| Plant | Tulip | 495 | Primary essential character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 1 | Flowering time | Block | Observation | date | Date when 80% of plants have flowered |
| 2 | Flower appearance | 5 plants | Observation | 1:Single 2:Double 3:Lily-shape 4:Parrot 5:Fringed 6:Viridiflora 9:Other | Classify the flower appearance |
| 3 | Flower color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 4 | Petal length | 5 plants | Measurement | cm (round to the 1st decimal place) | Outer petal length |
| 5 | Stem length | 5 plants | Measurement | cm (round to the 1st decimal place) | Length from ground level to the basal part of petal |
| 6 | Leaf length | 5 plants | Measurement | cm (round to the 1st decimal place) | Maximum length of the lowest leaf |
| 7 | Leaf width | 5 plants | Measurement | cm (round to the 1st decimal place) | Maximum width of the lowest leaf |
| 8 | First internode length | 5 plants | Measurement | cm (round to the 1st decimal place) | Length from ground level to the basal part of lowest leaf |

| Plant | Tulip | 495 | Primary optional character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 1 | Flower type | 5 plants | Observation | 1:Cylindrical 2:Conical 3:Reverse-conical 4:Bell-shaped 5:Oval 6:Global | |
| 2 | Inside color of outer petal | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 3 | Inside color of inner petal | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 4 | Outer color of inner petal | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 5 | Perianth-bottom color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 6 | Perianth-bottom type | 5 plants | Observation | 1:Round 2:Hexagonal 3:Axle shape 4:Double ring 5:Irregular | |
| 7 | Variegation type | 5 plants | Observation | 1:Monochromatic 2:Marginal variegation 3:Thready marginal variegation 4:Dual marginal variegation 5:Crumbled marginal variegation 6:Spotted variegation 7:Swept variegation 8:Outer variegation 9:Inner variegation | |
| 8 | Variegation base color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 9 | Marginal color of variegation | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 10 | Change of color | 5 plants | Observation | 0:Absent 9:Present | Change of color at flowering time |
| 11 | Flower length | 10 plants | Measurement | cm (round to the 1st decimal place) | Length from the base to the top of flower |
| 12 | Flower width | 10 plants | Measurement | cm (round to the 1st decimal place) | Maximum diameter of flower at flowering time |
| 13 | Number of petals | 5 plants | Observation | 1:6 2:Over 6 | Number of petals per flower at flowering time |
| 14 | Surface of petal | 5 plants | Observation | 1:Sinuous 2:Flat 9:Other | Petal surface at flowering time |

| Plant | Tulip | 495 | Primary optional character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 15 | Apex shape of inside petal | 5 plants | Observation | 1:Round 2:Pitted 3:Convex 4:Slightly convex 5:Pointed | |
| 16 | Apex shape of outer petal | 5 plants | Observation | 1:Round 2:Pitted 3:Convex 4:Slightly convex 5:Pointed | |
| 17 | Petal width | 10 plants | Measurement | cm (round to the 1st decimal place) | Maximum width of outer petal |
| 18 | Petal thickness | 5 plants | Observation | 3:Thin 5:Intermediate 7:Thick | |
| 19 | Filament color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 20 | Anther color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 21 | Pollen color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 22 | Style color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 23 | Number of stamens | 5 plants | Observation | 1:6 2:6< | Number of stamens per flower at flowering time |
| 24 | Blasting | 24 plants | Observation | 0:Absent 9:Present | Blinded flower appearance or not in forcing culture |
| 25 | Peduncle length | 10 plants | Measurement | cm (round to the 1st decimal place) | Length between flag leaf base and flower base |
| 26 | Peduncle width | 10 plants | Measurement | cm (round to the 1st decimal place) | Diameter of peduncle midpoint |
| 27 | Multiflower | 10 plants | Observation | 0:Absent 9:Present | |
| 28 | Ploidy | 5 plants | Observation | 2:2n 3:3n 4:4n 9:Others | Examine chromosome number of root tip cell (2n) and pollen mother cell (n) with a microscope |
| 29 | Peduncle color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 30 | Peduncle strength | 5 plants | Observation | 3:Weak 5:Intermediate 7:Strong | |

| Plant | Tulip | 495 | Primary optional character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 31 | Peduncle pubescence | 5 plants | Observation | 0:Absent 3:Little 5:Intermediate 7:Much | |
| 32 | Average internode length | 10 plants | Measurement | 3:Short 5:Intermediate 7:Long | Average length:(stem length/leaf number). Short:<=4 cm, intermediate:5-7 cm, long:>=8 cm |
| 33 | Stem color | 5 plants | Observation | | Indicate reference number RHS color chart |
| 34 | Stem strength | 5 plants | Observation | 3:Weak 5:Intermediate 7:Strong | |
| 35 | Plant height | 10 plants | Measurement | cm (integer) | Length from ground level to flag leaf apex |
| 36 | Leaf number | 10 plants | Observation | 3:3 4:4 5:5 | Leaf number per plant (stem) |
| 37 | Leaf type | 10 plants | Measurement | 3:Narrow 5:Intermediate 7:Wide | Leaf length ratio:(leaf width/leaf length) x 100. Narrow:<=40%, intermediate:41-60%, wide:>61=% |
| 38 | Leaf margin sinuosity | 10 plants | Observation | 0:Non sinuate 3:Weakly sinuate 5:Sinuate 7:Very sinuate | |
| 39 | Leaf curling | 10 plants | Measurement | 3:Weak 5:Intermediate 7:Strong | Lowest leaf:(natural width of leaf/stretch width of leaf) x 100. Weak:>=81%, intermediate:65-80%, strong:<=64% |
| 40 | Leaf color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 41 | Shiny leaves | 5 plants | Observation | 0:Absent 9:Present | |
| 42 | Leaf strength | 5 plants | Observation | 3:Weak 5:Intermediate 7:Strong | |
| 43 | Leaf pubescence | 5 plants | Observation | 0:Absent 3:Little 5:Intermediate 7:Much | |
| 44 | Setting angle of leaf | 10 plants | Observation | 1:Horizontal 3:Somewhat horizontal 5:Intermediate 7:Somewhat perpendicular 9:Perpendicular | Setting angle of lowest leaf. Horizontal:<=25, slightly horizontal:26-40, intermediate:41-55, slightly perpendicular:56-70, perpendicular:>=71 |

