

WINTER AND SPRING WHEAT (*Triticum aestivum* L.) DESCRIPTORS

III CHARACTERISATION AND EVALUATION DESCRIPTORS

Cereal genetic resources evaluation methodology:

Plot size: minimum 5m², at least 3 replications, random plot layout. Seed rate: winter wheat, oat - 500, spring wheat, spring barley, triticale, rye 400 seeds able to germinate per m². Non-treated seed is used. 3 year average data is transformed to 1-9 scale and used for final evaluation.

Characterization of testing location:

- a. Country of characterization
- b. Institute name and address
- c. Institute site (latitude, longitude, elevation)
- d. Sowing date
- e. Harvest date
- f. Percentage seed germination
- g. Percentage field establishment
- h. Plot size
- i. Number of replications
- j. Fertilizer (types, doses)
- k. Plant protection

ENVIRONMENT CHARACTERISTIC

- l. Soil type
- m. Relief
- n. Soil pH
- o. Soil organic matter content
- p. Soil texture
- q. Temperature range (year and/or the seasonal mean, maximum, minimum)
- r. Frost (date and lowest temperature of most recent frost)

Descriptor code	Trait No. in another descriptors	Descriptor Scale (score)	Reference values	Notes
Characterisation				
III/1		Seasonal type		
	¹ IPGRI 4.1.1 ⁴ UPOV 26	1 Winter 2 Intermediate 3 Spring		
III/2		Coleoptile anthocyanin coloration		
	UPOV 1	1 Absent 3 Weak 5 Medium 7 Strong 9-11 Very strong		09-11 (decimal code of cereal plant growth stages by Zadoks) Set up 20 grains on wet filter paper with a Petri Dish lid during germination. After coleoptiles have reached a length of about 1 cm in darkness, they are placed in artificial light 12000-15000 lux for 3-4 days
III/3		Growth habit		
	IPGRI 6.1.1 UPOV 3	1 Erect 3 Semi-erect 5 Intermediate 7 Semi-prostrate 9 Prostrate	0-0 ⁰ 11-34 ⁰ 35-56 ⁰ 57-79 ⁰ 80-90 ⁰	25-29 (Decimal code of cereal plant development stages by Zadoks) The growth habit should be assessed visually from the angle formed by the outer leaves and tillers with an imaginary middle axis should be used. (Picture 1, Appendix)
III/4		Flag leaf attitude		
	UPOV 4	1 Rectilinear 3 Slightly recurved 5 Recurved	<15 ⁰ 15-45 ⁰ 45 ⁰ -90 ⁰	47-51

		7 9	Strongly recurved Very strongly recurved	91 ⁰ -135 ⁰ >135 ⁰	
III/5		Flag leaf anthocyanin coloration of auricles			
	UPOV 3	1 3 5 7 9	Absent Weak Medium Strong Very strong		47-51
III/6		Plant height (cm)			
	IPGRI 4.1.2. ² D6 ³ BA UPOV 9	1 2 3 4 5 6 7 8 9 X	Dwarf Dwarf to short Short Short to intermediate Intermediate Intermediate to high High High to very high Very high Variable expression	<35 35-50 51-65 66-80 81-95 96-110 111-125 126-140 >140	*, 75-92 Measured at maturity from ground to top of spike, excluding awns in cm
III/7		Time of emergence			
	IPGRI 4.2.1. UPOV 5	1 3 5	Very early Early Medium	winter wheat spring wheat <145 < 50 146-155 51-59 156- 160 60-64	* Winter wheat - number of days from 1 January to heading when first spikelet is visible on 50 % of plants * Spring wheat - number of days from sowing

		7 9	Late Very late	161- 165 >166	65-69 > 70	to heading when 50 % of plants have started heading.
III/8		Flag leaf glaucosity				
	UPOV 7	1 3 5 7 9	Absent Weak Medium Strong Very strong			55-69
III/9		Ear glaucosity				
	UPOV 8	1 3 5 7 9	Absent Weak Medium Strong Very strong			60-69
III/10		Culm: glaucosity of neck				
	UPOV 9	1 3 5 7 9	Absent Weak Medium Strong Very strong			55-75
III/11		Culm: hairness of uppermost node				
	UPOV 11	1 3 5 7 9	Absent Week Intermediate High Very high			55-75, (Picture 3, Appendix)
III/12		Ear shape				

