

SPRING AND WINTER BARLEY (*Hordeum vulgare* 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	Number of trait in other descriptors	Descriptor Scale (score)	Reference values	Remarks
Characterisation				
III/1		Seasonality		
	¹ IPGRI 7.1.1 ² BA 1 ³ UPOV 29	1 Winter 2 Facultative (intermediate) 3 Spring		
III/2		Growth habit		
	IPGRI 7.1.2 BA 2 UPOV 1	3 Erect 5 Intermediate 7 Prostrate		25-29 (Decimal code of cereal plant growth stages by Zadoks)
III/3		Plant height (cm)		
	IPGRI 7.1.3 BA 3 UPOV 12	1 Very short 2 3 Short 4 5 Medium 6 7 Long 8 9 Very long	<41 41-60 61-70 71-80 81-95 96-110 111-125 126-140 >140	*, 80-92, measured from the ground level to the top of spike excluding awns, for 5 plants per plot. Average data from all replications.
III/4		Glaucosity of flag leaf sheath		
	IPGRI 7.1.5 UPOV 4	1 Absent or very weak 3 Weak 5 Medium 7 Strong 9 Very strong		50-60
III/5		Stem pigmentation (immature)		
	IPGRI 7.1.4	1 Green 2 Basal only 3 Half or more		60-65

III/6		Intensity of anthocyanin coloration of awn tips			
	UPOV 9	3	Weak		60-65
		5	Medium		
		7	Strong		
III/7		Flag leaf auricle pigmentation			
	IPGRI 7.1.5	1	Green		45-49
	UPOV 4	3	Weak		
		5	Medium		
		7	Strong		
		9	Very strong		
III/8		Time of heading			
	IPGRI 7.2.2	1	Very short	<45	* number of days from sowing to heading when 50 % of plants have started heading. Determined in one replication.
	BA 4	2		45-48	
	UPOV 7	3	Short	49-52	
		4		53-58	
		5	Medium	59-62	
		6		63-66	
		7	Long	67-70	
		8		71-74	
		9	Very long	>74	
III/9		Number of ear rows			
	IPGRI 7.2.3	1	Two-row		
	BA 6	2	Six-row		
	UPOV 13				
III/10		Spike density			
	IPGRI 7.2.4	3	Lax	<12	*, 92, number of rachis internodes per 4 cm of rachis length. Counted in the middle of ear for one ear from each replication.
	BA 7	5	Intermediate	12-15	
	UPOV 15	7	Dense	>15	
III/11		Lemma awn			
	IPGRI 7.2.6	1	Awnless		
	BA 9	2	Short awn		
		3	Normal awn		
		4	Otherwise		
III/12		Lemma awn barbs			

	IPGRI 7.2.7 BA 10	3 Smooth (few barbs at tip) 5 Intermediate (small barbs on upper half) 7 Rough		85-92
III/13		Glume colour		
	IPGRI 7.2.9 BA 11	1 White 2 Yellow 3 Brown 4 Black		92
III/14		Length of rachilla hairs		
	IPGRI 7.2.12 UPOV 22	1 Short 2 Long	Picture 1 in Appendix	92
III/15		Kernel covering		
	IPGRI 7.3.1 BA 12 UPOV 23	1 Naked grains 2 Semi-covered grains 3 Covered grains		92
III/16		Lemma colour		
	IPGRI 7.3.3 BA 13	1 Amber (normal) 2 Tan/red 3 Purple 4 Black/grey 5 Other		92
III/17		Awn length compared to ear		
	UPOV 17	3 Shorter 5 Similar 7 Longer	Picture 2 in Appendix	80-92
III/18		Colour of aleurone layer		
	IPGRI 7.3.5 UPOV 28	1 Light 2 Weekly coloured 3 Strongly coloured		85-87, evaluated after 12 hours soaking in water.
III/19		1000 kernel weight (g)		
	IPGRI 7.3.6 BA 14	1 Very low 2	<34.1 34.1-36.0	*, 2x500 kernels are counted (grains cleaned by air separator or through 1.5

