

Plant		Carnation		450	Primary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Ground color of flower	5 flowers	Observation			Indicate reference number of RHS color chart
2	Color pattern of bicolored flower	5 flowers	Observation			Indicate reference number of RHS color chart
3	Coloration pattern	5 flowers	Observation	1:Single color 2:Spotted 3:Spotted stripe 4:Stripe 5:Stripe picotee 6:Picotee 7:Gradation 8:Light shade 9:Other		Observe at flowering stage
4	Plant height	5 shoots	Measurement	1:<=19 cm 2:20-39 cm 3:40-59 cm 4:60-79 cm 5:80-99 cm 6:100-119 cm 7:>=120 cm		Length of plant at the full flowering stage
5	Flower diameter	5 flowers	Measurement	1:<=1.9 cm 2:2.0-3.9 cm 3:4.0-5.9 cm 4:6.0-7.9 cm 5:>=8.0 cm		The highest flower for spray type
6	Number of petals	5 flowers	Measurement	1:<=19 cm 2:20-39 cm 3:40-59 cm 4:60-79 cm 5:80-99 cm 6:>=100 cm		The highest flower for spray type
7	Number of petal's ninus	5 flowers	Measurement	1:<=9 2:10-19 3:20-29 4:30-39 5:>=40		Count ninus which are more than 0.5 mm in the outermost petal
8	Deep of petal's ninus	5 flowers	Measurement	1:<=1.9 mm 2:2.0-2.9 mm 3:3.0-3.9 mm 4:4.0-4.9 mm 5:>=5.0 mm		Measure the deepest ninus of the outermost petal
9	Number of stamens	5 flowers	Measurement	1:<=2.9 2:3.0-5.9 3:6.0-8.9 4:>=9.0		Number of normal stamens
10	Number of pistils	5 flowers	Measurement	1:<=1.9 2:2.0-2.9 3:3.0-3.9 4:>=4.0		Number of normal pistils
11	Leaf length	5 leaves	Measurement	1:<=5.9 cm 2:6.0-8.9 cm 3:9.0-11.9 cm 4:12.0-14.9 cm 5:>=15.0 cm		Measure the fifth leaf from top
12	Leaf width	5 leaves	Measurement	1:<=5.9 mm 2:6.0-8.9 mm 3:9.0-11.9 mm 4:>=12.0 mm		Measure the fifth leaf from top

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1	Type of flowering	5 shoots	Observation	1:Spray type 2:Both 3:Standard type		Observe at flowering stage. Standard type has only one flower on a stem.
2	Color classification	5 flowers	Observation	1:Single color 2:Both 3:Mix		Observe at flowering stage
3	Mixing single color flower	10 shoots	Observation	0:Absent 9:Present		Present:at least one shoot
4	Ratio of making color	10 shoots	Observation	3:Little 5:Intermediate 7:Much		Observe at flowering stage
5	Uniformity of color	10 plants	Observation	0:Absent 9:Present		Classified per individual plant
6	Stability of flower color	10 shoots	Observation	0:Absent 9:Present		Seasonal changes of flower color or change of flower color about flowering time
7	Number of branches	5 plants	Measurement	1:<=1.9 2:2.0-3.9 3:4.0-5.9 4:>=6.0		Number of primary branches per plant
8	Number of lateral buds	5 shoots	Measurement	1:<=0.9 2:1.0-1.4 3:1.5-1.9 4:>=2.0		Number of buds until the ninth node from flower head
9	Flower type	5 flowers	Observation	1:Single 2:Double		Five petals in single flower type, 6 or more in double flower type
10	Number of flowers per shoot	5 shoots	Measurement	1:1 2:2-3 3:4-6 4:7-9 5:10-12 6:>=13		Number of primary lateral branch buds (standard is spray type.)
11	Sideview of flower	5 flowers	Observation	1:Flat 2:Convex 3:Pendent 9:Other		Most typical flower type at the full flowering stage
12	Peduncle length	5 shoots	Measurement	1:<=5.9 cm 2:6.0-9.9 cm 3:10.0-13.9 cm 4:>=14 cm		Spray type, average of all peduncles length until primary lateral branch bud
13	Peduncle hardness	5 shoots	Observation	1:Drooping 2:Not drooping		Hardness of the longest primary branch peduncle
14	Calyx shape	5 flowers	Observation	1:Funnel shaped 2:Cylindrical 3:Campanulate 4:Pot shaped		Refer to the carnation cultivar registration manual