	UPOV15	1 2 3 4 5	Tapering Parallel Fusiform Semi-clavate Clavate		80-92 (Picture 2, Appendix)
III/13		Spike density			
	IPGRI 4.2.2 D5 BA13 UPOV12	1 3 5 7 9	Very low/very sparse Low/sparse Intermediate High/dense Very high/compact	<16 16.0-25.0 25.1-30.0 30.1-40.0 >40.0	*, 80-92 the average number of spikelets per 10 cm of spike). Count in the middle of spike for one spike from each replication
III/14		Awnedness			
	IPGRI 4.2.3 D1 BA4 UPOV17; 18	1 3 5 7 9	Awnless to very short awnlettes on upper part of spike Awletted Intermediate (long awnlettes/short awns on upper part of spike Awned (whole spike) Long awned (whole spike)	<10 mm 10-40 mm 41-60 mm <=Length of spike > Length of spike	*,70-92

III/15		Apical rahis segment; hairness of convex surface		
	UPOV 21	1 3 5 7 9	Absent Weak Medium Strong Very strong	80-92
III/16		Lower glume shoulder width		
	UPOV 22	1 3 5 7 9	Absent Narrow Medium Broad Very broad	80-92 Spikelet in mid-third of spike. (Picture 4, Appendix)
III/17		Lower glume shoulder shape		
	UPOV 23	1 3 5 7 9	Sloping Rounded Straight Elevated Elevated with 2nd point present	80-92 (Picture 5, Appendix)
III/18		Lower glume beak shape		
	UPOV 25	1 3 5 7 9	Straight Slightly curved Moderately curved Strongly curved geniculate	80-92 (Picture 6, Appendix)

III/19		Glume hairness		
	IPGRI 4.2.5 D4 BA12 UPOV 26	1 3 5 7	Absent Sparse (low) Intermediate Dense	*, 80-92 (Picture 7, Appendix)
III/20		Glume colour		
	IPGRI 4.2.4 D3 BA2	1 2 3 4 5	White yellow Brown/red Grey Black Other	*,80-92
III/21		Grain shape		
	UPOV 29	1 2 3	Rounded Ovoid Elongated	92
III/22		Grain colour		
	IPGRI 4.3.1 D2 BA11 UPOV 30	1 2 3 4 5 6 7	White yellow Amber yellow Light brown/light red Brown/red Dark brown/dark red Purple Other	* 92 Colour of mature caryopsis

Evolution				
III/23		1000 kernel weight (g)		
	D7 BA 1	1 3 5 7 9	Very low Low Intermediate High Very high	<27 27.1-36.0 36.1-45.0 45.1-54.0 >54
				*, Counted 2 times of 500 kernels from each replication (grains are clean by air cleaner or through 1,5 mm sieve). Average data of three years from all replications
III/24		Yield level (t ha⁻¹)		
	D10 BA 17	1 3 5 7 9	Very low Low Intermediate High Very high	<2.0 2,1- 4,0 4,1-6,0 6.1-8,0 >8,0
				*, Recalculated to 14% moisture
		Crude protein content (%)		
III/25	IPGRI 6.3.3 D8 BA 14	1 2 3 4 5 6 7 8 9	Very low Very low to low Low Low to intermediate Intermediate Intermediate to high High High to very high High	<9.0 9.1-10.2 10.3 –11,4 11.5-12.6 12.7-13.8 13.9 -15.0 15.1-16.2 16.3-18.0 >18.0
				*, Measured as percentage dry weight, indication the conversion factors used as N content x 5.7. Representative sample from all replications

III/26		Principal utilisation		
	IPGRI 6.3.5 D9 BA10	1 2 3 4 5 6 7	Bakers product Special pasta Feed product Bakers and feed product Technical purposes Ornamental purposes Other	*, Representative sample from all replications
III/27		Falling number (s)		
		1 3 5 7 9	Very low Low Intermediate High Very high	<100 101- 190 191-200 201-300 >300
III/28		Sedimentation (ml)		
	BA15	1 3 5 7 9	Very low Low Intermediate High Very high	>20 21-30 31-40 41-60 <60
Resistance to abiotic stress				

