**MATRIX TABLES FOR PHYLIP SOFTWARE**

**Table: Seed Character and Character states for cladogram and cluster analysis of plants.**

|  |  |
| --- | --- |
| **Character** | **Character States** |
| Seed color | White=0,Golden yellow=1,Green=2, brown orange=3,brown=4, dark Brown=5, Black=6 |
| Inner color | White=0,Off-white=1,Light yellow=2,Yellow=3,Light brown=4,Brown=5,Copper brown=6,Blackish brown=7, Grey=8 |
| Seed shape | Spherical=0,Spherical-Globose=1,Obovate=2,Oblong=3, Ovate=4, kidney=5, Spheroid-ovate=6, elliptical=7, Globular-Spheroid=8, Discoid-Obovate=9, Oblong-ellipsoid=10 |
| Texture/Surface | Smooth=0, Rough=1,Wrinkled & furrows=2 |
| Hilium | Not visible=0, Terminal=1 |
| Compression | Absent=0, Lateral=1,Ventral=2, Dorsoventral=3 |
| Length | 2-4= 0, 4.1-6=1, 6.1-8=2, 8.1-10=3, 10.1-12=4, 12.1-14=5 |
| Width | 1-2=0, 2.1-3=1, 3.1-4=2, 4.1-5=3, 5.1-6=4, 6.1-7=5, 7.1-8=6 |
| L/W ratio | L/W ratio≤2=0, L/W ratio>2=1 |

**Table: Character state matrix for cluster analysis of different plant species based on morphological features of seed.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Plant Name** | **Seed color** | **Inner color** | **Seed shape** | **Texture/ surface** | **Hilum** | **Compression** | **Length (mm)** | **Width (mm)** | **L/W ratio** |
| Ailanthus altissima (Mill.) Swingle | 4 | 4 | 1 | 0 | 0 | 1 | 2 | 5 | 0 |
| Argemone ochroleuca Sweet, Brit. Fl. Gard. | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 1 | 0 |
| Azadirachta indica A.Juss. | 2 | 6 | 3 | 1 | 1 | 1 | 3 | 2 | 1 |
| Calotropis procera (Aiton) Dryand. | 4 | 4 | 4 | 0 | 1 | 3 | 1 | 3 | 0 |
| Cannabis sativa L. | 2 | 1 | 3 | 0 | 1 | 1 | 1 | 2 | 0 |
| Cassia occidentalis L. | 2 | 5 | 4 | 0 | 1 | 1 | 1 | 2 | 0 |
| Chenopodium ambrosioides L. | 2 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Datura innoxia Mill | 4 | 1 | 5 | 1 | 0 | 3 | 1 | 1 | 0 |
| Dodonaea viscosa (Linn.) Jacq. | 6 | 3 | 0 | 0 | 1 | 1 | 0 | 2 | 0 |
| Lantana camara L. | 4 | 2 | 6 | 2 | 1 | 0 | 1 | 3 | 0 |
| Lantana urticoides Hayek | 4 | 2 | 6 | 2 | 1 | 0 | 1 | 3 | 0 |
| Nasturtium officinale R.Br. | 4 | 2 | 7 | 2 | 1 | 3 | 3 | 5 | 0 |
| Ricinus communis L | 4 | 0 | 3 | 0 | 1 | 3 | 5 | 4 | 1 |
| Robinia pseudoacacia L. | 5 | 4 | 5 | 2 | 0 | 1 | 1 | 2 | 0 |
| Sapium sebiferum (L.) Roxb. | 0 | 5 | 8 | 0 | 1 | 2 | 3 | 4 | 0 |
| Sesamum indicum L. | 2 | 0 | 2 | 0 | 1 | 1 | 1 | 1 | 0 |
| Silybum marianum (L.) Gaertn. | 2 | 0 | 3 | 0 | 1 | 3 | 1 | 1 | 1 |
| Solanum surattense Burm. f. | 3 | 3 | 9 | 0 | 1 | 1 | 0 | 1 | 0 |
| Sonchus oleraceus (L.) L | 5 | 1 | 4 | 0 | 1 | 3 | 0 | 0 | 1 |
| Xanthium strumarium L. | 4 | 8 | 10 | 1 | 1 | 3 | 5 | 6 | 0 |

