

Plant		Sorghum		33(06009)	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 neck node of panicle of main stem
2	Number of tillers	10 plants, 2 replications	Measurement	Number/plant (round to the 1st decimal place)		Number of tillers longer than 1/3 height of main stem per plant for green forage type, or number of panicles per plant for grain type
3	Panicle length	10 plants, 2 replications	Measurement	cm (round to the 1st decimal place)		Length from the neck node to the tip of panicle
4	Grain weight per panicle	10 plants, 2 replications	Measurement	g (round to the 1st decimal place)		Weight of cleaned grains per panicle on main stem
5	Panicle shape	10 plants, 2 replications	Observation	1:Broom 2:Lax cone 3:Cone 5:Spindle 7:Cylinder 9:Short cylinder		Panicle shape at maturity
6	Panicle type	10 plants, 2 replications	Observation	1:Open 5:Intermediate 9:Compact		Inflorescence type at maturity
7	Grain density on panicle	10 plants, 2 replications	Observation	1:Very sparse 3:Sparse 5:Intermediate 7:Dense 9:Very dense		Density of grains on panicle at maturity
8	Grain color	10 plants, 2 replications	Observation	1:White 2:Yellowish white 3:Yellow 4:Orange 5:Red 6:Reddish brown 7:Brown 8:Purplish brown 9:Other		Color of threshed and dehulled grains at maturity
9	Date of heading	10 plants, 2 replications	Observation	date		Date when 50% of plants have begun heading
10	Date of maturity	10 plants, 2 replications	Observation	date		Date when grains at 1/3 of panicle length from the base of panicle became as hard as wax in most panicles
11	Diameter of culm	10 plants, 2 replications	Measurement	mm (round to the 1st decimal place)		Long diameter of the middle of internode of main stem at 10 to 15 cm above the ground
12	Leaf length	10 plants, 2 replications	Measurement	cm (integer)		Length of the longest leaf blade

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13	Leaf width	10 plants, 2 replications	Measurement	mm (round to the 1st decimal place)	Width of the widest part of the longest leaf blade

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1	Coleoptile color	10 plants, 2 replications	Observation	1:Green 5:Mixed 9:Purple		Coleoptile color after germination. Green:more than 70% of seedlings have green coleoptiles, mixed:other, purple:more than 70% have purple coleoptiles
2	Quantity of lipid white powder on stems and sheaths	10 plants, 2 replications	Observation	0:None 3:Little 4:Slightly little 5:Intermediate 6:Some 7:Much 8:Very much 9:Extremely much		Quantity of waxy white powder on stems and sheaths 50 days after sowing
3	Number of leaves on main stem	10 plants, 2 replications	Measurement	(round to the 1st decimal place)		Number of leaves on main stem
4	Angle between leaf and stem	10 plants, 2 replications	Observation	3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large		Angle that the longest leaf makes with the stem at heading time. Small:30 degrees, intermediate:45 degrees, large:60 degrees
5	Color of midrib	10 plants, 2 replications	Observation	1:White 2:Light green 3:Green 4:Green-Orange 5:Orange 6:Orange-Brown 7:Brown 9:Mixed		Midrib color of a few leaves below the longest leaf at heading time
6	Number of panicles	10 plants, 2 replications	Measurement	Number/plant (round to the 1st decimal place)		Number of mature panicles per plant
7	Neck length of panicle	10 plants, 2 replications	Observation	1:Not emerged 2:Very short 3:Short 4:Slightly short 5:Intermediate 6:Slightly long 7:Long 8:Very long 9:Extremely long		Neck length emerged from flag leaf sheath to the base of panicle
8	Awn presence	10 plants, 2 replications	Observation	0:Absent 9:Present		Presence of awns at maturity
9	Glume color	10 plants, 2 replications	Observation	1:Gray 2:Yellow 3:Yellowish brown 4:Orange 5:Red 6:Reddish brown 7:Brown 8:Purplish brown 9:Black		Color of glumes of mature grain
10	Polyembryony	10 plants, 2 replications	Observation	0:Absent 9:Present		Presence of twin or triple embryos at maturity