III/29		Lodging intensity		
	IPGRI 7.9 D11	1 3 5 7 9	Very low Low Intermediate High Very high	*, 90-92, average data all replications
III30		Winter hardiness		
	IPGRI 7.1.1	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression	*, Evaluated after renew of vegetation in spring; average data of three years from all replications
III/31		Cold resistance		
	IPGRI 7.1.2 BA16	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression	*, Damage caused by cold aerial parts of plants; not associated with death of plants in winter
Resistance to diseases				Evaluated in natural infection background; non treated seed material used; plant development stage of evaluation should be recorded
III/32		Powdery mildew (<i>Blumeria graminis f.sp.tritici</i>), (syn.<i>Erysiphe graminis f.sp.</i>)		
	IPGRI 8.2.4 D15	1 3 5	Very high High Intermediate	*

		7 9 X	High Very high Variable expression		
III/33		Stem rust (<i>Puccinia graminis f.sp.tritici</i>)			
	IPGRI 8.2.2 D12	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/34		Stripe rust (<i>Puccinia striiformis f.sp.tritici</i>)			
	IPGRI 8.2.1 D13	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/35		Leaf rust (<i>Puccinia triticina</i>)			
	IPGRI 8.2.3 D14	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/36		Septoria tritici, (<i>Mycosphaerella graminicola</i>)			

	D16	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/37		Stagonospora nodorum (<i>syn. Phaeosphaeria nodorum, syn. Septoria nodorum</i>)			
	IPGRI 8.2.5 D17	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/38		Head blight (<i>Fusarium spp.</i>)			
	IPGRI 8.2.7 D18	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/39		Eyespot <i>Oculimacula spp.</i> (<i>syn. Tapesia spp., syn Pseudocercospora spp.</i>)			
	IPGRI 8.2.6 D19	1 3 5	Very high High Intermediate		*,

		7 9 X	High Very high Variable expression		
III/40		Take-all (<i>Gaeumannomyces graminis</i> var. <i>tritici</i>) syn. <i>Ophiobolus graminis</i> var. <i>tritici</i>)			
	IPGRI 8.2.8 D20	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/41		Tan spot <i>Pyrenophora tritici-repentis</i>) <i>syn. Helminthosporium tritici-repentis</i>			
	D21	1 3 5 7 9 X	Very high High Intermediate High Very high Variable expression		*,
III/42		Snow mould (Fusarium seedling blight), (<i>Fusarium nivale</i>)			
	IPIGRI 10	1 3 5 7 9	Very high High Intermediate High Very high		Evaluation immediately after thaw in spring

		X	Variable expression		
III/43		Notes			Any other additional information
III/44		Cytological characteristics and identified genes			
III/45		Molecular markers			
III/46		Pictures			

Explanations and references

¹ IPGRI descriptors (1994)

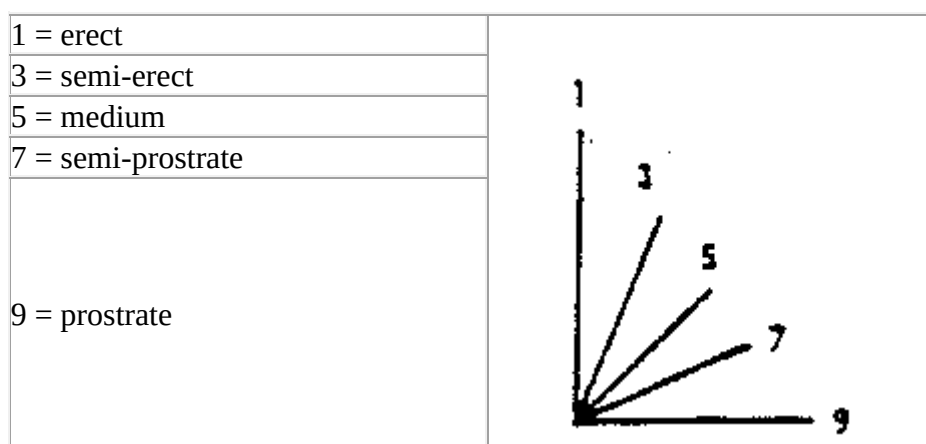
² D, EWDB (EU wheat data base) (2006)

³BA – Common descriptors of Baltic states (1997)

