Morphological diversity of ancho chile pepper landraces from Mexico

**Rocío Toledo-Aguilar1, Higinio López-Sánchez2\*, Pedro Antonio López2, Víctor Heber Aguilar-Rincón3, Humberto Vaquera-Huerta4, Amalio Santacruz-Varela3, Víctor Arturo González-Hernández3, Adolfo López-Pérez5,César del A. Hernández-Galeno1 and Moisés Ramírez-Meraz6**

1Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias (INIFAP), Campo Experimental Iguala, Programa de Recursos Genéticos. Iguala de la Independencia, Guerrero, México.

2Colegio de Postgraduados (COLPOS), Campus Puebla, Programa de Estrategias para el Desarrollo Agrícola Regional. San Pedro Cholula, Puebla, México.

3COLPOS, Campus Montecillo, Programa de Recursos Genéticos y Productividad - Genética. Texcoco, Estado de México, México.

4COLPOS, Campus Montecillo, Programa de Socioeconomía, Estadística e Informática - Estadística. Texcoco, Estado de México, México.

5COLPOS, Campus Montecillo, Programa de Hidrociencias. Texcoco, Estado de México, México.

6INIFAP, Campo Experimental Las Huastecas, Programa Nacional de chile. Estación Cuauhtémoc, Tamaulipas, México.

\*Corresponding author ([higiniols@colpos.mx](mailto:higiniols@colpos.mx)). <https://orcid.org/0000-0002-4653-2104>

