

Plant		Strawberry		492	Primary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Growth habit	10 plants	Observation	3:Erect 4:Semi-erect 5:Intermediate 6:Semi-prostrate 7:Prostrate		Plant type at the beginning of harvest season in spring
2	Petiole length	10 plants	Measurement	cm (round to the 1st decimal place)		Petiole length of the 3rd leaves before transplanting in autumn
3	Leaf number	10 plants	Measurement	Number per plant (round to the 1st decimal place)		Total number of leaves at the beginning of harvest season in spring
4	Leaflet length	10 plants	Measurement	cm (round to the 1st decimal place)		Middle leaflets of the 3rd leaves at the beginning of harvest season in spring
5	Leaflet width	10 plants	Measurement	cm (round to the 1st decimal place)		Middle leaflets of 3rd leaves at the beginning of harvest season in spring
6	Length of flower cluster	10 plants	Measurement	cm (round to the 1st decimal place)		1st flower clusters at the beginning of harvest season in spring
7	Number of flowers	10 plants	Measurement	Number per cluster (integer)		Total number of flowers at the beginning of harvest season in spring
8	Shape pf fruit	10 plants	Observation	1:Oblate 2:Globose 3:Globose-conic 4:Conic 5:Long-conic 6:Wedge 7:Cyindrical 8:Oblong		Fruit type of the 2nd and 3rd normal fruits in the 1st cluster
9	Skin color of fruit	10 plants	Observation	1:Yellow-White 2:Light orange 3:Orange-Red 4:Light red 5:Red 6:Dark red 7:Dark purple		Skin color of the 2nd and 3rd normal ripening fruits in the 1st cluster
10	Flesh color of fruit	10 plants	Observation	1:White 2:Light yellow 3:Light orange 4:Light red 5:Red 6:Dark red		Color of the vertical section of the 2nd and 3rd fruits in the 1st cluster
11	Weight of fruit	10 plants	Measurement	g (round to the 1st decimal place)		Average weight of the 2nd and 3rd normal ripening fruits in the 1st cluster

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1	Height of plant	10 plants	Measurement	cm (round to the 1st decimal place)		Plant height at the beginning of harvest season in spring
2	Vigor	10 plants	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		Growth vigor at the beginning of harvest season in spring
3	Number of axillary bud	10 plants	Measurement	Number per plant (round to the 1st decimal place)		Number of lateral buds at the beginning of harvest season in spring
4	Curvature of leaf	10 plants	Observation	3:Upward 4:Slightly upward 5:Fall 6:Slightly downward 7:Downward		Middle leaflets of the 3rd leaves at the beginning of harvest season in spring
5	Leaf thickness	10 plants	Measurement	mm (round to the 2nd decimal place)		Average of 2 points in a midrib from the middle leaflets of the 3rd leaves at the beginning of harvest season in spring
6	Leaf color	10 plants	Observation	1:Yellowish green 2:Slightly yellowish green 3:Green 4:Slightly deep green 5:Deep green 6:Slightly dark green 7:Dark green		Middle leaflets of the 3rd leaves at the beginning of harvest season in spring
7	Depth of serration	10 plants	Observation	1:Extremely shallow 2:Very shallow 3:Shallow 4:Slightly shallow 5:Intermediate 6:Slightly deep 7:Deep 8:Very deep 9:Extremely deep		Middle leaflets of the 3rd leaves at the beginning of harvest season in spring
8	Number of leaflet	10 plants	Observation	1:Three 2:Sometimes more than three		Number in normal leaves at the beginning of harvest season in spring
9	Petiole thickness	10 plants	Measurement	mm (round to the 1st decimal place)		Middle leaflets of the 3rd leaves at the beginning of harvest season in spring
10	Petiole coloration	10 plants	Observation	0:None 1:Extremely weak 2:Very weak 3:Weak 4:Slightly weak 5:Intermediate 6:Slightly strong 7:Strong 8:Very strong 9:Extremely strong		Anthocyan pigmentation at the beginning of harvest season in spring
11	Thickness of peduncle	10 plants	Measurement	mm (round to the 1st decimal place)		Middle parts of the peduncle on the 1st fruit of 1st clusters at harvest

