**Table S1.** Classification and naming of EMS mutants of *C. annuum*.

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| --- | --- | --- | --- | --- | --- |
| **Class** | **Subclass** | **Gene(s)** | **Phenotypic characteristics** | **References** | **Remarks** |
| Plant growth | small plant | *sm* | small size compared to control |  | Fig. 1. g |
| dwarfism | *dw-1* | retarded growth, very short internodes, dark green, glossy leaves and no flower  | Daskalov (1973; 1974) | Fig. 1. h, i |
| Leaf | white variegation type | *bv, pi* | plant with apical and mottled white leaves | Cook (1961); Lippert *et al*. (1965) | Fig. 1. j - m |
| pale green variegation type | *frcl, chl* | similarity to frog back shape,mottled, pale green with dark-greenbackground | Lippert *et al*. (1965) | Fig. 1. n, o |
| yellow variegation type | *myl* | mottled yellow leaves |  | Fig. 1. p |
| ivory variegation type | *ivl* | ivory color leaf, half ivory and green  |  | Fig. 1. q |
| pale green type  | *pgl* | pale-green leaves |  | Fig. 1. r, s |
| yellow type | *lut-1 to 18* | uniformly yellowish leaves | Csillery (1985) | Fig. 1. t |
| hair-like type | *fi-2, wiry* | shoestring-like leaf, lack of leaf bladeexpansion | Csillery (1980); Yifhar *et al*. (2012) | Fig. 1. u |
| squid leg type | *ago1* | rosette leaves and a single stem, lack a leafblade | Bohmert *et al*. (1998) | Fig. 1. v, w |
| Chinese cabbage-like type | *ru-1, ru-2* | rugose and cabbage leaf with dark green,downward curved leaves | Csillery (1983) | Fig. 1. x |
| scabrous type | *sd* | rough leaf surface  | Bergh and Lippert (1964) | Fig. 1. y |
| downward curling type | *dcl* | downward curling leaves with small roundfruits |  | Fig. 1. z, aa |
| upward curling type | *tu, fl, ca* | rolled up, tube-like leaf, folded upward (boat-shaped appearance), rolled upward leaves | Csillery (1980); Greenleaf (1986); Aniel Kumar *et al*. (2001) | Fig. 1. ab, ac |
| undulation type | *fr* | undulation of leaf margin | Csillery (1980) | Fig. 1. ad |
| flaccid type | *flc* | flaccid, wilting leaves under typical green-house conditions | Bosland (2002) | Fig. 1. ae |
| bushed and abnormal leaf type  | *sp* | many leaves fused, limited stem development,numerous small and large leaves | Bergh and Lippert (1964) | Fig. 1. af - ai |
| narrow leaf type | *anv* | lack of leaf expansion, long and narrow leaves | Daskalov and Poulos (1994) | Fig. 1. aj |
| elongated petiole type  | *ep* | narrow and long petiole | Aniel Kumar *et al*. (2001) | Fig. 1. ak - am |
| Flower | flowerless type | *cf-2* | calyx covering half of the corolla, which remains rolled and never opens, and many branches | Pathak *et al*. (1983) | Fig. 1. an, ao |
| fasciculation type | *ci, fa, ci,* *Mf-1, 2, 3* | compound inflorescences and short internodes,flowers borne in clusters | Van der Beek and Ltifi (1990); Elizur *et al*. (2009); Csillery (1983);Daskalov and Poulos, (1994); Shuh and Fontenot (1990) | Fig. 1. ap |
| sunflower type | *sun* | many petals and lots of abnormal carpels |  | Fig. 1. aq |
| two floral organs on one calyx | *twfl* | two floral organs (flower head) on one calyx |  | Fig. 1. ar |
| replicated petal type | *rp* | replicated petals with downward curling leaves |  | Fig. 1. as |
| black stamen type | *bs* | altered black stamen color |  | Fig. 1. at |
| white calyx and petiole type | *wcp* | white calyx and petiole with white leaf variegation |  | Fig. 1. au |
| Fruit | tailed type | *sel-1, 2* | tailed type, no seed and abnormal morphology of the ovary | Curtis and Scarchuck (1948); Prolaram *et al*. (1990) | Fig. 1. av |
| round and small fruit | *rsfr* | round and small fruit and many fruits on one node |  | Fig. 1. aw |
| two fruits on one calyx | *twfr* | two fruits on one calyx |  | Fig. 1. ax |
| two color fruits on one plant type | *tcfr* | orange and yellow color fruits on one plant |  | Fig. 1. ay |
| variegation type in immature fruits | *vfr* | variegated fruits at the immature stage, pale-orange fruits at the mature stage |  | Fig. 1. az |
| yellow color | *y* | yellow mature fruits  | Hurtado-Hernandes and Smith (1985) | Fig. 1. ba |
| orange color | *B* | orange mature fruits  | Lippert *et al*. (1965) | Fig. 1. bb |

**Table S2.** Construction of EMS mutagenized population.

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| **Year** | **EMS treatment (%)** | **M1 size** | **Germination rate (%)** | **No. of M2 lines obtained (%)** |
| 2009 | 1.0 | 200 | 85.4 | 190 (95.0) |
| 1.5 | 990 | 83.0 | 879 (88.7) |
| 2.0 | 72 | 74.1 | 29 (40.2) |
| 2010 | 1.5 | 950 | 80.2 | 422 (44.4) |
| 2011 | 1.5 | 3,600 | 81.0 | 1,776 (49.3) |
| 2012 | 1.5 | 1,000 | 78.1 | 649 (64.9) |
| Total | 6,812 |  | 3,945 |