

Plant		Oat		464	Primary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Culm length	10 plants, 2 replications	Measurement	cm (integer)		Length from the ground to the base of panicle at the full heading stage
2	Panicle length	10 plants, 2 replications	Measurement	cm (round to the 1st decimal place)		Length from the base to the tip of panicle (excluding awn)
3	Number of panicles	10 plants, 2 replications	Measurement	Number of panicles /plant (round to the 1st decimal place)		Number of panicles per plant at the full heading stage
4	Glume color	2 plots	Observation	1:Light yellow 2:Yellow-Light yellow 3:Yellow 4:Gray-Yellow 5:Gray 6:Gray-Brown 7:Brown 8:Brown-Black 9:Black		Color of glumes at maturity
5	Weight of 1000 grains	100 seeds, 3 replications	Measurement	g (round to the 1st decimal place)		1000 grain weight estimated by sampling 100 harvested grains with 3 replications
6	Heading date	2 plots	Observation	date		Date when 50% of productive tillers have headed
7	Leaf length	10 plants, 2 replications	Measurement	cm (round to the 1st decimal place)		Length of the first leaf blade below flag leaf
8	Leaf width	10 plants, 2 replications	Measurement	mm (round to the 1st decimal place)		Width of widest part of the first leaf blade below flag leaf
9	Plant type	2 plots	Observation	1:Erect 2:Nearly erect 3:Semi-erect 4:Slightly semi-erect 5:Intermediate 6:Slightly intermediate 7:Semi-prostrate 8:Nearly prostrate 9:Prostrate		Angle that outer main stems make with the ground
10	Pubescence on internode	2 plots	Observation	0:None 1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Most		Presence and amount of pubescences on the uppermost internode of main stem at beginning of anthesis
11	Grain type	2 plots	Observation	1:Hulled 9:Naked		Presence of hull

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1	Culm thickness	10 plants, 2 replications	Measurement	mm (round to the 1st decimal place)	Long diameter of the middle internode of main stem at a height of 10 to 15 cm at heading stage
2	Date of maturity	2 plots	Observation	date	Date when 80% of the necks of panicles turned yellow and grains became as hard as wax
3	Plant length at early stage	10 plants, 2 replications	Measurement	cm (integer)	Length from the ground to the tip of leaf at the early stage before wintering
4	Plant length in spring	10 plants, 2 replications	Measurement	cm (integer)	Length from the ground to the tip of the uppermost leaf of plant in early spring
5	Number of tillers	2 plots	Obs.&Measr.	1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Most	Number of tillers per unit area at heading time
6	Texture of culm	2 plots	Observation	1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Rough 8:Very rough 9:Extremely rough	Texture of culms estimated by touching at maturity
7	Leaf color	2 plots	Observation	1:Extremely light 2:Very light 3:Light 4:Slightly light 5:Intermediate 6:Slightly dark 7:Dark 8:Very dark 9:Extremely dark	Greenness of leaf blades at the full tillering stage
8	Waxiness on leaf sheath	2 plots	Observation	0:None 1:Extremely little 2:Very little 3:Little 4:Slightly little 5:Intermediate 6:Some 7:Much 8:Very much 9:Most	Presence and degree of waxiness on the uppermost leaf sheath of main stem at heading stage
9	Pubescence on leaf sheath	2 plots	Observation	0:None 1:Extremely little 2:Very little 3:Little 4:Slightly little 5:Intermediate 6:Some 7:Much 8:Very much 9:Most	Presence and amount of pubescences on leaf sheath
10	Panicle shape	2 plots	Observation	1:Secund and compressed 5:Intermediate 9:Spreading	Shape of panicle
11	Number of spikelets	10 plants, 2 replications	Measurement	1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Extremely many	Number of spikelets per panicle at the full heading date

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12	Spikelet density	2 plots	Observation	1:Extremely sparse 2:Very sparse 3:Sparse 4:Slightly sparse 5:Intermediate 6:Slightly dense 7:Dense 8:Very dense 9:Extremely dense		Density of spikelets on panicle
13	Number of awns	2 plots	Observation	0:None 1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Most		Presence and number of awns on a spikelet
14	Awn length	2 plots	Observation	1:Extremely short 2:Very short 3:Short 4:Slightly short 5:Intermediate 6:Slightly long 7:Long 8:Very long 9:Extremely long		Length of the awn of the uppermost caryopsis on panicle
15	Grain shape	2 plots	Observation	1:Extremely slender 2:Very slender 3:Slender 4:Slightly slender 5:Intermediate 6:Slightly thick 7:Thick 8:Very thick 9:Extremely thick		Ratio of the thickness to the length of grains harvested
16	Grain weight per liter	3 replications	Measurement	g/liter (integer)		Weight of clean grains per liter
17	Pubescence length of caryopsis base	2 plots	Observation	1:Extremely short 2:Very short 3:Short 4:Slightly short 5:Intermediate 6:Slightly long 7:Long 8:Very long 9:Extremely long		Length of pubescences on the base of the uppermost caryopsis on the panicle of main stem
18	Threshability	2 plots	Observation	1:Extremely easy 2:Very easy 3:Easy 4:Slightly easy 5:Intermediate 6:Slightly hard 7:Hard 8:Very hard 9:Extremely hard		Ease of detaching mature caryopses from rachis-branches at maturing stage