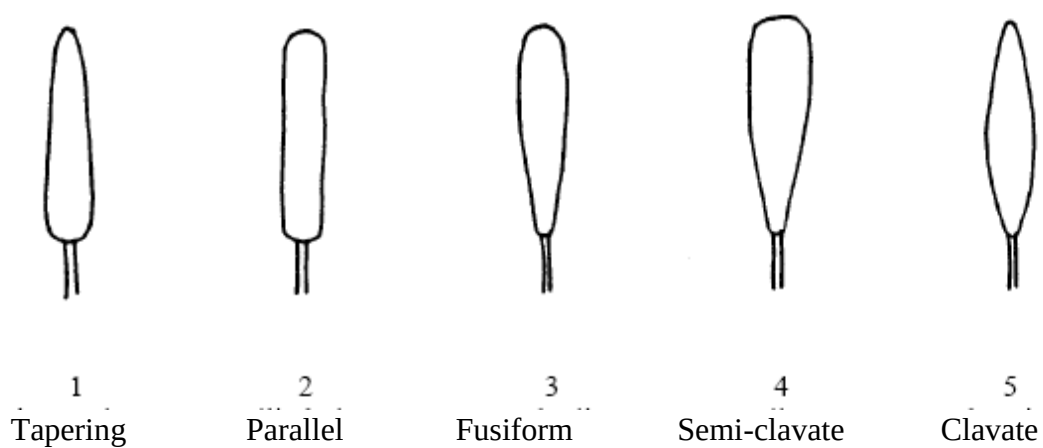
⁴ UPOV – 1982.g.

*Trait estimation according to Methodology for arrangement of cereal trials for evaluation of genetic resources.