**Supplementary Material**

**Supplementary Table S1.** Morphological traits used in the characterization of native ancho chile peppers of Mexico.

|  |  |  |
| --- | --- | --- |
| **Plant part** | **Trait** | **State / Measurement\*** |
| Seedling | Hypocotyl color | 2: Green, 3: Purple |
|  | Hypocotyl pubescence | 3: Sparse, 5: intermediate, 7: Dense |
|  | Cotyledonous leaf color | 1: Light Green, 2: Green, 3: Dark green |
|  | Cotyledonous leaf shape | 1: Deltoid, 2: Ovate, 3: Lanceolate, 4: Elong-deltoid |
|  | Cotyledonous leaf length | Fully leaf developed. From the base to tip, in mm |
|  | Cotyledonous leaf width | Fully leaf developed. In widest part of leaf, in mm |
|  | Cotyledonous leaf length/width index | Cotyledonous leaf length / Cotyledonous leaf width |
|  | Stem color | Before transplanting, 1: Green, 2: Green with purple stripes, 3: Purple |
| Plant | Nodal anthocyanin | 1: Green, 2: Light purple, 5: Purple, 7: Dark purple |
|  | Stem pubescence | 3: Sparse, 5: intermediate, 7: Dense |
|  | Stem shape | 1: Cylindrical, 2: Angled, 3: Flattened |
|  | Plant growth habit | 1: Prostrate, 5: Intermediate, 7: Erect |
|  | Plant height | From the stem base to last leaf, in cm |
|  | Plant width | In widest part of plant, in cm |
|  | Plant length/width index | Plant length / Plant width |
|  | Stem length | From the stem base to first bifurcation, in mm |
|  | Stem diameter | In middle part to first bifurcation, in mm |
|  | Branching habit | 3: Sparse, 5: Intermediate, 7: Dense |
|  | Bifurcations number | Registered on a primary branch, from the first bifurcation of the plant |
|  | Branches numbers after first bifurcation |  |
|  | Primary branches number | Primary branches quantification |
|  | Tillering | 3: Sparse, 5: Intermediate, 7: Dense |
| Leaf | Leaf density | 3: Sparse, 5: Intermediate, 7: Dense |
|  | Leaf shape | 1: Deltoid, 2: Ovate, 3: Lanceolate |
|  | Leaf margin | 1: Entire, 2: Undulate, 3: Ciliate |
|  | Leaf pubescence | 3: Sparse, 5: Intermediate, 7: Dense |
|  | Mature leaf length | From the base to tip, in mm |
|  | Mature leaf width | In widest part of leaf, in mm |
|  | Mature leaf length/width index | Mature leaf length / Mature leaf width |
| Flower | Days to flowering | Number of days from sowing until 50 % of plants had at least one open flower |
|  | Number of flowers per axil | 1: One, 2: Two, 3: Three or more |
|  | Flower position | 3: Pendant, 5: Intermediate, 7: Erect |
|  | Corolla color | 1: White, 2: Light yellow, 3: Yellow |
|  | Corolla spot color | Anthocyanin spots on outside of corolla, 1: without spot, 5: purple |
|  | Corolla shape | 1: Rotate, 2: Campanulate |
|  | Corolla length | Dissected corolla. From the base to tip, in mm |
|  | Anther length | During anthesis, in widest part of open flower, in mm |
|  | Anther colour | 1: White, 2: Yellow, 3: Pale blue, 4: Blue, 5: Purple |
|  | Filament length | Dissected corolla. From de base to the tip, in mm |
|  | Filament color | 1: White, 2: Yellow, 3: Green, 4: Blue |
|  | Stigma exsertion | 3: Inserted, 5: Same level, 7: Exserted |
|  | Male sterility | Presence of pollen, 0: Absent, 1: Present |
|  | Calyx pigmentation | Anthocyanin spots on calyx, 0: Absent, 1: Present |
|  | Calyx margin | 1: Entire, 2: Intermediate, 3: Dentatee |
|  | Petals number | In open flowers |
|  | Calyx annular constriction | 0: Absent, 1: Present |
| Fruit | Days to fruiting | Number of days from sowing until 50 % of plants had at least one small fruit. |
|  | Anthocyanin spot on immature fruit | 0: Absent, 1: Present |
|  | Immature fruit color | 1: lime green, 2: medium green, 3: dark green |
|  | Fruit color at intermediate stage | Recorded just before the ripening stage. 3: green, 4: orange |
|  | Fruit set | 3: low, 5: intermediate, 7: high |
|  | Fruit-bearing period | From first fruit set to last fruit formation |
|  | Fruits number per plant | Quantified during completed fruiting period |
|  | Fruit yield per plant | Fresh fruit weight, during four cuts of fruit, in g |
|  | Fruit color at mature stage | 7: Light red, 8: Red, 9: Dark red, 11: Brown, 12: black, 13: chocolate |
|  | Fruit shape | 3: triangular, 4: campanulate, 5: blocky |
|  | Fruit length | From de base to the tip, without pedicel, in cm |
|  | Fruit width | Measured at the widest point, in cm |
|  | Fruit length/width index | Fruit length / Fruit width |
|  | Fruit shape at pedicel attachment | 3: truncate, 4: cordate, 5: 73.9 % lobute |
|  | Neck at base of fruit | 0: Absent, 1: Present |
|  | Fruit shape blossom end | 1: pointed; 2: blunt, 3: sunken |
|  | Fruit blossom end appendage | 0: absent, 1: present |
|  | Fruit surface | Fresh fruit, 1: smooth, 2: wrinkled, 3: Wrinkled |
|  | Fruit weight | In g |
|  | Fruit pedicel length | From de base to the tip, in mm |
|  | Fruit wall thickness | Cross section of fruit of one third from pedicel end, in mm |
|  | Fruit cross-sectional corrugation | 3: poco corrugado, 5: intermedio, 7: muy corrugado |
|  | Number of locules in the fruit | Observed in cross section of fruit |
|  | Ripe fruit persistence with pedicel | 3: Slight, 5: Intermediate, 7: Persistent |
|  | Placenta length | Longitudinal section of fruit, proportion that contains seeds, in mm |
| Seed | Seed size | 3: small, 5: Intermediate, 7: large |
|  | Seed diameter | In mm |
|  | 1000-seed weight | In mm |
|  | Seed weight per fruit | In g |
|  | Number of seed per fruit |  |

\*State for qualitative trait; measurement for quantitative trait.