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1	Crown rust resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of Puccinia coronata by artificial inoculation or late sowing
2	Lodging resistance	10 plants, 2 replications	Obs.&Measr.	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the measurement of culm strength by instrument or by the degree of lodging by dense planting

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1	Holo blight resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of <i>Pseudomonas syringae</i> when the infection is apparent
2	Leaf stripe resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of <i>Pyrenophora avenae</i> when the infection is apparent
3	Scab resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of <i>Gibberella zeae</i> when the infection is apparent
4	Stem rust resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of <i>Puccinia graminis</i> when the infection is apparent
5	Loose smut resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of <i>Ustilago avenae</i> when the infection is apparent
6	Pink snow mold resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of <i>Microdochium nivale</i> when the infection is apparent
7	Pythium snow mold resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the infection of <i>Pythium</i> spp. when the infection is apparent
8	Aphid resistance	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the resistance based on the damage by aphids when the damage is apparent
9	Pre-harvest sprouting	10 plants, 2 replications	Obs.&Mear.	1:Extremely high 2:Very high 3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low 9:Extremely low		Ratio of sprouting grains at maturity in the field

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10	Cold tolerance	10 plants, 2 replications	Obs.&Measr.	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of cold hardiness based on the rate of survival or winter damage just after overwintering or during winter
11	Tolerance to snow cover	10 plants, 2 replications	Obs.&Measr.	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of the tolerance based on the rate of survivals or winter damage of the heavy snow just after overwintering
12	Tolerance to excess moisture	10 plants, 2 replications	Obs.&Measr.	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of tolerance to wet conditions in the field or in the installation
13	Spring habit	10 plants, 2 replications	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Ratio of heading plants when seeded periodically in spring
14	Regrowth	10 plants, 2 replications	Observation	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Excellent		Regrowth in the second week after the first harvest

Plant		Oat		464	Tertiary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Fresh yield of first harvest	2 plots	Measurement	kg/a (integer)		Fresh yield estimated from fresh weight including panicles harvested from an area more than 2 square meters at the first harvest (at the dough-ripe stage for whole crop silage)
2	Dry matter ratio of first harvest	2 plots	Measurement	% (round to the 1st decimal place)		Dry matter ratio measured by sampling 1 kg of fresh weight and drying at 70 centi degrees for 48 hours at the first harvest

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1	Fresh yield of regrowth	2 plots	Measurement	kg/a (integer)		Fresh yield of regrowth after the first harvest measured in the same way as that of the first harvest
2	Dry matter of regrowth	2 plots	Measurement	% (round to the 1st decimal place)		Dry matter ratio of regrowth after the first harvest measured in the same way as that of the first harvest
3	Total fresh yield	2 plots	Measurement	kg/a (integer)		Total of fresh yield harvested during the growing season
4	Total dry matter yield	2 plots	Measurement	kg/a (integer)		Total of dry matter yield during the growing season
5	Grain yield	2 plots	Measurement	kg/a (integer)		Grain yield harvested at dough-ripe stage only for whole crop silage
6	Leaf ratio	2 plots	Measurement	% (round to the 1st decimal place)		Ratio of the weight of leaves in 500 g of fresh sample
7	Hull ratio	2 plots	Measurement	% (round to the 1st decimal place)		Ratio of the weight of hull in 10 g of harvested grains
8	Awning	2 plots	Observation	1:Extremely hard 2:Very hard 3:Hard 4:Slightly hard 5:Intermediate 6:Slightly easy 7:Easy 8:Very easy 9:Extremely easy		Ease of deawning at maturity only for hulled oats
9	Hulling	2 plots	Observation	1:Extremely hard 2:Very hard 3:Hard 4:Slightly hard 5:Intermediate 6:Slightly easy 7:Easy 8:Very easy 9:Extremely easy		Ease of detaching glumes at maturity only for naked oats
10	Dry matter digestibility	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of digestible dry matter on dry matter base by in vitro enzyme method or near infrared spectroscopy (NIRS)



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11	Crude protein	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of crude protein contained a dry matter base by Kjeldahl method or near infrared spectroscopy (NIRS)
12	Acid detergent fiber (ADF)	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of ADF content on a dry matter base analyzed by acid detergent-acetone washing
13	Neutral detergent fiber (NDF)	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of NDF content on a dry matter base analyzed by neutral detergent-acetone washing
14	Acid detergent lignin (ADL)	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of ADL content on a dry matter base analyzed by acid detergent-acetone washing
15	Non-structural carbohydrate (NSC)	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of NSC content on a dry matter base analyzed by phenol-sulfuric acid method after ethanol extraction