| Plant | Tulip | 495 | Primary optional character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 45 | Leaf variegation type | 5 plants | Observation | 0:None 1:Marginal variegation 2:Central variagation 3:Streak 4:Broken streak 5:Broken streak 9:Other | |
| 46 | Leaf variegation color | 5 plants | Observation | | Indicate reference number of RHS color chart |
| 47 | Variegation stability | 10 plants | Observation | 0:Absent 9:Present | |
| 48 | Bulb shape | 60 plants | Observation | 1:Globular 2:Long globular 3:Flat globular | Shape of main bulb after drying |
| 49 | Tunic color | 10 plants | Observation | | Indicate reference number of RHS color chart |
| 50 | Tunic luster | 60 plants | Observation | 0:Absent 9:Present | Tunic luster of bulb after drying |

| Plant | Tulip | 495 | Secondary essential character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 1 | Virus resistance (TBV) | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of diseased plants due to TBV from leafing time to flowering time in open field. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 2 | Botrytis resistance (Botrytis blight) | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of disease plants from the sprouting time to the flowering time in open field. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 3 | Fusarium resistance (Bulb rot) | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of disease plants from the flowering time to stem and leaf yellowing time in open field. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 4 | Flowering time in forcing culture | 24 plants | Observation | date | Date when 80% of forcing culture has flowered in greenhouse |
| 5 | Flowering rate in forcing culture | 24 plants | Observation | % (integer) | Flowering rate:(flowered plants/investigated plants) x 100:forcing culture in greenhouse |
| 6 | Usage | 24 plants | Observation | 1:Bedding plants 2:Forcing cutting-flower 3:Retarding culture 4:Potted plants 5:Hydro-culture | In field, forcing on cold storage, retarding and hydroponic cultivation |
| 7 | Withering time | 60 plants | Observation | date | Date by which 80% of plants had withered |
| 8 | Harvesting time | 60 plants | Observation | date | Date by which 50% of main bulbs were brownish |

| Plant | Tulip | 495 | Secondary optional character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 1 | Gummosis resistance | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of infected bulbs during storage. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 2 | Silvering resistance | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of diseased bulbs during growing period. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 3 | Mite resistance (Aceria tulipae) | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of bulbs infested during storage. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 4 | Nematode resistance | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of bulbs infested during growing period. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 5 | Aphid resistance | 60 plants | Observation | 1:Very low 3:Low 5:Intermediate 7:High 9:Very high | Percentage of bulbs infested during growing period. Very high:0%, high:<=5%, intermediate:6-10%, low:11-15%, very low:>=16% |
| 6 | Heat tolerance of bulbs | 24 plants | Observation | 0:Absent 9:Present | Damage during growing period |
| 7 | Drought resistance of bulbs | 24 plants | Observation | 0:Absent 9:Present | Damage during growing period |
| 8 | Semi-forcing flowering time | 24 plants | Observation | date | Date by which 80% of semi-forcing culture had flowered in a greenhouse |
| 9 | Retarding flowering time | 24 plants | Observation | date | Date by which 80% of retarding culture had flowered in a greenhouse |

| Plant | Tulip | 495 | Tertiary essential character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 1 | Bulb yield | 100 plants | Measurement | 3:Low 5:Intermediate 7:High | Total bulb weight per 100 plants. Low:<=2.9 kg, intermediate:3.0-3.9 kg, high:>=4.0 kg |
| 2 | Thickening of main bulb | 100 plants | Measurement | 3:Little 5:Intermediate 7:Much | Peak size of main bulb circumference per 100 plants. Little:<=10 cm, intermediate:11 cm, much:>=12 cm |
| 3 | Number of bulbs per 100 plants | 100 plants | Measurement | 3:Few 5:Intermediate 7:Many | Total bulb number per 100 plants. Few:<=299, intermediate:300-399, many:>=400 |
| 4 | Vase life | 24-100 plants | Observation | 3:Short 5:Intermediate 7:Long | Flowering period of each flower. Short:<=7 days, intermediate:8-12 days, long:>=13 days forcing and retarding culture in greenhouse |

| Plant | Tulip | 495 | Tertiary optional character |
|---|---|---|---|

| No | Characters | No. of samples | Methods | Rank or measurement unit | Remarks |
|---|---|---|---|---|---|
| 1 | Fragrance of flower | 5 plants | Observation | 0:Absent 1:Extremely weak 3:Weak 5:Intermediate 7:Strong | Fragrance at flowering time |
| 2 | Bulb skin cracking | 60 plants | Measurement | 3:Little 5:Intermediate 7:Much | Skin cracking after lifting (cracking width is over 1.5 cm) Little:<=5%, intermediate:6-19%, much:>=20% |
| 3 | Dropper | 60 plants | Observation | 0:Absent 3:Little 5:Intermediate 7:Many | Dropper at withering time. Absent:0%, few:<=10%, intermediate:11-19%, many:>=20% |
| 4 | Degeneration | 60 plants | Observation | 0:None 3:Little 5:Intermediate 7:Much | None:0%, little:<=10%, intermediate:11-19%, much:>=20% |