**Table: Pollen character and Character states for cladogram and cluster analysis of plants.**

|  |  |
| --- | --- |
| **Character** | **Character States** |
| Size | Small=0, Small-Medium=1, Medium=2, Medium-large=3, Large=4 |
| Polar View | Circular, Spheroidal, oblate-spherical=0, Angular=1, Irregular=2, Triangular=3, Sub-oblate=4, Prolate=5, Oblique=6, Semi-circular=7, sub-prolate=8 |
| Equatorial View Shape | Prolate=0, Prolate-Spheroidal=1, Sub-Prolate=2, Spheroidal=3, Oblate-Spheroidal=4, Oblate=5, Sub-Oblate=6 |
|  |  |
| Pollen Type | Monoporate=0, Dicolporate=1, Tricolpate, Tricolporate, Trizonocolporate=2, Tetracolpate=3, Pentoporate=4, Colporate=5, Tricolporate, Colporate=6, Tetracolpate, Tricolpate=7 |
| Exine ornamentation | Psilate=0, Echinate=1, Verrucate=2, Reticulate=3, Scabrate, Verrucate=4, Micro-perforate, Echinate=5, Micro-reticulate=6, Rugulate-Striate=7, Psilate-Perforate=8, Scabrate=9, Perforate=10, Striate=11, Striate,Scabrate=12 |
|  |  |

**Table: Character state matrix for cluster analysis of different plant species based on morphological features of pollen.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Plants Species** | **SIZE** | **Polar View** | **Equatorial View Shape** | **Pollen Type** | **Exine Ornamentation** |
| Achyranthes aspera L. | 0 | 0 | 2 | 4 | 0 |
| Ageratum conyzoides (L.) L. | 0 | 0 | 1 | 2 | 1 |
| Anagallis arvensis L. | 1 | 0 | 3 | 2 | 2 |
| Beuhinia verigata L. | 3 | 0 | 1 | 2 | 3 |
| Bidens pilosa L. | 2 | 0 | 4 | 2 | 1 |
| Brachychiton acerifolius (A.Cunn. ex G.Don) | 2 | 0 | 1 | 2 | 4 |
| Broussonetia papyrifera (L.) L'Hér. ex Vent. | 0 | 2 | 2 | 2 | 4 |
| Bryophyllum pinnatum (Lam.) Oken | 2 | 0 | 1 | 2 | 0 |
| Cannabis sativa L. | 0 | 1 | 1 | 2 | 3 |
| Carthamus oxyacantha M.Bieb. | 4 | 1 | 4 | 2 | 5 |
| Cassia occidentalis L. | 2 | 0 | 1 | 2 | 0 |
| Callistemon citrinus (Curtis) Skeels | 0 | 6 | 3 | 2 | 0 |
| Chenopodium ambrosioides L. | 0 | 0 | 3 | 4 | 5 |
| Commelina benghalensis L. | 2 | 1 | 2 | 2 | 0 |
| Conyza canadensis (L.) Cronquist | 1 | 0 | 1 | 2 | 1 |
| Convolvulus arvensis L. | 0 | 0 | 4 | 2 | 1 |
| Datura innoxia Mill. | 4 | 0 | 1 | 2 | 7 |
| Digera muricata (L.) Mart. | 2 | 0 | 3 | 2 | 0 |
| Eucalyptus camaldulensis Dehnh | 2 | 0 | 5 | 4 | 8 |
| Jasminum humile Linn. | 0 | 0 | 1 | 2 | 3 |
| Justicia adhatoda L. | 2 | 0 | 2 | 1 | 9 |
| Lantana camara L. | 2 | 7 | 0 | 2 | 10 |
| Malvestrum coromandelianum (L.) Garcke | 2 | 0 | 3 | 4 | 1 |
| Melilotus indicus (L.) All. | 1 | 0 | 2 | 2 | 3 |
| Oxalis corniculate L. | 2 | 8 | 1 | 2 | 9 |
| Parthenium hysterophorus L. | 0 | 0 | 6 | 2 | 1 |
| Prosopis juliflora (Sw.) DC. | 0 | 0 | 1 | 2 | 0 |
| Pyrus pashia Buch.-Ham. ex D. | 2 | 3 | 1 | 6 | 12 |
| Quisqualis indica L. | 1 | 0 | 1 | 2 | 3 |
| Ranunculus arvensis L. | 2 | 2 | 4 | 7 | 4 |
| Ranunculus muricatus L. | 0 | 0 | 3 | 2 | 6 |
| Ricinus communis L. | 0 | 0 | 1 | 2 | 3 |
| Rosa alba L. | 2 | 5 | 1 | 5 | 11 |
| Sorghum halepense (L.) Pers. | 2 | 3 | 4 | 0 | 8 |
| Taraxacum campylodes G.E.Haglund | 0 | 4 | 2 | 2 | 1 |
| Tecoma stans (L.) Juss. ex Kunth | 2 | 0 | 1 | 2 | 0 |
| Tribulus terrestris L. | 2 | 0 | 4 | 4 | 3 |
| Tropaeolum majus L. | 2 | 1 | 1 | 2 | 8 |
| Verbena officinalis L. | 0 | 3 | 4 | 2 | 8 |
| Verbesina encelioides (Cav.) | 2 | 0 | 1 | 2 | 1 |

