

**Name:** *flacca* (*flc*)

**Accessions:** H8 (LA4479)

**Gene ID:** Solyc07g066480

**Map position:** Chromosome 7 (Long arm)

**Gene function:** Defective for maturation (sulfurase activity) of Mo cofactor. This form of cofactor is necessary for ABA-aldehyde oxidase and xanthine dehydrogenase activities but not for nitrate reductase (NR) activity, which also uses the same Mo cofactor.

**Gene effect:** plants with the mutated allele have low levels of the hormone abscisic acid (ABA).

**Phenotypes:** MT-*flc* plants have small leaves that tend to wilt under dry, sunny conditions, leading to necrosis, particularly on margins. MT-*flc* plants are increased branched, which does not occur in other tomato ABA mutants (*sit*, *not*).

**Comments:** Seeds should not be harvest from overripe fruits, otherwise they will germinate during fermentation of the pulp.

**Description of accessions available:** MT-*flc* is a BC6Fn introgressed from LA0673 (cv. Rheinlands Ruhm)

## Figure

## Bibliography

Bradford KJ (1983) Water relations and growth of the *flacca* tomato mutant in relation to abscisic acid. *Plant Physiology* 72:251-255.

Bradford KJ, Sharkey TD, Farquhar GD (1983) Gas exchange, stomatal behavior, and  $\delta^{13}C$  values of the *flacca* tomato mutant in relation to abscisic acid. *Plant physiology* 72(1):245-250.

Carvalho RF, Campos ML, Pino LE, Lombardi-Crestana SL, Zsogon A, Lima JE, Benedito VA, Peres LEP (2011) Convergence of developmental mutants into a single tomato model system: Micro-Tom as an effective toolkit for plant development research. *Plant Methods*, 7:18.

Cornish K, Zeevaart JA (1988) Phenotypic expression of wild-type tomato and three wilted mutants in relation to abscisic acid accumulation in roots and leaflets of reciprocal grafts. *Plant physiology* 87(1):190-194.

Holbrook NM, Shashidhar VR, James RA, Munns R (2002) Stomatal control in tomato with ABA-deficient roots: response of grafted plants to soil drying. *Journal of Experimental Botany*. 53(373):1503-1514.

Imber D, Tal M (1970) Phenotypic reversion of *flacca*, a wilted mutant of tomato, by abscisic acid. *Science*. 169 (3945):592–593.

Marin A, Marion-Poll A (1997) Tomato *flacca* mutant is impaired in ABA aldehyde oxidase and xanthine dehydrogenase activities. *Plant Physiology Biochemistry* 35: 369-372.

Neill SJ, McGaw BA, Horgan R (1986) Ethylene and 1-aminocyclopropane-1-carboxylic acid production in *flacca*, a wilted mutant of tomato, subjected to water deficiency and pre-treatment with abscisic acid. *Journal of Experimental Botany* 37: 535–541.

Sagi M, Fluhr R, Lips SH (1999) Aldehyde oxidase and xanthine dehydrogenase in a *flacca* tomato mutant with deficient abscisic acid and wilted phenotype. *Plant Physiology* 120:571-578.

Sagi M, Scaccocchio C, Fluhr R (2002) The absence of molybdenum cofactor sulfuration is the primary cause of the *flacca* phenotype in tomato plants. *Plant Journal* 31:305-317

Sindhu RK, Walton DC (1988) Xanthoxin metabolism in cell-free preparations from wild type and wilted mutants of tomato. *Plant physiology* 88(1):178-182.

Tal M (1966) Abnormal stomatal behavior in wilted mutants of tomato. *Plant Physiology* 41:1387-1391.

Tal M (1979) Abnormal stomatal behavior and hormonal imbalance in *flacca*, a wilted mutant of tomato: V. effect of abscisic acid on indoleacetic acid metabolism and ethylene evolution. *Plant physiology* 63:1044-1048

Taylor IB, Linforth RST, Al-Naieb RJ, Bowman WR, Marples BA (1988) The wilted tomato mutants *flacca* and *sitiens* are impaired in the oxidation of ABA-aldehyde to ABA. *Plant Cell Environment* 11:739-745.

Wilkinson S, Corlett JE, Oger L, Davies WJ (1998) Effects of xylem pH on transpiration from wild-type and *flacca* tomato leaves. A vital role for abscisic acid in preventing excessive water loss even from well-watered plants. *Plant Physiology* 117:703-709.