		3	Low	36.1-38.0	mm sieve). Representative sample from all replications.
		4		38.1-40.0	
		5	Medium	40.1-42.0	
		6		42.1-45.0	
		7	High	45.1-48.0	
		8		48.1-50.0	
		9	Very high	>50	
III/20		Duration of vegetation period			
	BA 5	1	Very short	<85	*, number of days from sowing to when 50 % of plants are mature. Data collected from one replication.
		2		85-88	
		3	Short	89-92	
		4		93-95	
		5	Intermediate	96-99	
		6		100-103	
		7	Long	104-107	
		8		108-111	
		9	Very long	>112	
Evaluation					
III/21		Test weight (g l ⁻¹)			
	IPGRI 8.1.3	1	Very low	<550	*, representative sample from all replications.
		2		551-570	
		3	Low	571-600	
		4		601-620	
		5	Intermediate	621-650	
		6		651-670	
		7	High	671 700	
		8		701-720	
		9	Very high	>720	
III/22		Yield (t ha ⁻¹)			
		1	Very low	<3.0	*, recalculated to 14 % moisture.
		2		3.0-3.5	
		3	Low	3.6-4.0	
		4		4.1-4.5	
		5	Intermediate	4.6-5.0	

		6		5.1-6.0	
		7	High	6.1-6.5	
		8		6.6-7.0	
		9	Very high	>7.0	
III/23		Crude protein content (%)			
	IPGRI 8.1.1 BA 15	1	Very low	<8.1	*, measured as percentage dry weight, indication the conversion factors used as N content x 6.25. Representative sample from all replications.
		2		8.1-9.0	
		3	Low	9.1-10	
		4		10.1-12.0	
		5	Intermediate	12.1-13.0	
		6		13.1-14.0	
		7	High	14.1-15.0	
		8		15.1-17.0	
		9	Very high	>17.0	
III/24		Lysine content in protein (%)			
	IPGRI 8.1.2	1	Very low	<2.90	*, representative sample from all replications
		2		2.90-3.19	
		3	Low	3.20-3.49	
		4		3.50-3.79	
		5	Intermediate	3.80-4.09	
		6		4.10-4.39	
		7	High	4.40-4.69	
		8		4.70-4.99	
		9	Very high	>4.99	
III/25		Starch content (%)			
		1	Very low	<55.0	*, measured as percentage dry weight. Representative sample from all replications.
		2		55.0-56.6	
		3	Low	56.7-58.3	
		4		58.4-60.1	
		5	Intermediate	60.2-61.9	
		6		62.0-63.6	
		7	High	63.7-65.3	
		8		65.4-67.0	
		9	Very high	>67.0	

III/26		Extractivity (%)		
		1 Very low	<75.0	*, measured as percentage dry weight, representative sample from all replications.
		2	75.0-75.9	
		3 Low	76.0-76.9	
		4	77.0-77.9	
		5 Intermediate	78.0-78.9	
		6	79.0-79.9	
		7 High	80.0-80.9	
		8	81.0-81.9	
		9 Very high	>81.9	
III/27		Hull content (%)		
		1 Very low	<6.0	*, 2x100 grains from representative sample from all replications, soak two ours in the water, keep in the moist chamber in room temperature, remove hulls, dry and weigh each fraction.
		2	6.0-6.6	
		3 Low	6.7-7.3	
		4	7.4-8.0	
		5 Intermediate	8.1-8.8	
		6	8.9-9.6	
		7 High	9.7-10.3	
		8	10.4-11.0	
		9 Very high	>11.0	
III/28		Beta-glucan content in grain (%)		
		1 Very low	<2.5	*, measured as percentage dry weight. Representative sample from all replications.
		2	2.6-3.0	
		3 Low	3.1-3.5	
		4	3.6-4.0	
		5 Intermediate	4.1-4.5	
		6	4.6-5.0	
		7 High	5.1-5.5	
		8	5.6-6.0	
		9 Very high	>6.0	

Resistance to diseases				*, evaluated in natural infection background; non treated seed material used; plant development stage of evaluation time should be recorded.	
III/29		Powdery mildew (<i>Blumeria graminis</i>)			
	IPGRI 10.2.4	1	Very high resistance		
		3	High resistance		
		5	Intermediate resistance		
		7	Low resistance		
		9	Very low resistance		
III/30		Net bloch (<i>Phyrenophora teres</i>)			
	IPGRI 10.2.7	1	Very high resistance		
		3	High resistance		
		5	Intermediate resistance		
		7	Low resistance		
		9	Very low resistance		
III/31		Loose smut (<i>Ustilago nuda</i>), (infected ears per m ²)			
	IPGRI 10.2.9	1	Very high resistance	0	61-63, number of infected ears per m ² ; infected ears in all replications are counted.
		3	High resistance	1-3	
		5	Intermediate resistance	4-6	
		7	Low resistance	7-9	
		9	Very low resistance	>9	
III/32		Leaf stripe (<i>Phyrenophora graminea</i>), (infected plants per m ²)			
	IPGRI 10.2.6	1	Very high	0	71-75, number of infected plants per m ² ; infected plants in all replications are counted.
		3	High	1-3	
		5	Intermediate	4-6	
		7	Low	7-9	
		9	Very low	>9	
III/33		Leaf scald (<i>Rynchosporium secalis</i>)			
	IPGRI 10.2.5	1	Very high resistance		
		3	High resistance		
		5	Intermediate resistance		
		7	Low resistance		
		9	Very low resistance		