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15	Calyx length	5 flowers	Measurement	1:<=1.9 mm 2:2.0-2.9 mm 3:3.0-3.9 mm 4:>=4.0 mm		From the base to the tip of lobe
16	Diameter of calyx	5 flowers	Measurement	1:<=0.9 cm 2:1.0-1.2 cm 3:1.3-1.5 cm 4:>=1.6 cm		Diameter of calyx at a position 6 mm from the tip of calyx involucre
17	Tip of calyx lobe	5 flowers	Observation	1:Acuminate 2:Acute 3:Obtuse		Refer to the carnation cultivar registration manual
18	Calyx color	5 flowers	Observation	3:Pale 5:Intermediate 7:Dark		Observe at flowering stage
19	Degree of calyx splitting	10 flowers	Observation	0:0% 1:1-19% 2:20-39% 3:40-59% 4:>=60%		Observe at flowering stage (%)
20	Angle of tip calyx involucre	5 flowers	Measurement	3:Acute 5:Right 7:Obtuse		Acute:<80 degrees, right:80-100 degrees, obtuse:100< degrees
21	Petal shape	5 flowers	Measurement	1:Vertical 2:Round 3:Horizontal		Measure the most outside petal in a flower, petal length/ (2 x petal width), vertical:0.9<, round:0.8-0.9, horizontal:<0.8
22	Petal size	5 flowers	Measurement	3:Small 5:Intermediate 7:Large		Petal width x Petal length/2. Small:<6, intermediate:6-9, large:9<
23	Petal thickness	5 flowers	Observation	3:Thin 5:Intermediate 7:Thick		Based on touch
24	Petal foundation coloration	10 flowers	Observation	0:Absent 9:Present		Observe at flowering stage
25	Stain on petal	10 flowers	Observation	0:Absent 1:Present		Observe until the end of flowering. Present:over 5 shoots
26	Multi core	10 flowers	Observation	0:Absent 1:Little 2:Much		Examine sub stamen when petal is investigated. Absent:0%, little:<50%, much:50%<=
27	Anthocyanin pigmentation on anthers	10 flowers	Observation	0:Absent 9:Present		Anthocyanin pigmentation. Present:more than one shoot

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28	Ovary size	5 flowers	Measurement	1:<=3.9 mm 2:4.0-5.9 mm 3:6.0-7.9 mm 4:>=8.0 mm		Measure horizontal shaft at flowering bud, for spray type measure the ovary of terminal bud
29	Ovary shape	5 flowers	Observation	1:Globular 2:Cylindrical 3:Conical 4:Spindle shape 5:Other		Refer to the carnation cultivar registration manual
30	Ovary surface	10 flowers	Observation	1:Smooth plane 2:Grooving		Grooving:50%<=
31	Ovary coloration	10 flowers	Observation	0:Absent 9:Present		Anthocyanin pigmentation. Present:more than one shoot
32	Length of styles	5 flowers	Measurement	1:<=0.9 cm 2:1.0-1.9 cm 3:2.0-2.4 cm 4:2.5-2.9 cm 5:>=3.0 cm		Measure the longest style
33	Surface of stigma	10 flowers	Observation	1:Flattened 2:Crowned		Carnation corresponds to one classification when over 51%
34	Exposure of stigma	10 flowers	Measurement	% (round to the whole number) (integer)		Measure at flowering stage
35	Stigma coloration	10 flowers	Observation	0:Absent 5:Present in back 9:Present		Classified by most frequent type
36	Shape of buds	5 flowers	Observation	1:Globular 2:Ovate 3:Cylindrical		Refer to the carnation cultivar registration manual
37	Bud size	5 flowers	Measurement	1:<=1.9 2:2.0-2.9 3:3.0-3.9 4:4.0-4.9 5:5.0-5.9 6:>=6.0		Measure buds just before flowering, measure terminal bud in spray type. Length of bud x diameter
38	Stem length	5 shoots	Measurement	1:<=19 cm 2:20-39 cm 3:40-49 cm 4:50-59 cm 5:>=60 cm		From sepal to the seventh internode. In the case of spray type, measure from position where the terminal bud was removed to the fifth internode
39	Internode length	5 shoots	Measurement	1:<=1.9 cm 2:2.0-3.9 cm 3:4.0-5.9 cm 4:6.0-7.9 cm 5:8.0-9.9 cm 6:10.0-11.9 cm 7:>=12 cm		Length of the fifth internode

