397 ns	0,993 ns	2,851	0,863
11	Timeofflowering	1,899	**10,345**	**17,196**	10,549	0,742
12	Colorofpetals	0,030 ns	**170,186**	0,415	0,154	0,081
13	Lengthofpetals	8,927	**37,628**	2,027	6,124	0,584
14	Widthofpetals	1,805	**12,601**	2,464	5,996	0,315
15	Productionofpollen	0,000 ns	0,000 ns	0,000 ns	27,787	0,000 ns
16	Plant:height	**13,807**	7,351	4,154	5,844	0,986
17	Plant:totallength	**10,260**	9,018	**25,240**	8,291	0,762
18	Siliqua:length	1,169 ns	**10,057**	2,221	6,599	0,476
19	Lengthofbeak	0,076 ns	0,453 ns	1,795	8,589	0,468
20	Lengthofpeduncle	0,205 ns	6,115	0,989	5,296	0,369
21	Tendencyinfloresc.	**508,219**	**70,209**	**123,704**	17,680	1,092 ns

ns -notsignificant

5.   Theexpressionofthecharac   teristics"Seed:erucicacid","Leaf:lobes"and"Production ofpollen"isfullyharmonizedforthecommonsetof67varieties.Anyvariationiscausedby varietiesitself.Themostimportantsourceofvariationfortheothercharacteristicsdependson thecharacteristic,buttheeffectoflocationisgreaterinmorecharacteristicsthantheeffectof year.Interactionbetweenlocation   andyearisalsoimportantinsomecharacteristics,whereas interactionbetweenvarietiesandlocationsisgenerallyo   nlyverysmall.

6.   Themeanexpressionofthecharacteristicsinthedifferentlocationsin2000and2001is presentedinTable5forallcharacteristicswithsignificantenvironmentalvariation.Evaluation ofthesedataprovidesexplanationfo   rsomeofthenon   -harmonizedcharacteristicsandshows howbetterharmonizationcouldbeachieved.

7.   A significant effect of location can be caused by: environmental influence on the expression; different scorings in dependence of the observe   r; or differences in the transformation of measured data into states of expression. Even if these factors cannot be clearlyseparated,themeanvaluesprovidesomeinformation.

8.   The greatest effect of location occurs in "Flower: color of p   etals" and "Leaf: dentation of margin." The difference in flower color is caused by the use of different scales of states. In Germany, notes are used as presented in TG/36/6, i.e. 1 to 4, with 3 for "normal yellow". All varieties have note 3. In Franc   e and Denmark, more differentiation is used for describing this characteristic. The same varieties have expression 4, 5 or 6. Consequently, better harmonization could be achieved by using the same scale for assessment. The location effect on dentation o f margin is mainly caused by location DE   -2. At this location a clear shift of the level of scale can be observed. It must be checked if this is really based on environmental effects or if it is a question of standardization of scale. In the latter case,   more harmonization could be possible.

9.   A very strong year effect was observed in the characteristic "Tendency to form inflorescences in year of sowing" because of different mean values at location DE   -1 and DE -2 in 2000 and 2001. The differen   ce is attributed to the way of transforming the observed data into notes. A fixed system of notes is used which does not reflect the specific conditions of the year. 2000 and 2001 represented extreme conditions, one with very low and the other with very strong induction of flowering. The system currently in use is considered to be appropriate for assessment of distinctness but it should be checked if better harmonization of description could be achieved.

10.   In general, a difference between loc   ation means, or year means, of half a note or less is considered to occur by chance. No systematic effects have been found for characteristics 3, 8, 9, 10, 16, 18, 19 and 20. The maximum differences between location means for characteristics 2, 4, 6, 11,   13, 14 and 17 are greater with 0.6 to 1.2 notes. A more detailed study of data, way of assessment and standardization of scale is necessary to identify and perhaps to reduce systematic effects which result in variation between descriptions in these chara   cteristics.

11.   In winter oilseed rape, more harmonization of descriptions is necessary, in particular for the quantitative characteristics which have a high discrimination power, in order to use variety descriptions developed in different growin   g cycles in an efficient way for the selection of similar varieties. At the current level of harmonization, a large minimum distance must be used for establishing distinctness based on data coming from different growing cycles. All possibilities for an i   mprovement of the frequency distribution presented in Table 3 must be checked.