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12	Size of flower	10 plants	Measurement	cm (round to the 1st decimal place)		Diameter of the 2nd and the 3rd flowers in the 1st clusters
13	Size of calyx	10 plants	Measurement	cm (round to the 1st decimal place)		Calyx diameter of the 2nd and the 3rd flowers in the 1st clusters
14	Number of petals	10 plants	Measurement	Number per flower (round to the 1st decimal place)		Average number of the 2nd and 3rd normal flowers in the 1st clusters
15	Length of anther	10 plants	Measurement	mm (round to the 1st decimal place)		Average length in the 2nd and the 3rd flowers of the 1st clusters
16	Uniformity of fruit	10 plants	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		Uniformity of the 2nd to the 10th fruits in the 1st clusters
17	Band without achenes	10 plants	Observation	0:None 1:Extremely small 2:Very small 3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large 8:Very large 9:Extremely large		Size of band without achene on the 2nd and the 3rd fruits of the 1st clusters
18	Size of neck	10 plants	Observation	0:None 1:Extremely small 2:Very small 3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large 8:Very large 9:Extremely large		Size of neck on the 2nd and the 3rd fruits of the 1st clusters
19	Vertical furrow of fruit	10 plants	Observation	0:None 1:Extremely small 2:Very small 3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large 8:Very large 9:Extremely large		Size of furrow on the 2nd and the 3rd fruits of the 1st clusters
20	Hollow heart of fruit	10 plants	Observation	0:None 1:Extremely small 2:Very small 3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large 8:Very large 9:Extremely large		Hollow size in the vertical section of the 2nd and the 3rd fruits in the 1st clusters
21	Core color of fruit	10 plants	Observation	1:White 2:Light yellow 3:Light orange 4:Light red 5:Red 6:Slightly dark red 7:Dark red 8:Very dark red		Core color in the vertical section of the 2nd and 3rd fruits in the 1st clusters

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22	Glossiness of fruit	10 plants	Observation	1:Extremely dull 2:Very dull 3:Dull 4:Slightly dull 5:Intermediate 6:Slightly glossy 7:Glossy 8:Very glossy 9:Extremely glossy		Glossiness of the 2nd and 3rd fruits in the 1st clusters at harvest
23	Easiness of peduncle cutting	10 plants	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		Cutting easiness of the 2nd and 3rd fruits in the 1st clusters at harvest
24	Detachment of calyx	10 plants	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		Detaching easiness of the 2nd and 3rd fruits in the 1st clusters at harvest
25	Depth of achene	10 plants	Observation	1:Raised 2:Very shallow 3:Shallow 4:Slightly shallow 5:Intermediate 6:Slightly deep 7:Deep 8:Very deep		Mature parts of the 2nd and 3rd fruits in the 1st clusters
26	Desity of achene	10 plants	Measurement	Number in 1 cm diameter circle (round to the 1st decimal place)		Number in 1 cm diameter circle of the central parts on the 2nd and 3rd fruits of the 1st clusters
27	Number of runners	10 plants	Measurement	Number per plant (round to the 1st decimal place)		Number of runners in early summer
28	Diameter of runner	10 plants	Measurement	mm (round to the 1st decimal place)		Central parts of the 1st runners in mid July to early August
29	Pollen fertility	10 plants	Measurement	% (integer)		Microscopic observation by staining on 3 flowers per plants and 300 pollens per flowers at anthesis of the 1st clusters
30	Pollen diameter	10 plants	Measurement	micrometer (integer)		Microscopic measurement for 3 flowers per plants and 100 fertile pollens per flowers at anthesis of the 1st clusters

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No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Date of the first runner appearance	10 plants	Observation	date		Average of the first runner appearance date under natural condition
2	Fruiting habit	10 plants	Observation	1:June bearing 3:Partially everbearing 5:Everbearing		Based on the appearance of flower clusters under natural condition
3	Date of the first flowering	10 plants	Observation	date		Average anthesis date of the 1st flowers in the 1st clusters
4	Date of the first fruit ripening	10 plants	Observation	date		Average maturing date of the 1st fruits in the 1st clusters