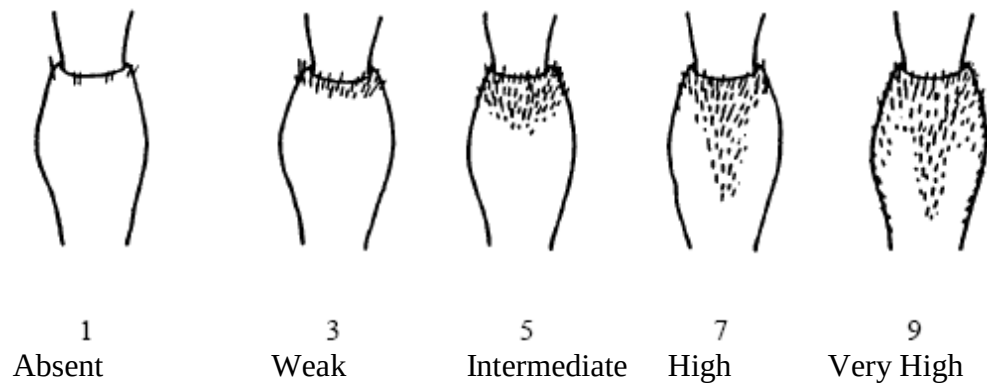
Appendix



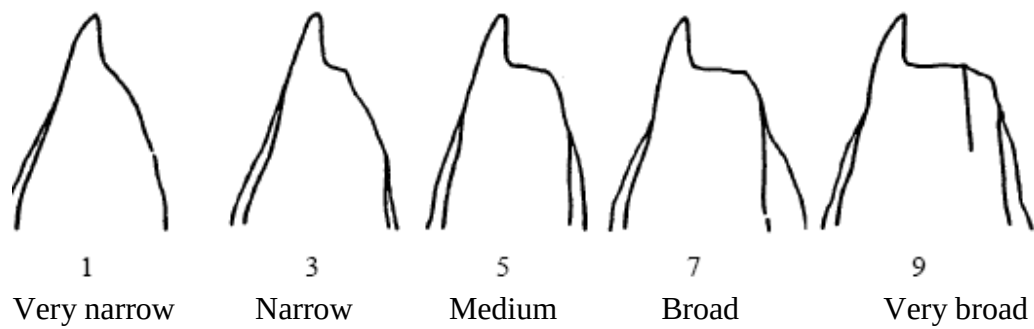
Picture 1. III/3: Growth habit



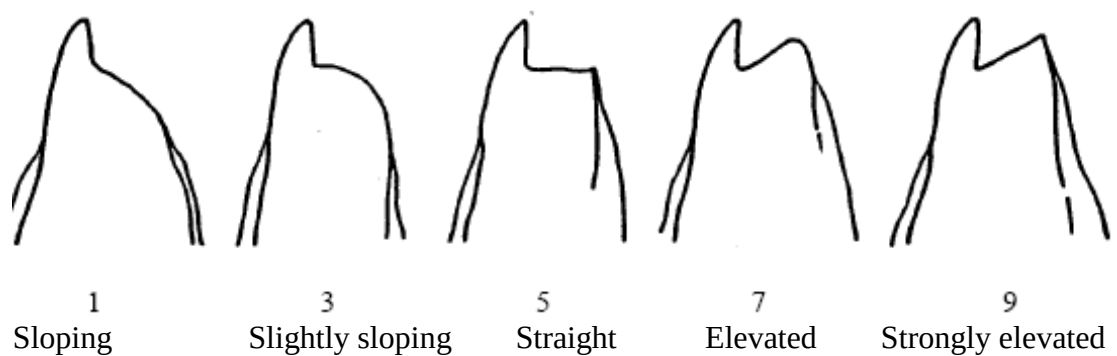
Picture 2. III/12Ear shape



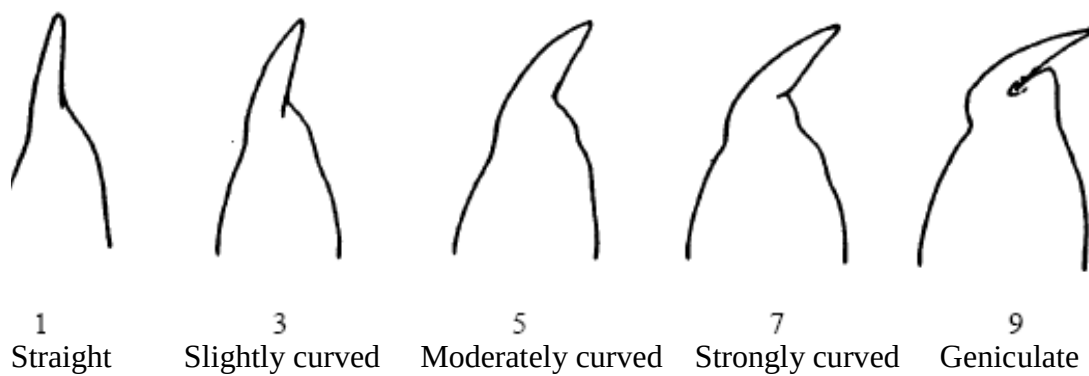
Picture 3. **III/11: Culm: hairness of uppermost node**



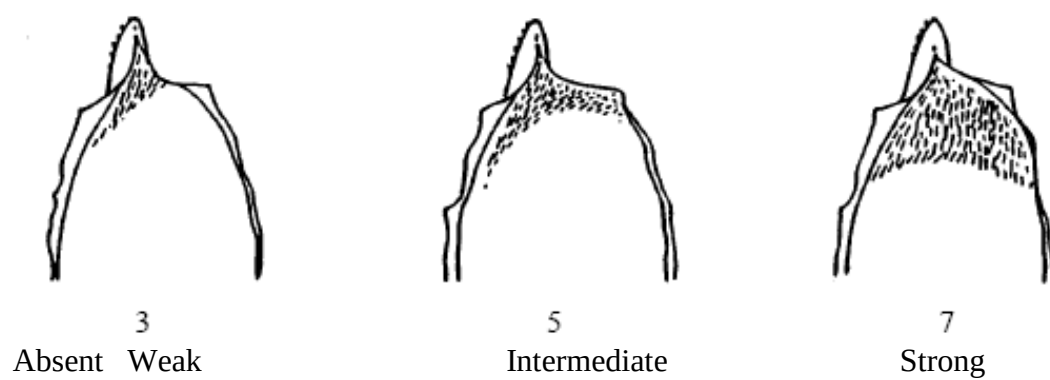
Picture 4. **III/16: Lower glume shoulder width**



Picture 5. **III/17 Lower glum shoulder shape**



Picture 6. **III/18:Lower glume beak shape**



Picture 7. **III/19:Lower glume: extent of internal hairs**