| Plant A |  | Alfalfa |  | 6014) Primary essential character |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
| 1 | Plant habit | 10 plants, 2 replications | Observation | $\begin{aligned} & \text { 1:Erect } 2: \text { Nearly erect } 3: \text { Semi-erect } \\ & 4: \text { Slightly semi-erect } 5: \text { Intermediate } \\ & \text { 6:Slightly intermediate } 7: \text { Semi-prostrate } \\ & \text { 8:Nearly prostrate 9:Prostrate } \end{aligned}$ | 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 | Leaflet length | 10 plants, 2 replications | Measurement | mm (round to the 1st decimal place) | Length of the middle leaflet of the biggest leaf at flowering stage |
| 5 | Leaflet width | 10 plants, 2 replications | Measurement | mm (round to the 1st decimal place) | Width of the middle leaflet of the biggest leaf at flowering stage |
| 6 | Blooming time | 10 plants, 2 replications | Observation | date | Date when 50\% of plants have begun to flower |
| 7 | Flower color | 10 plants, 2 replications | Observation |  | Color of flower petals observed soon after flowering |


| Plant | Alfalfa |  |  | 6014) Primary optional character |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
| 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 | Sprouting date | 10 plants, 2 replications | Observation | date | Date of the beginning of sprouting after overwintering in a cold region |
| 3 | 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 |
| 4 | Pubescence | 10 plants, 2 replications | Observation | ```1:Very sparce 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 | Pod shape | 10 plants, 2 replications | Observation | $\begin{aligned} & \text { 1:None(sickle shape) 2:Very few } 3: \text { Few } \\ & \text { 4:Slightly few } 5: \text { Intermediate } 6: \text { Some } 7: \text { Many } \\ & \text { 8:Very many } 9: \text { Abundant } \end{aligned}$ | Number of spirals of pod after podding. Few:1, intermediate:<=3, many:>=5 |
| 6 | Number of seeds per pod | 10 plants, 2 replications | Measurement | Number of seeds/pod (round to the 1st decimal place) | Number of seeds per matured pod counted by sampling 10 pods per plant |
| 7 | 1000 seeds weight | 10 plants, 2 replications | Measurement | $g$ (round to the 2nd decimal place) | Weight of 1000 seeds. Measured by sampling 100 clean seeds from the mixture of 20 plants with 4 replications |
| 8 | Variation in flower color | 50 plants | Observation | ```1:Yellow 2:Yellow-slightly yellow 3:Slightly yellow 4:Mixture-Yellow 5:Mixture 6:Mixture- Purple 7:Slightly purple 8:Slightly purple- Purple 9:Purple``` | Variation in color of flower petals. Yellow:at least $98 \%$ of plants have yellow flowers, mixture:25-75\% have purple flowers, purple:when at least 98\% have purple flowers at flowering |


| Plant A | Alfalfa |  |  | 6014) Secondary essential character |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
| 1 | Resistance to <br> 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 Leptosphaerulia briosiana based on the number of lesion spots on leaves |
| 2 | Resistance to spring black stem and 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 Ascochyta imperfecta based on the severity of lesions on stems and leaves |
| 3 | 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 |
| 4 | Regrowth | 20 plants, 2 replications | Observation | ```1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly vigorou 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 |


| Plant | Alfalfa 38 |  |  | 6014) Secondary optional character |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
| 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 | Anthracnose 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 Colletotrichum trifolii based on the number of mottles on leaves and stems and the frequency of dead plants |
| 3 | Southern blight 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 Corticium rolfsii based on the degree of the infection on leaves and stems and the frequency of dead plants in summer |
| 4 | 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 |
| 5 | Root-knot nematode 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 nematode based on the number of club roots and the degree of growth inhibition in summer to autumn |
| 6 | 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 |
| 7 | Tolerance to excess moisture | 20 plants, 2 replications | Observation |  | Tolerance to excess moisture based on the growth inhibition and discoloration of leaves in the wet fields during or after rainy season |
| 8 | 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 |


| Plant | Alfalfa |  | 38 (06014) | 6014) Tertiary essential character |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
| 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 |


| Plant | Alfalfa 38 |  |  | 6014) Tertiary optional character |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
| 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 measared 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 Analyzer |
| 4 | Acid detergent fiber (ADF) | $\begin{aligned} & 2 \text { plots, } 3 \\ & \text { replications } \end{aligned}$ | 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 <br> oligosaccharids | $\begin{aligned} & 2 \text { plots, } 3 \\ & \text { replications } \end{aligned}$ | Measurement | \% (round to the 1st decimal place) | Ratio of mono-and oligosaccharid 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. |  | 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 racemes | 10 plants, 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 |


| Plant |  | Alfalfa | $38(06014)$ | Tertiary optional character |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
| 11 | Seed weight per flower | 10 plants, 2 <br> replications | Measurement | mg (integer) | Pure seed weight per plant measured by sampling |
| 20 racemes |  |  |  |  |  |

