

WINTER AND SPRING RYE (*Secale cereale* 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 4.1 ² UPOV 22	1 Winter 2 Facultative (intermediate) 3 Spring		
III/2		Ploidy		
	UPOV 1	2 diploid 4 tetraploid		
III/3		Growth habit		
	IPGRI 6.1.1. UPOV 3	1 Erect 3 Semierect 5 Intermediate 7 Semiprostrate 9 Prostrate	0 -10° 11-34° 35-56° 57-79° 80-90°	The trait should be assessed in plant development stage 25-29 (Decimal code for the growth stages of cereals by Zadoks) The growth habit should be assessed visually from the angle formed by the outer leaves and tillers with an imaginary middle axis
III/4		Coleoptile: anthocyanin coloration		
	UPOV 3	1 absent or very weak 3 weak 5 medium 7 strong 9 very strong		The trait should be assessed in plant devel. stage 09-11 (Decimal code for the growth stages of cereals by Zadoks) Set up 20 grains on moistened filter paper in Petri Dish during germination. After the 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/5		Time of ear emergence		
	IPGRI 4.2.1 UPOV 9	3 early 5 medium 7 late	winter rye < 150 days spring rye 151-156 days > 157 days	* Winter rye - number of days from 1 January to heading when first spikelet is visible on 50 % of plants * Spring rye - number of days from sowing to heading when 50 % of plants have started heading.
III/6		Stem: density of hairiness of neck		
	IPGRI 4.2.2	1 absent or very weak	Figure 1. Appendix.	The trait should be assessed in stage of

	UPOV 13	3 weak 5 medium 7 strong 9 very strong		anthesis
III/7		Plant: length (stem and ear)		
	IPGRI 4.1.2 UPOV 14	1 very short 2 3 short 4 5 medium 6 7 high 8 9 very high	< 50 cm 50-70 cm 71-90 cm 91-110 cm 111- 130 cm 131-150 cm 151-170 cm 171-190 cm <190 cm	The trait should be assessed in plant development stage 80-92 (Decimal code for the growth stages of cereals by Zadoks) * Measured from the ground to the top of spike, excluding awns, for 5 plants per plot from each replication and the mean has calculated
III/8		Stem: length of the upper internode		
	Descriptor list for rye Est	1 very short 2 3 short 4 5 medium 6 7 high 8 9 very high	< 15,0 cm 15.0-25 25.1-35 35.1-45 45.1-55 55.1-65 65.1-75 75.1-85 >85	The trait should be assessed in plant development stage 80-92 (Decimal code for the growth stages of cereals by Zadoks) * Measured length of the upper internode for 5 plants per plot from each replication and the mean has calculated
III/9		Leaf: second upper length		
	Descriptor list for rye Est	1 very short 2 3 short 4 5 medium 6 7 high 8 9 very high	<10.0 cm 10-12 cm 12.1-14 cm 14.1-16 cm 16.1-18 cm 18.1-20 cm 20.1-22 cm 22.1-24 cm >24 cm	The trait should be assessed in plant development stage 80-92 (Decimal code for the growth stages of cereals by Zadoks) * Measured length of the second upper leaf for 5 plants per plot from each replication and the mean has calculated

III/10		Spike: awns length		
	IPGRI 4.2.4 UPOV 16	1 absend 3 very short 5 short 7 medium 9 long	0 <10 mm 10-30 mm 31-60 mm >60 mm	The trait should be assessed in plant development stage 80-92 (Decimal code for the growth stages of cereals by Zadoks) * Measured for 5 plants per plot from each replication and the mean should be calculated
III/11		Ear: density		
	UPOV 17	1 very lax 3 lax 6 medium 7 dense 9 very dense	< 20 20-26 27-32 33-38 39 -41	The trait should be assessed in plant development stage 92 (Decimal code for the growth stages of cereals by Zadoks) * The average number of spikelets per 10 cm length of spike for 5 plants per plot from each replication must be determined
III/12		Ear: length excluding awns		
	UPOV 16 IPGRI 4.2.3	1 very short 3 short 5 medium 7 long 9 very long	< 2,1 cm 6-10 cm > 10-14 cm 14-18 cm > 18 cm	The trait has been assessed in plant development stage 92 (Decimal code for the growth stages of cereals by Zadoks) * The spike length for 5 plants per plot from each replication should be determined and the mean calculated
III/13		Spike: position		
	UPOV 18	1 erect 3 semi-erect 5 horizontal 7 nodding 9 very nodding	< 15 ° 15-45° 46-90° 91-135° >135°	The spike position at full ripeness for 5 plants per plot from each replication should be determined and the mean calculated
III/14		Grain: shape		
	IPGRI 4.2.3	1 ovate 3 ovate oblong 5 barrel-shaped 7 compressed on each side 9 side	Figure 2. Appendix	The trait has been assessed in plant development stage 92 (Decimal code for the growth stages of cereals by Zadoks) Evaluated for 60 grains of representative sample from all replications

III/15		Grain: coloration with phenol		
	UPOV 21	1 nil or very light 3 light 5 medium 7 dark 9 very dark		Evaluated for 20 grains after 16-20 hours soaking in water
⁴III/16		Winterhardiness		
	IPGRI 7.1.1 SIN	1 very low 3 low 5 intermediate 7 high 9 very high	< 30 % 30-50 % 50-70 % 70-90 % > 90 %	* The number of plants per m ² in autumn and spring must be counted in each replication and percent of survived plants calculated
III/17		Resistance to lodging		
	IPGRI 7.7.1 SIN	1 very low 3 low 5 intermediate 7 high 9 very high	> 90% 51-90 % 16-50 % 6-15 % < 5 %	*The trait should be assessed in plant development stage 90-92 (Decimal code for the growth stages of cereals by Zadoks)
III/18		Resistance to preharvest sprouting		
	SIN 39 IPGRI 6.3.1	1 very low 3 low 5 intermediate 7 high 9 very high	> 20 % 11-20 % 3-10 % < 30 0 %	*Representative sample from all replications - 25 ears should be harvested, percent of germinated grain from total harvested number of grains calculated. The trait should be tested only in years, when sprouting is determined
III/19		1000 kernel weight		
	IPGRI 4.3.3 UPOV 19	1 very low 3 low 5 intermediate 7 high 9 very high	< 20 g 21-30 g 31-40 g 41-60 g > 61 g	*Representative sample from all replications. 2 x 500 kernels are counted.
III/20		Protein content		
	IPGRI 6.3.3 SIN 52.3.3	1 very low 3 low	< 8 % 8-9.9 %	*Representative sample from all replications. Measured as percentage of

		5 intermediate 7 high 9 very high	10.0-11.9 % 12.0 -13.9 14.0 - 15.0 %	dry weight The conversation factor used as either N x 6.25 Testing method should be indicated
III/21		Test weight		
	SIN 51	1 very low 3 low 5 intermediate 6 7 high 9 very high	< 600 g l ⁻¹ 601-650 g l ⁻¹ 651-680 g l ⁻¹ 681-700 g l ⁻¹ 701-730 g l ⁻¹ > 730 g l ⁻¹	*Representative sample from all replications. Average data of three years
III/22		Starch content (%)		
	SIN 52	1 very low 3 low 5 intermediate 7 high 9 very high	< 60 % 61.0-62.0 % 63.0-64.0 % 65.0-66.0 % > 66 %	*Representative sample from all replications. Average data of three years. Measured as percent of dry weight. Testing method should be indicated
III/23		Falling number		
	SIN 52.3.2	1 Very low 3 low 4 5 intermediate 7 high 9 very high	< 80s, 220s 80-90 s, 201-220 s 91-109s 110-119s, 171-200 s 120-139 s 140-170 s	*Representative sample from all replications. Average data of three years.
⁴III/24		Susceptibility to snow mould (<i>Microdochium nivale</i>)		
	IPGRI 8.2.5	1 very low 3 low 5 intermediate 7 high 9 very high	< 2 % 2-20 % 21-50 % 51-70 % > 70 %	* Surface of infection is determined and the average is calculated. Average data of three years.
III/25		Susceptibility to powdery mildew (<i>Erysiphe graminis</i>)		
	IPGRI 8.2.3	1 very low 3 low 5 intermediate 7 high	< 1% 2-10 % 11-25 % 26-50%	The susceptibility should be assessed in plant development stage 70-79 (Decimal code for the growth stages of cereals by Zadoks)

		9 very high	> 50%	* Flag leaf and second leaf from top for 5 plants in each replication should be estimated and mean calculated
III/26		Susceptibility to leaf rust (<i>Puccinia recondita</i>)		
	SIN	1 very low 3 low 5 intermediate 7 high 9 very high	< 1% 2-10 % 11-25 % 26-50% > 50%	The susceptibility should be assessed in plant development stage 70-79 (Decimal code for the growth stages of cereals by Zadoks) * Flag leaf and second leaf from top for 5 plants in each replication should be estimated and mean calculated
III/27		Susceptibility to stem rust (<i>Puccinia graminis</i>)		
	SIN	1 very low 3 low 5 intermediate 7 high 9 very high		The susceptibility should be assessed in plant development stage 70-79 (Decimal code for the growth stages of cereals by Zadoks) * Stem from 5 plants in each replication should be estimated and mean calculated
III/28		Notes		Any other additional information
III/29		Cytological characteristics and identified genes		
III/30		Molecular markers		
III/31		Pictures		

Explanations and references

* Trait evaluation according “Cereal genetic resources evaluation methodology”

¹ IPGRI descriptors (1985.)

² UPOV – DUS test guidelines, TG/58/6, 1999-03-24,

³ SIN

⁴ Only for winter rye accessions

Descriptor list rye. Estonia

Appendix

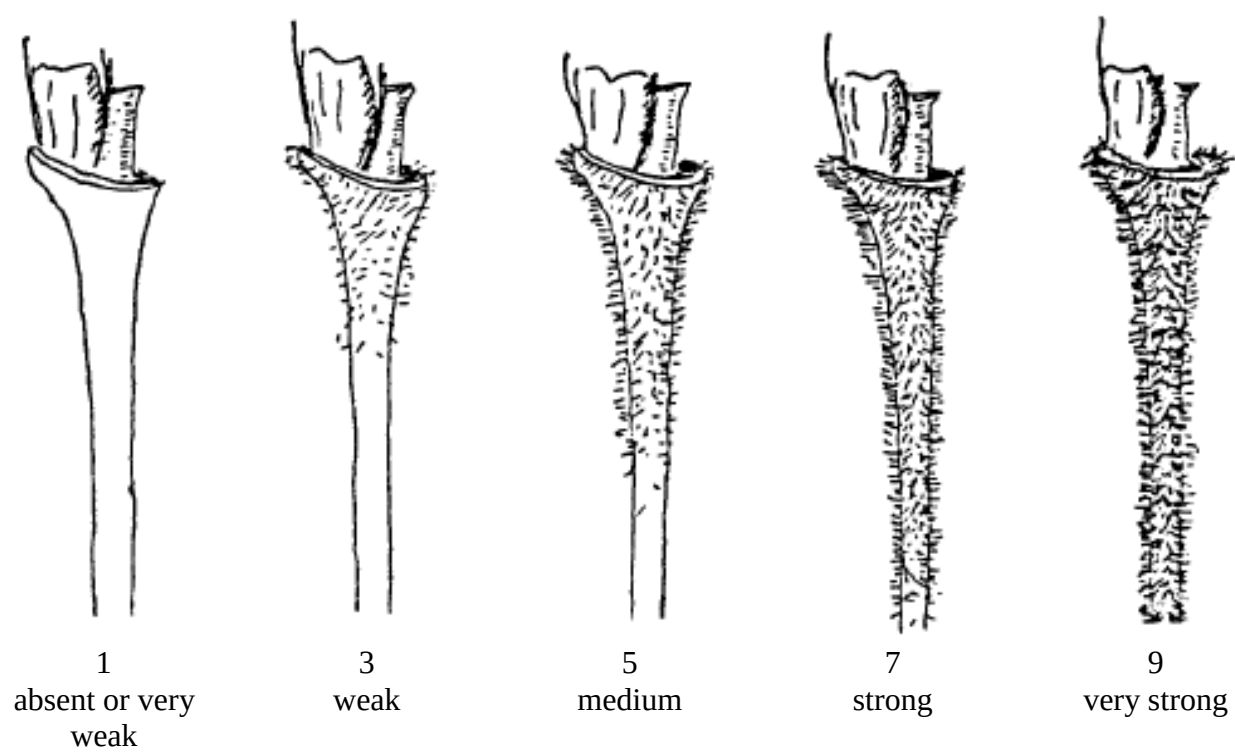


Figure 1. **Stem: density of hairiness of neck**

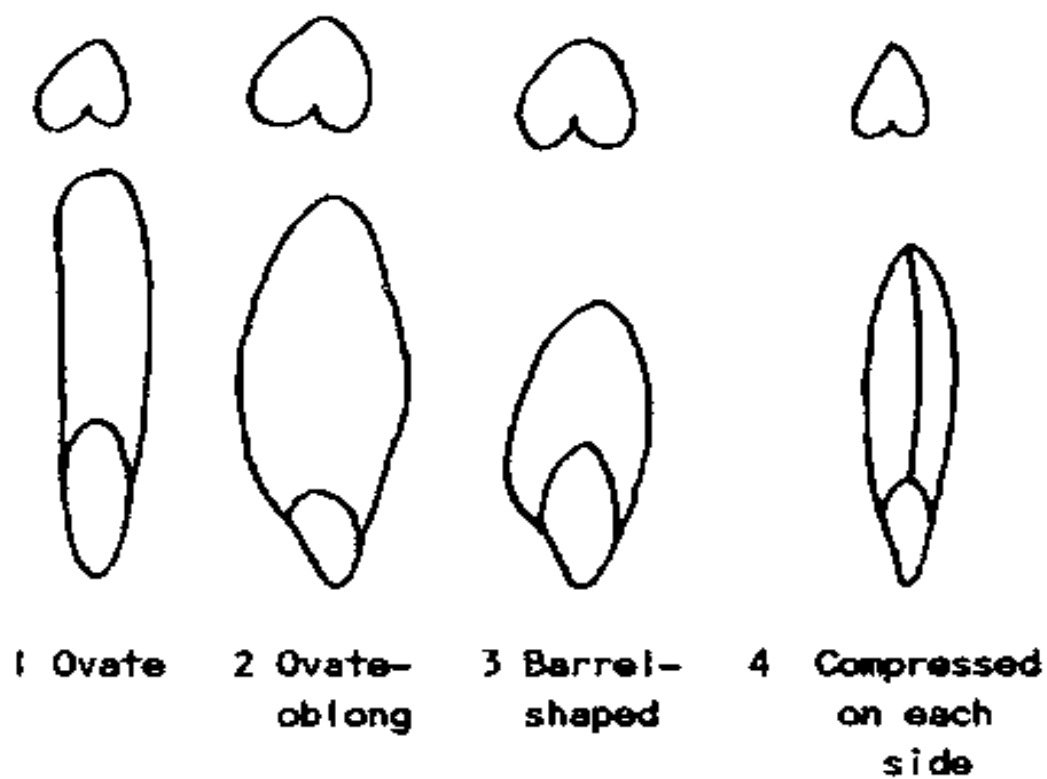