**Table: Pollen character and Character states for cladogram and cluster analysis of plants.**

|  |  |
| --- | --- |
| **Character** | **Character States** |
| P/E ratio | Average=1, Value≤1=0,Value>1=1 |
| Exine Thickness | Average=3.92, Value≤4=0, Value>4=1 |
| Polar Diameter | Average=26.89, Value≤27=0, Value>27=1 |
| Equatorial diameter | Average=26.36, Value≤26=0,Value>26=1 |
| Length of Colpi | Average=4.266,Value≤4=0, Absent=0,Value>4=1 |
| Width of Colpi | Average=4.22,Value≤4=0, Absent=0, Value>4=1 |
| Length of Spine | Average=0.55,Value≤0.55=0, Absent=0,Value>0.55=1 |
| Width of Spine | Average=0.33,Value≤0.33=0, Absent=0,Value>0.33=1 |
| Mesocolpium | Average=11.87, Value≤12=0, Absent=0, Value>12=1 |
| Fertility | Average=91.56925, Fertility≤92=0,Fertility>92=1 |
| Sterility | Average=7.99, Sterility≤8=0, Sterility>8=1 |

**Table: Character state matrix for cluster analysis of different plant species based on morphological features of pollen**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Plants species** | **P/E ratio** | **Exine Thickness** | **Polar diameter** | **Equatorial diameter** | **Length of Colpi** | **Width of Colpi** | **Length of Spine** | **Width of Spine** | **Mesocolpium** | **Fertility (%)** | **Sterility (%)** |
| Achyranthes aspera L. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Ageratum conyzoides (L.) L. | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| Anagallis arvensis L. | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| Beuhinia verigata L. | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| Bidens pilosa L. | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| Brachychiton acerifolius. | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| Broussonetia papyrifera (L.) L'Hér. ex Vent. | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| Bryophyllum pinnatum (Lam.) Oken | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Cannabis sativa L. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Carthamus oxyacantha | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |
| Cassia occidentalis L. | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Callistemon citrinus (Curtis) Skeels | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Chenopodium ambrosioides L. | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| Commelina benghalensis | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Conyza canadensis (L.) | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| Convolvulus arvensis L. | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Datura innoxia Mill. | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| Digera muricata (L.) | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eucalyptus camaldulensis Dehnh | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| Jasminum humile Linn. | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Justicia adhatoda L. | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Lantana camara L. | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Malvestrum coromandelianum | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Melilotus indicus (L.) | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Oxalis corniculate L. | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| Parthenium hysterophorus L. | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| Prosopis juliflora (Sw.) DC. | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Pyrus pashia Buch.-Ham. ex D. | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| Quisqualis indica L. | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Ranunculus arvensis L. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Ranunculus muricatus L. | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Ricinus communis L. | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| Rosa alba L. | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| Sorghum halepense (L.) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Taraxacum campylodes | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| Tecoma stans (L.) Juss. | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Tribulus terrestris L. | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Tropaeolum majus L. | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Verbena officinalis L. | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| Verbesina encelioides | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |