

Plant		Alfalfa		468	Primary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Plant habit	10 plants, 2 replications	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		Angles that outer stems make with the ground at flower budding stage
2	Plant height	10 plants, 2 replications	Measurement	cm (integer)		Plant height from the ground to the top of a plant at flowering stage
3	Stem thickness	10 plants, 2 replications	Measurement	mm (round to the 1st decimal place)		Diameter of stems in the middle of stem length
4	Pubescence	10 plants, 2 replications	Observation	1:Very sparse 2:Very little 3:Little 4:Slightly little 5:Intermediate 6:Some 7:Much 8:Very much 9:Abundant		Amount of pubescences on stems
5	Time of beginning of flowering	20 plants, 2 replications	Observation	date		Date when 3 flower head bloom per plant
6	Flower color	20 plants, 2 replications	Observation	1:White 2:Yellowish white 3:Yellow 4:Greenish yellow 5:Blueish purple 6:Red purple 7:Purple 8:Dark purple 9:Others		Color of flower petals observed soon after flowering
7	Leaflet length	10 plants, 2 replications	Measurement	mm (integer)		Length of the middle leaflet of the biggest leaf at flowering stage
8	Leaflet width	10 plants, 2 replications	Measurement	mm (integer)		Width of the middle leaflet of the biggest leaf at flowering stage

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1	Plant height at early stage	10 plants, 2 replications	Measurement	cm (integer)		Plant height within 2 months after sowing only when seeded in autumn
2	Natural plant height in autumn of sowing year	20 plants	Measurement	cm (integer)		Length of natural plant height in autumn of sowing year, spring seeding only
3	Natural plant height in late autumn of sowing year	20 plants	Measurement	cm (integer)		Length of natural plant height in late autumn of sowing year, spring seeding only
4	Sprouting date	20 plants, 2 replications	Observation	date		Date of the beginning of sprouting after overwintering in a cold region
5	Leaf color	10 plants, 2 replications	Observation	1:Extremely light green 2:Very light green 3:Light green 4:Slightly light green 5:Intermediate 6:Slightly dark green 7:Dark green 8:Very dark green 9:Extremely dark green		Leaf color at flower budding stage
6	Pod shape	10 plants, 2 replications	Observation	1:None(sickle shape) 2:Very few 3:Few 4:Slightly few 5:Intermediate 6:Some 7:Many 8:Very many 9:Abundant		Number of spirals of pod after podding. Few:1, intermediate:<=3, many:>=5
7	Blooming time	20 plants, 2 replications	Observation	date		Date when 50% of plants have begun to flower
8	Frequency of variegated flowers	50 plants	Observation	1:None or almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Extremely many		Frequency of variegated flower plants just after flowering
9	Frequency of yellow flowers	50 plants	Observation	1:None or almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Extremely many		Frequency of yellow, cream and white flower plants just after flowering
10	1000 seeds weight	2 plots, 2 replications	Measurement	g (round to the 2nd decimal place)		Weight of 1000 seeds estimated by sampling 100 seeds from a mixture of total 20 plants (10 plants with 2 replications) with 4 replications

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11	Number of racemes	2 plots, 2 replications	Observation	1:None or almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Extremely many	Number of racemes at flowering stage or the first cutting
12	Seed weight per flower	10 plants, 2 replications	Measurement	mg (integer)	Pure seed weight per plant measured by sampling 20 racemes
13	Number of stems	20 plants	Observation	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 stems at flowering stage

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1	Resistance to Leptosphaerulina leaf spot	20 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 Leptosphaerulina briosiana based on the number of lesion spots on leaves
2	Verticillium wilt resistance	20 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 resistance to Verticillium wilt based on the infection when it became apparent by artificial inoculation or planting in an infected field
3	Sclerotinia root rot and crown rot resistance	20 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 Sclerotinia trifolii based on the degree of the infection on stems and the frequency of dead plants in early spring
4	Regrowth	20 plants, 2 replications	Observation	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly vigorous 7:Vigorous 8:Very vigorous 9:Extremely vigorous		Regrowth based on the herbage mass in one to three weeks after the first cutting
5	Plant vigor in spring	20 plants, 2 replications	Observation	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly vigorous 7:Vigorous 8:Very vigorous 9:Extremely vigorous		Regrowth based on the herbage mass 2 weeks after sprouting in early spring
6	Plant vigor in summer	20 plants, 2 replications	Observation	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly vigorous 7:Vigorous 8:Very vigorous 9:Extremely vigorous		Plant growth based on the herbage mass in mid summer
7	Plant vigor in autumn	20 plants, 2 replications	Observation	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly vigorous 7:Vigorous 8:Very vigorous 9:Extremely vigorous		Regrowth based on the herbage mass after cutting in autumn
8	Lodging resistance	20 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 lodging observed at each cutting, especially when lodging occurred at the time of heavy herbage mass of the first or second harvest

