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DISCRIMINATION POWER OF CHARACTERISTICS IN OILSEED RAPE

Document prepared by experts from Germany

DISCRIMINATION POWER OF CHARACTERISTICS IN OILSEED RAPE

The number of listed and protected varieties has been continually increasing for winter oilseed rape over the last few years. In only 4 years, the number of varieties in the Common Catalogue increased from 171 to 337 (+97%) and in the OECD-Catalogue from 231 to 433 (+87%). Between 80 and 100 new candidate varieties have been entered in Germany every year. Together with components of hybrids and new reference varieties, approximately 150 new varieties enter DUS testing every year. Since 1996, the number of varieties grown in the DUS test has increased by about 50% (about 550 varieties in 2000).

The ever growing number of varieties makes it more and more difficult to manage the collection with regard to the growing test for distinguishing new varieties. One method to reduce the number of variety comparisons required is the use of grouping characteristics. In oilseed rape there are 5 qualitative characteristics which are suitable for grouping but the majority of varieties have the same expression for these characteristics (Table 1). Most varieties belong to the same group and grouping is, therefore, not efficient.

Quantitative characteristics in winter oilseed rape have a much higher discriminative power than qualitative characteristics (Table 2). With many characteristics, one third to one half of the collection can be distinguished. The actual discriminative power of a characteristic is influenced by the location and the collection grown. Data from DUS tests in Denmark were kindly provided by Gerhard Deneken and Erik Lawaetz. Further analyses are necessary to explain the differences between results from Denmark and Germany. The results shown in Table 2 refer only to a single two-year growing cycle (1999 + 2000). The conformity of the collection was not checked. The differences between locations are not correlated with the applied minimum distances (LSD). Therefore, they may be caused by a different expression of characteristics and/or different collections.

The discriminative power of a characteristic in combination with other characteristics is shown in Table 3. The first characteristic has the highest efficiency for discrimination. The possibility of additional discrimination by additional characteristics decreases with the number of characteristics even if the additional characteristics have the same discriminative power. By combining all quantitative characteristics, it was possible to establish distinctness for all but 6 out of 7,626 variety comparisons.

By taking into account the results over a longer period of time, more locations and more collections, it could be possible to identify the characteristics with the highest discriminative power over years and locations. These characteristics would be most appropriate for efficient grouping.

The characteristics with the highest discriminative power should be indicated in the Technical Questionnaire as precisely as possible in order to use them for the management of the growing trial. But the usefulness of a characteristic for grouping depends not only on its discriminative power at one location and over one year. For grouping, the differences in variety descriptions between locations and years must also be considered. If the descriptions are not stable over environments, the minimum distances must be increased and grouping becomes less efficient.

Some problems concerning the uniformity of variety descriptions from different trials are demonstrated in Table 4. Data from France were kindly provided by Françoise Blouet. In order to obtain a better analysis, variety descriptions should be compared for more varieties, years and locations.

Table 1: Distribution of expression of qualitative characteristics in winter oilseed rape (%)

Characteristic	Note									Discrimin. power (%)
	1	2	3	4	5	6	7	8	9	
Flower: color of petals	0	0	**100**	0						0
Leaf: glaucosity	0								**100**	0
Leaf: lobes	1								**99**	2
Production of pollen	13				4				**83**	29
Seed: erucic acid	**95**								5	9

Table 2: Discriminative power of quantitative characteristics in winter oilseed rape (% discriminating variety comparisons of all pairwise comparisons)

Characteristic	DE	LSD	DK	LSD
Cotyledon: length	43	1,7	20	1,3
Cotyledon: width	45	2,2	38	2,4
Leaf: green color	7	2	17	1,5
Leaf: number of lobes	28	1,7	21	1,2
Leaf: dentation of margin	9	2	6	1,9
Leaf: length (blade and petiole)	27	48,9	13	38,4
Leaf: width	17	17,8	11	14,7
Leaf: length of petiole	28	39,3	15	32,0
Time of flowering	51	3,2	35	1,9
Flower: length of petals	33	2,1	44	0,9
Flower: width of petals	28	1,7	34	0,8
Plant: height (at full flowering)	33	16,0	28	15,8
Plant: total length including side branches	45	17,6	24	15,9
Siliqua: length (between peduncle and beak)	34	9,1	44	5,8
Siliqua: width	37	0,5		
Siliqua: length of beak	35	2,2	46	1,7

Siliqua: length of peduncle	49	4,0	37	2,7
Tendency to form inflorescences in year of sowing for spring sown trials	38	2,0	42	1,5

Table 3: Evaluation of characteristics - winterrape 1999-2000, (Tystofte, DK; 7626 comparisons)

Characteristic	SIGFIRST	SIGNEXT	% Discrimination
Siliqua: length of beak	3523	3523	46
Flower: length of petals	3368	1751	44
Tendency to form inflorescences ...	3171	926	42
Cotyledon: width	2932	530	38
Siliqua: length of peduncle	2837	243	37
Siliqua: length	3374	165	44
Time of flowering	2682	99	35
Flower: width of petals	2581	54	34
Leaf: lobes	1635	43	21
Plant: height (at full flowering)	2128	34	28
Cotyledon: length	1553	17	20
Leaf: green color	1261	14	17
Plant: total length including side branches	1855	9	24
Leaf: length (blade and petiole)	960	5	13
Leaf: width	805	3	11
Leaf: dentation of margin	485	3	6
Leaf: length of petiole	1160	1	15
Flower: color of petals	88	0	1
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		7420	

Table 4: Variety description of winter oilseed rape "CAPITOL" over 5 years and 4 locations

UPOV no.	Characteristic	Location	Capitol				
			1996	1997	1998	1999	2000
4	Leaf: green color	Minière	6	5	5	5	6
		Magneraud	8	7	7	5	7
		Eder	7	7	7	7	7
		Scharnhorst	7	6	5	6	7
6	Leaf: number of lobes	Minière	5	6	6	5	6
		Magneraud	5	4	6	6	6
		Eder	6	6	5	5	4
		Scharnhorst	5	5	6	4	6
7	Leaf: dentation of margin	Minière	5	5	6	5	5,5
		Magneraud	5	5	6	6	6
		Eder	5	5	5	6	6
		Scharnhorst	4	4	5	4	4
11	Time of flowering	Minière	4	5	3	4	5
		Magneraud	6	5	4	6	4
		Eder	6	5	3	5	5
		Scharnhorst	5	5	4	5	5
13	Flower: length of petals	Minière	5	6	7	5	5
		Magneraud	6	7	6	5	7
		Eder	7	6	6	6	6
		Scharnhorst	6	6	6	7	7
14	Flower: width of petals	Minière	5	5	6	5	6
		Magneraud	5	5	6	5	7
		Eder	7	5	5	6	6
		Scharnhorst	6	6	5	7	6
16	Plant: height (full flowering)	Minière	7	8	6	7	7
		Magneraud	8	8	5	7	7
		Eder	6	6	6	8	8
		Scharnhorst	7	5	7	6	5

Minière, Magneraud

Characteristics visually observed on plots on a 1 to 9 scale, for char. 4, 6, 7, 13 and 14.

Characteristics measured on plots for char. 11 and 16 and then converted into a 1 to 9 scale.

Scharnhorst, Eder

Characteristics visually observed on plots on a 1 to 9 scale, for char. 4 and 7.

Characteristics measured on plots for char. 16 and then converted into a 1 to 9 scale.

Characteristics measured on 60 single plants for char. 6, 11, 13 and 14 and then converted into a 1 to 9 scale.

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