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No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Date of flower bud initiation	10 plants	Observation	date		Microscopic observation of apical buds in late summer to early autumn
2	Low temperature requirement for breaking dormancy	20 plants	Measurement	hours (integer)		Cumulative hours under 5 centi degrees for breaking dormancy in late autumn
3	Dormancy	20 plants	Observation	1:Extremely shallow 2:Very shallow 3:Shallow 4:Slightly shallow 5:Intermediate 6:Slightly deep 7:Deep 8:Very deep 9:Extremely deep		Dwarfness while daily average temperature is around 10 centi degrees in late autumn or in early spring
4	Heat tolerance	20 plants	Measurement	% (round to the 1st decimal place)		Reduction of pollen fertility at 35 centi degrees compared to 17 centi degrees
5	Cold tolerance	20 plants	Measurement	% (round to the 1st decimal place)		Reduction of pollen fertility at 5 centi degrees compared to 17 centi degrees
6	Drought tolerance	20 plants	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		
7	Powdery mildew resistance	20 plants	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		Natural infection in field from late spring to early summer
8	Fusarium wilt resistance	20 plants	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		Transplantation to artificially or naturally infested soil from late spring to summer
9	Gray mold resistance	20 plants	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		Natural infection in field with plastic covering in late autumn
10	Anthraco nose resistance	20 plants	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		Artificial inoculation with spore suspension under warm and humid condition
11	Verticillium wilt resistance	20 plants	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		

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12	Red stele resistance	20 plants	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		
13	Phytophthora rot resistance	20 plants	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		
14	Angular leaf spot resistance	20 plants	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		
15	Spider mite resistance	20 plants	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		Natural infection in field from spring to early summer
16	Root knot nematode resistance	20 plants	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		
17	Leaf and stem nematode resistance	20 plants	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		

Plant		Strawberry		492	Tertiary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Soluble solid content	10 fruits	Measurement	% (round to the 1st decimal place)		Brix of juice from the 2nd and 3rd fruits of the 1st fruit clusters
2	pH of juice	10 fruits	Measurement	* (round to the 1st decimal place)		pH of raw extract of the 2nd and 3rd fruits in the 1st clusters
3	Fragrance	10 fruits	Observation	1:Extremely little 2:Very little 3:Little 4:Slightly little 5:Intermediate 6:Some 7:Much 8:Very much 9:Extremely much		Sensory test of the 2nd and 3rd fruits in the 1st clusters
4	Fruit firmness	10 fruits	Measurement	g (integer)		The 2nd and 3rd fruits of the 1st clusters measured by force-gauge with 3 mm diameter plunger

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1	Titratable acidity	10 fruits	Measurement	mg/100g (integer)		Titration of juice as content of citric acid
2	Flesh firmness	10 fruits	Measurement	g (integer)		The 2nd and 3rd fruits of the 1st clusters measured by force-gauge with 3 mm diameter plunger
3	Skin toughness	10 fruits	Measurement	g (integer)		The 2nd and 3rd fruits of the 1st clusters measured by force-gauge with 3 mm diameter plunger
4	Texture of fruit	10 fruits	Observation	1:Extremely non-mealy 2:Very non-mealy 3:Non-mealy 4:Slightly non-mealy 5:Intermediate 6:Slightly mealy 7:Mealy 8:Very mealy 9:Extremely mealy		
5	Redness of juice	10 fruits	Measurement	* (round to the 2nd decimal place)		Extract from the 2nd and 3rd fruits of the 1st clusters, measured by spectrophotometer at 500 nm
6	Pectin content	10 fruits	Measurement	mg/100g (integer)		Total pectin and its components analyzed by Carbazol colorimetric method
7	Drip ratio	10 fruits	Measurement	% (integer)		Decrease of solid weight through defrosting compared to fresh weight
8	Off-flavor	10 fruits	Sensory	1:Extremely little 2:Very little 3:Little 4:Slightly little 5:Intermediate 6:Some 7:Much 8:Very much 9:Extremely much		
9	Vitamin C contents	10 fruits	Measurement	mg/100g (integer)		Quantitative analysis, e.g. Hydrazine colorimetric method, fluorescence method or HPLC method
10	Total number of fruits	Block	Measurement	Number per 10 plants (integer)		Total fruits of 10 plants with at least 2 replications

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11	Average fruit weight	10 fruits	Measurement	g (integer)		Average of all the fruits of 10 plants with at least 2 replications
12	Keeping quality	10 fruits	Measurement	% (round to the 1st decimal place)		Change of the skin color and fruit firmness after storage at 15 centi degrees for 3-5 days
13	Shipping quality	50 fruits	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		
14	Anthocyan content in fruit skin	10 fruits	Measurement	* (round to the 2nd decimal place)		Extract from 5 grams of skin tissue of the 2nd and 3rd fruits of the 1st clusters with 1-2% HCl-Methanol, measured by spectrophotometer at 510-540 nm
15	Anthocyan content in fruit flesh	10 fruits	Measurement	* (round to the 2nd decimal place)		Extract from 5 grams of flesh tissue of the 2nd and 3rd fruits of the 1st clusters with 1-2% HCl-Methanol, measured by spectrophotometer at 510-540 nm