III/34		Leaf rust (<i>Puccinia hordei</i>)			
	IPGRI 10.2.3	1	Very high resistance		
		3	High resistance		
		5	Intermediate resistance		
		7	Low resistance		
		9	Very low resistance		
III/35		Fusarium seedling blight (<i>Fusarium nivale</i>)			
	IPGRI 10.2.11	1	Very high resistance		Evaluated immediately after melting of snow.
		3	High resistance		
		5	Intermediate resistance		
		7	Low resistance		
		9	Very low resistance		
Resistance to abiotic stress					
III/36		Resistance to lodging			
	IPGRI 9.8	1	Very high resistance		*, 90-92, average data all replications.
		3	High resistance		
		5	Intermediate resistance		
		7	Low resistance		
		9	Very low resistance		
III/37		Resistance to winter kill			
	IPGRI 9.5	1	Very high resistance		* evaluated after renew of vegetation in spring; average data of three years from all replications.
		3	High resistance		
		5	Intermediate resistance		
		7	Low resistance		
		9	Very low resistance		
III/38		Notes			Any other additional information
III/39		Cytological characteristics and identified genes			
III/40		Molecular markers			
III/41		Pictures			

Explanations and references

* Trait evaluation according “Cereal genetic resources evaluation methodology”

¹ IPGRI descriptors (1994.g.)

² BA – Common descriptors of Baltic states³ UPOV – DUS test guidelines, 1994.g.

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

Appendix

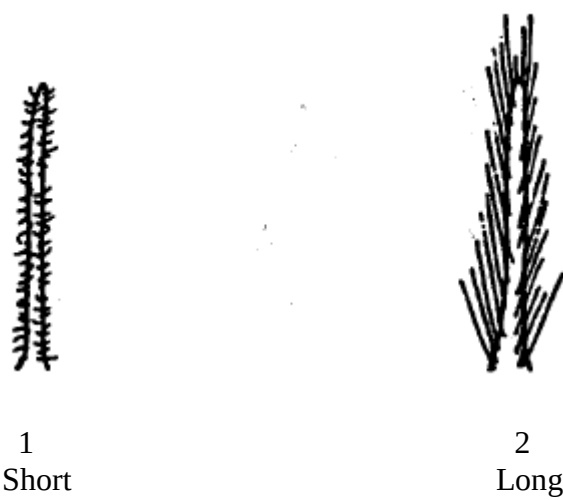


Figure 1. Length of rachilla hairs

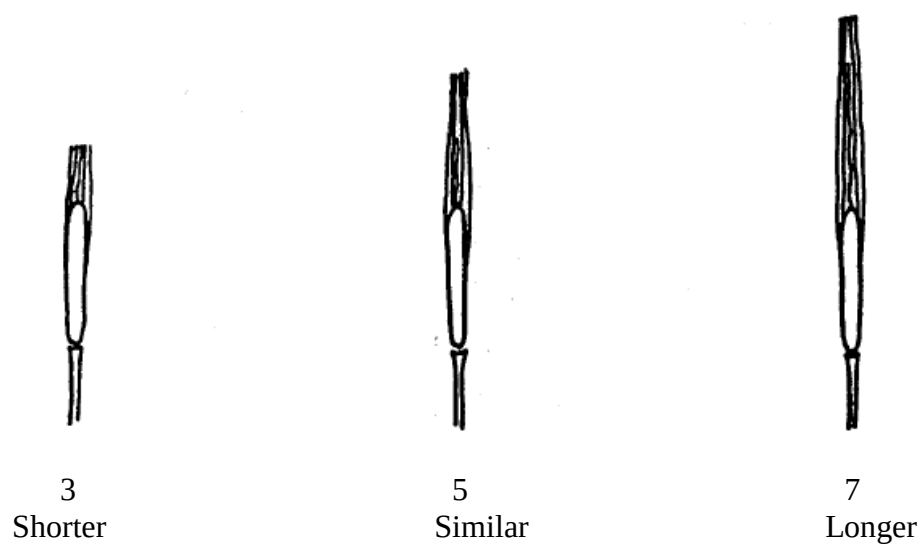


Figure 2. Awn length compared to ear