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1	Viral disease resistance	20 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 Alfalfa mosaic virus based on the degree of yellow lesions, discolored mottles or mosaic lesions on leaves after the first cutting
2	Resistance to blue alfalfa aphid	20 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 Acyrthosiphon kondoi based on the number of aphids on a plant and the degree of wilting
3	Resistance to Typhula snow blight	20 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 Typhula snow blight based on the damage to stem and leaf, and frequency of died plants
4	Bug resistance	20 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 stick bugs based on the degree of damage to buds and fruits
5	Tolerance to excess moisture	20 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		Tolerance to excess moisture based on the growth inhibition and discoloration of leaves in the wet fields during or after rainy season
6	Acid tolerance	20 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		Acid tolerance based on the growth in soils with a pH of 5.0 or less
7	Summer survival	20 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		Summer survival, judging from the rate of dead plants and tillers and plant vigor in early autumn
8	Winter survival	20 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		Overwintering ability based on the ratio of dead plants and the degree of winter injury in early spring
9	Disease resistance	20 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 disease, judging from the degree of disease damage (note the name of disease)

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10	Insect resistance	20 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 insects, judging from the degree of insect damage (note the name of insect)

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1	Green yield in spring	2 plots	Measurement	kg/a (integer)		Total of green yield estimated from the fresh weight harvested from an area of 2 square meters per plot at each cutting in spring
2	Dry matter ratio in spring	2 plots	Measurement	% (round to the 1st decimal place)		Average ratio of dry matter measured by sampling 300 g of fresh sample and drying at 70 centi degrees for 48 hours at each cutting in spring
3	Dry matter yield in spring	2 plots	Calculation	kg/a (integer)		Total of dry matter yield calculated by green yield x dry matter ratio/100 at each cutting in spring
4	Green yield in summer	2 plots	Measurement	kg/a (integer)		Green yield in summer estimated in the same way as that of spring
5	Dry matter ratio in summer	2 plots	Measurement	% (round to the 1st decimal place)		Dry matter ratio in summer measured in the same way as that of spring
6	Dry matter yield in summer	2 plots	Calculation	kg/a (integer)		Dry matter yield in summer calculated in the same way as that of spring
7	Green yield in autumn	2 plots	Measurement	kg/a (integer)		Green yield in autumn estimated in the same way as that of spring
8	Dry matter ratio in autumn	2 plots	Measurement	% (round to the 1st decimal place)		Dry matter ratio in autumn calculated in the same way as that of spring
9	Dry matter yield in autumn	2 plots	Calculation	kg/a (integer)		Dry matter yield in autumn calculated in the same way as that of spring

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1	Leaf ratio	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Average ratio of the dry weight of leaves to the total dry weight measured by sampling 20 g of fresh weight at each cutting
2	Dry matter digestibility	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of digestible dry matter analyzed by in vivo test or in vitro enzyme method
3	Crude protein content	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of crude protein content on a dry matter base analyzed by Kjeldahl method or near infrared spectroscopy (NIRS)
4	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
5	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
6	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
7	Mono-and oligosaccharides	2 plots, 3 replications	Measurement	% (round to the 1st decimal place)		Ratio of mono-and oligosaccharide content on a dry matter base analyzed by the thin layer chromatography after alcohol extraction
8	Saponin	2 plots, 3 replications	Measurement	% (round to the 2nd decimal place)		Ratio of saponin content on a dry matter base analyzed by the thin layer chromatography after ethanol extraction
9	Persistency	2 plots, 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:Excellent		Persistency based on the degree of decrease of annual yield after sowing or the ratio of remaining plants at the last cutting of each year
10	Number of seeds per pod	20 plants	Measurement	Number of seeds/pod (round to the 1st decimal place)		Number of seeds per matured pod counted by sampling 10 pods per plant

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11	Seed productivity	2 plots, 2 replications	Measurement	g per square meters (integer)		Seed productivity estimated by measurement of pure seed yield from 1 square meter after maturity
12	Acceptability	2 plots, 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:Excellent		Intake per unit time by grazing or free cafeteria feeding