Figure 2. **Grain shape**

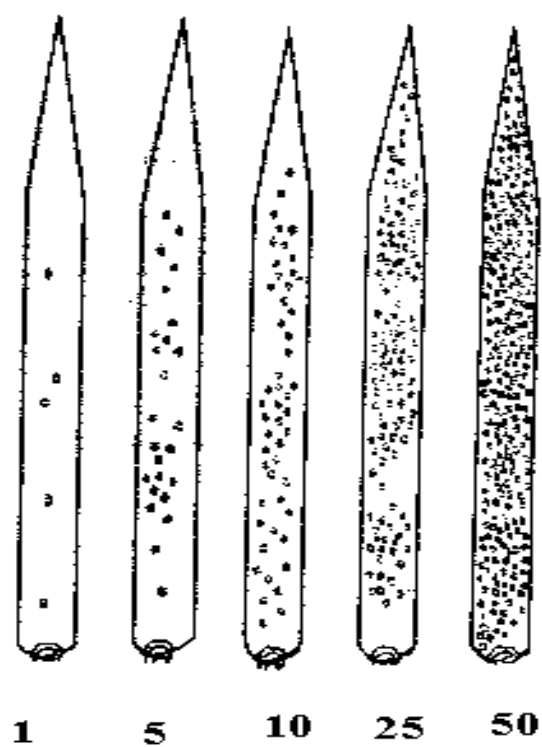


Figure 3. Susceptibility to powdery mildew (*Erysiphe graminis*), %

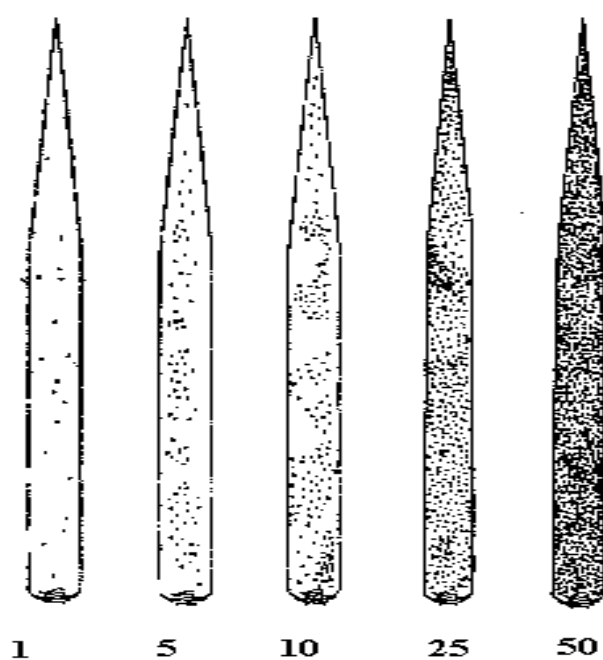


Figure 4. Susceptibility to leaf rust (*Puccinia recondita*), %