Table5: Meanexpressionofcharacteristics(67varieties,grownat5locationsinFrance   -FR,
Germany -DEandDenmark   -DKover2years)

	Characteristic	Year	DE-1	DE-2	FR-1	FR-2	DK-1	Mean
2	Cotyledon:length	2000	4,6	4,6			5,1	4,7
		2001	4,6	4,5			5,1	4,8
		Mean	**4,6**	**4,5**			**5,1**	
3	Cotyledon:width	2000	5,2	5,1			5,1	5,1
		2001	5,0	4,4			5,0	4,8
		Mean	5,1	4,7			5,0	
4	Leaf:greencolor	2000	5,9	5,6	5,1	5,3	6,2	5,6
		2001	5,7	5,3	5,2	5,9	5,7	5,5
		Mean	**5,8**	**5,4**	**5,2**	**5,6**	**6,0**	
6	Leaf:numberoflobes	2000	5,2	5,8	5,2	5,3	5,1	5,3
		2001	5,4	5,8	5,3	5,7	5,1	5,5
		Mean	**5,3**	**5,8**	**5,3**	**5,5**	**5,1**	
7	Leaf:dentationofmargin	2000	5,4	3,4	4,9	5,3	4,9	4,8
		2001	5,3	3,3	5,1	5,5	5,0	4,8
		Mean	**5,3**	**3,4**	**5,0**	**5,4**	**5,0**	
8	Leaf:length	2000	4,8	4,5			4,9	4,7
		2001	5,1	4,9			5,0	5,0
		Mean	5,0	4,7			5,0	
9	Leaf:width	2000	4,8	4,8			4,8	4,8
		2001	4,5	4,6			4,8	4,7
		Mean	4,7	4,7			4,8	
10	Leaf:lengthofpetiole	2000	4,9	5,1			4,9	5,0
		2001	5,3	5,1			5,1	5,2
		Mean	5,1	5,1			5,0	
11	Timeofflowering	2000	4,1	4,5	5,5	4,4	4,9	4,7
		2001	4,9	4,8	4,2	4,1	5,0	4,6
		Mean	**4,5**	**4,7**	**4,9**	**4,2**	**4,9**	
12	Flower:colorofpetals	2000	3,0	3,0	5,0	4,9	5,2	4,2
		2001	3,0	3,0	5,1	5,0	5,0	4,2
		Mean	**3,0**	**3,0**	**5,1**	**5,0**	**5,1**	
13	Flower:lengthofpetals	2000	5,8	6,1	5,1	6,2	5,2	5,7
		2001	6,3	6,0	5,4	6,6	5,2	5,9
		Mean	**6,0**	**6,0**	**5,2**	**6,4**	**5,2**	
14	Flower:widthofpetals	2000	5,7	5,4	5,1	5,7	5,1	5,4
		2001	5,5	6,0	5,1	5,8	5,2	5,5
		Mean	**5,6**	**5,7**	**5,1**	**5,8**	**5,1**	
16	Plant:height	2000	4,8	**4,1**			4,8	4,5
		2001	5,0	4,8			4,9	4,9
		Mean	4,9	4,4			4,8	
17	Plant:totallengthincluding sidebranches	2000	4,8	4,4	5,5	6,1	4,8	5,1
		2001	4,7	5,1	5,0	4,4	5,0	4,8
		Mean	**4,7**	**4,7**	**5,3**	**5,3**	**4,9**	
18	Siliqua:length	2000	5,5	5,3			4,8	5,2
		2001	5,3	5,1			5,0	5,1
		Mean	5,4	5,2			4,9	
19	Siliqua:lengthofbeak	2000	5,1	4,9			4,9	5,0
		2001	5,0	5,1			5,1	5,0
		Mean	5,0	5,0			5,0	
20	Siliqua:lengthofpeduncle	2000	5,5	5,1			5,1	5,2
		2001	5,5	5,3			5,2	5,3
		Mean	5,5	5,2			5,1	
21	Tendencytoform inflorescencesinyearof sowingforspringsowntrials	2000	2,3	2,3			2,7	**2,4**
		2001	5,6	5,6			2,7	**4,7**
		Mean	**4,0**	**3,9**			**2,7**	

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