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11	Grain shape	10 plants, 2 replications	Observation	1:Boat 2:Boat-Egg 3:Egg 4:Egg-Oval 5:Oval 6:Oval-Round 7:Round 8:Round-Fan 9:Fan	Shape of grains observed by sampling 10 mature grains per plant after threshing and removing glumes
12	Weight of 1000 grains	10 plants, 2 replications	Measurement	g (round to the 1st decimal place)	Weight of 1000 grains estimated by sampling 100 mature grains with duplications after threshing and removing glumes
13	Rhizome presence	10 plants, 2 replications	Observation	0:Absent 9:Present	Presence of rhizomes observed at maturity
14	Growth in early stage	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	Plant vigor observed 30 to 40 days after seeding
15	Flowering time	10 plants, 2 replications	Observation	date	Date when 50% of plants have flowered
16	Degree of self fertility	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 self fertility determined by bagging the panicle on main stem
17	Stem juiciness	10 plants, 2 replications	Observation	1:Dry 5:Mixed 9:Juicy	Stem juiciness observed on the cross section of stem at heading time. Dry:70% of plants are juicy, mixed:mixed, juicy:70% of plants are dry
18	Hullability	10 plants, 2 replications	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	Degree of hullability estimated by rubbing heads with hands in the field at maturity
19	Ease of removing glumes	10 plants, 2 replications	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 removing glumes from grains estimated by rubbing heads with hands
20	Grain texture	10 plants, 2 replications	Observation	1:Extremely small 2:Very small 3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large 8:Very large 9:Extremely large	Horny portion (semi-transparent) in endosperm of grain. Small:1/3 part of endosperm is horny, intermediate:1/2 part, large:2/3 part

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21	Endosperm type	10 plants, 2 replications	Observation	1:Non-glutinous 5:Intermediate 9:Glutinous	Glutinous or nonglutinous endosperm type tested by the potassium iodide reaction of clean grains cut in half

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1	Leaf 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	Resistance to Exserohilum turcicum based on the degree of infection by artificial inoculation or planting in an infected field
2	Leaf-sheath blight resistance	10 plants, 2 replications	Obs.&Mear.	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high	Resistance to Rhizoctonia solani based on the degree of infection (infection index=infected leaf height/culm height x 100) by artificial inoculation or planting in an infected field
3	Aphid resistance	10 plants, 2 replications	Obs.&Mear.	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high	Resistance to aphids based on the degree of damage by artificial inoculation or planting in an infected field
4	Lodging resistance	10 plants, 2 replications	Obs.&Mear.	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high	Resistance to lodging based on the rate of lodging plants under the dense and late planting conditions or the hardness of stem measured by a gauge
5	Perenniality	10 plants, 2 replications	Observation	1:Annual 9:Perennial	Perenniality observed the spring after overwintering
6	Number of regenerated tillers	10 plants, 2 replications	Observation	1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Most	Number of regenerated tillers 10 to 20 days after harvest
7	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	Plant vigor 10 to 20 days after harvest

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1	Bacterial 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	Resistance to <i>Pseudomonas andropogonis</i> observed when the infection is apparent
2	Zonate leaf spot 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	Resistance to <i>Gloeocercospora sorghi</i> observed when the infection is apparent
3	Target spot 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	Resistance to <i>Bipolaris cookei</i> observed when the infection is apparent
4	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	Resistance to <i>Puccinia purpurea</i> observed when the infection is apparent
5	Anthrachnose 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	Resistance to <i>Colletotrichum graminicola</i> observed when the infection is apparent
6	Ergot 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	Resistance to <i>Claviceps purpurea</i> observed when the infection is apparent
7	Oriental corn borer 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	Resistance to <i>Ostrinia furnacalis</i> observed when the damage is apparent
8	Armyworm, pink borer, etc.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	Resistance to <i>Mythimua separata</i> , <i>Sesamia inferens</i> , etc. observed when the damage is apparent
9	Bird 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	Resistance to birds observed when the damage is apparent
10	Growth under low temperature	10 plants, 2 replications	Obs.&Measr.	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Extremely good	Growth under low temperature conditions in the field or in the incubator for chilling treatment

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11	Drought 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	Resistance to drought conditions in the field or in the installation for drought treatment
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	Tolerance to wet conditions in the field or in the installation for wet treatment
13	Viviparity 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	Resistance to viviparity observed when it is apparent

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1	Fresh foliage yield of first harvest	2 plots	Measurement	kg/a (integer)		Fresh foliage yield estimated by weighing leaves and stems of at least 15 plants at first harvest, that is at dough ripe stage for whole-crop silage
2	Fresh head yield of first harvest	2 plots	Measurement	kg/a (integer)		Fresh yield of heads estimated by weighing heads of at least 15 plants at dough ripe stage of the first harvest
3	Total fresh yield of first harvest	2 plots	Calculation	kg/a (integer)		Total fresh yield of the first harvest calculated by fresh foliage + fresh head yield
4	Dry matter ratio of foliage at the first harvest	2 plots, 2 replications	Measurement	% (round to the 1st decimal place)		Dry matter ratio of foliage measured by sampling at least 1 kg of fresh foliage cut into pieces from more than 5 plants at the first harvest and drying at 70 centi degrees for 48 hours
5	Dry matter ratio of head of first harvest	2 plots, 2 replications	Measurement	% (round to the 1st decimal place)		Dry matter ratio of foliage measured by sampling at least 1 kg of fresh foliage cut into pieces from more than 5 plants at the first harvest and drying at 70 centi degrees for 48 hours
6	Dry matter yield of foliage of first harvest	2 plots	Calculation	kg/a (integer)		Dry matter yield of forage of first harvest calculated by fresh foliage yield x dry matter ratio of foliage/100
7	Dry matter yield of head of first harvest	2 plots	Calculation	kg/a (integer)		Dry matter yield of head of the first harvest calculated by fresh head yield x dry matter ratio of head/100