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40	Number of nodes	5 shoots	Measurement	1:<=9 2:10-12 3:13-15 4:16-18 5:>=19		Shoot of flowering, number of internodes from the position of lateral shoots to sepal
41	Position of the longest internode	5 shoots	Measurement	1:3rd or below 2:Fourth 3:Fifth 4:Sixth 5:Seventh or over		Position of the longest internode
42	Longest internode length	5 shoots	Measurement	1:<=6.9 cm 2:7.0-10.9 cm 3:>=11 cm		Measure at flowering stage (cm)
43	Cross section of the longest internode	5 shoots	Observation	1:Circular 2:Grooved		Carnation corresponds to one classification when over 50%
44	Color of the longest internode	5 shoots	Observation	1:Yellow green 2:Pale green 3:Green 4:Dark green 5:Tinted purplish green		Classified leaf color by the standard leaf color chart.
45	Node color	10 shoots	Observation	0:Absent 9:Present		Anthocyanin pigmentation, present:more than one
46	Stem diameter	5 shoots	Measurement	1:<=2.9 mm 2:3.0-3.9 mm 3:4.0-4.9 mm 4:>=5.0 mm		Measure the maximum stem diameter of the fifth internode from top
47	Stem hardness	5 shoots	Measurement	3:Soft 5:Intermediate 7:Hard		Mean values of twice measurements assessed by holding the stem horizontally at a point 45 cm from the flower neck. Spray type: at a point 45 cm from the highest flower neck
48	Stem malformation	20 shoots	Observation	0:Absent 1:1 2:2 3:>=3		Number of abnormal stems in flowering stems
49	Leaf thickness	5 leaves	Measurement	1:<=0.6 2:0.7<=		Center of the fifth internode leaf from upper
50	Leaf shape	5 leaves	Measurement	3:Narrow 5:Intermediate 7:Wide		The fifth internode leaf. Leaf length/leaf width
51	Degree of leaf wrinkling	5 leaves	Observation	1:None 2:Intermediate 3:Very severe		Refer to the carnation cultivar registration manual

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52	Leaf color	5 leaves	Observation	1:Yellowish green 2:Pale green 3:Green 4:Dark green 5:Purplish green		Classified by the standard leaf color chart. Examine after removing waxiness of the fifth internode leaf
53	Hollowness of leaf (surface)	10 leaves	Observation	0:Absent 9:Present		Observe cross section of center of the fifth internode leaf. Over 50% leaves corresponds to ``hollow''
54	Midrib of leaf (back)	10 leaves	Observation	0:Absent 9:Present		Observe midrib of center of fifth internode leaf
55	Leaf waxiness	10 leaves	Observation	0:Absent 3:Slight 5:Intermediate 7:Much		Observe whole leaf. Scania is intermediate.

Plant		Carnation		450	Secondary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Earliness of flowering	6 plants	Observation	1:Very early 3:Early 5:Intermediate 7:Late 9:Very late		Judge earliness of flowering by the first flowering
2	Resistance to bacterial wilt	10 plants	Observation	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Artificial inoculation of a disease germ or planting in infected field

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1	Cultivation type	10 plants	Observation	1:Outdoor culture 2:Both 3:Protected cultivation		Observe at flowering stage
2	Type of use	10 plants	Observation	1:Potted flower 2:Flower bed 3:Cut flower		Observe at flowering stage
3	Flowering habit	10 plants	Observation	1:One season flowering 5:Two season flowering 9:Perpetual		Observe at flowering stage
4	High temperature tolerance (growth)	10 plants	Obs.&Mear.	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Observe in summer
5	High temperature tolerance (flowering)	10 plants	Obs.&Mear.	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Observe in summer
6	Cold hardiness (growth)	10 plants	Obs.&Mear.	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Observe in winter
7	Cold hardiness (flowering)	10 plants	Obs.&Mear.	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Observe in winter
8	Rooting ability of herbaceous cutting	10 shoots	Observation	3:Low 5:Intermediate 7:High		Observe the degree after cutting
9	Viral disease resistance	10 shoots	Observation	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Observe the degree of disease occurrence at flowering stage
10	Spotting disease resistance	10 shoots	Observation	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Observe the degree of disease occurrence at cutting
11	Polyploidy	1 plant	Measurement	2:2x 3:3x 4:4x 5:5x 6:6x		Estimation of polyploidy levels by flow cytometry

Plant		Carnation		450	Tertiary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Number of flowers	6 plants	Measurement	2:Extremely 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many		Compare with the standard variety. Standard variety: Francesco=7(Many)
2	Flower longevity	10 shoots	Observation	2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Excellent		Stem length:50 cm. Standard variety: Francesco=5(Intermediate)
3	Stem toughness	10 shoots	Measurement	2:Very weak 3:Weak 4:Slightly weak 5:Intermediate 6:Slightly tough 7:Tough 8:Very tough		Toughness of stem 45 cm below flower head

Plant	Carnation		450	Tertiary optional character	
No	Characters	No. of samples	Methods	Rank or measurement unit	Remarks
1	Fragrance	5 flowers	Sensory	0:Absent 3:Weak 7:Strong	Smell fragrance of flowers all together at the full flowering stage