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8	Total dry matter yield of first harvest	2 plots	Calculation	kg/a (integer)		Total dry matter yield of the first harvest calculated by dry matter yield of foliage + dry matter yield of head
9	Sugar content of stem at the first harvest	2 plots, 5 plants	Measurement	% (integer)		Sugar content measured by Brix of internode sap in the middle of main stem or that of whole stem at harvest
10	Fresh foliage yield of aftermath	2 plots	Measurement	kg/a (integer)		Fresh yield of leaves and stems of aftermath measured as for the first harvest
11	Fresh head yield of aftermath	2 plots	Measurement	kg/a (integer)		Fresh yield of heads of aftermath measured as for the first harvest
12	Total fresh yield of aftermath	2 plots	Measurement	kg/a (integer)		Total yield of aftermath measured as for the first harvest
13	Dry matter ratio of foliage of aftermath	2 plots	Measurement	% (round to the 1st decimal place)		Dry matter ratio of fresh foliage of aftermath measured as for the first harvest
14	Dry matter ratio of head of aftermath	2 plots	Measurement	% (round to the 1st decimal place)		Dry matter ratio of fresh heads of aftermath measured as for the first harvest
15	Dry matter yield of foliage of aftermath	2 plots	Measurement	kg/a (integer)		Dry matter yield of foliage of aftermath calculated as for the first harvest
16	Dry matter yield of head of aftermath	2 plots	Measurement	kg/a (integer)		Dry matter yield of head of aftermath calculated as for the first harvest
17	Total dry matter yield of aftermath	2 plots	Measurement	kg/a (integer)		Total dry matter yield of aftermath calculated as for the first harvest
18	Sugar content of stem of aftermath	2 plots, 5 plants	Measurement	% (round to the 1st decimal place)		Sugar content of aftermath measured as for the first harvest

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19	Yearly total fresh yield	2 plots	Calculation	kg/a (integer)	Total of fresh yield of each harvest for the year
20	Annual dry matter yield	2 plots	Calculation	kg/a (integer)	Total of dry matter yield of each harvest for the year

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1	Grain yield	2 plots, 2 replications	Measurement	kg/a (round to the 1st decimal place)		Yield of grains threshed and cleaned for grain type only
2	Dry matter digestibility	2 plots, 2 replications	Measurement	% (round to the 1st decimal place)		Ratio of digestible dry matter estimated by in vivo test or enzyme activity in vitro enzyme method
3	Crude protein	2 plots, 2 replications	Measurement	% (round to the 1st decimal place)		Ratio of crude protein content on dry matter base analyzed by Kjeldahl method or Near Infra-red Analyzer
4	Acid detergent fiber (ADF)	2 plots, 2 replications	Measurement	% (round to the 1st decimal place)		Ratio of ADF content on dry matter base analyzed by acid detergent-acetone washing
5	Acid detergent lignin (ADL)	2 plots, 2 replications	Measurement	% (round to the 1st decimal place)		Ratio of ADL content on dry matter base analyzed by acid detergent-acetone washing
6	Neutral detergent fiber (NDF)	2 plots, 2 replications	Measurement	% (round to the 1st decimal place)		Ratio of NDF content on dry matter base analyzed by neutral detergent-acetone washing
7	Mono-and oligosaccharides	2 plots, 2 replications	Measurement	% (round to the 2nd decimal place)		Ratio of mono-and oligosaccharides content on dry matter base analyzed by phenol sulfuric acid method after ethanol extraction
8	Hydrocyanic acid	2 plots, 2 replications	Measurement	ppm (round to the 3rd decimal place)		Hydrocyanic acid content on dry matter base analyzed by colorimetric analysis with alkali picrate solution
9	Nitrate nitrogen (NO ₃ -N)	2 plots, 2 replications	Measurement	ppm (round to the 3rd decimal place)		Nitrate nitrogen content on dry matter base analyzed by phenol di-sulfuric acid method
10	Intake	4 replications	Obs.&Measr.	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Excellent		

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11	Palatability	4 replications	Obs.&Measr.	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Excellent	