



**Non-Confidential Description - PSU No. 3404**  
**"High Lycopene Tomatoes"**

**Keywords:**

Tomatoes, Vegetables, Nutritional Foods, Food Processing of Catsup, Sauces, Salsas, Juices and Soups

**Links:**

[Inventor website](#)

**Inventor:** Majid Foolad

**Background**

Lycopene is the red pigment and a major carotenoid in tomatoes. Lycopene's antioxidant capacity is roughly twice that of  $\beta$ -carotene. Numerous epidemiological and intervention studies have demonstrated that dietary intake of LYC-rich foods result in decreased incidence of certain cancers, including the prostate, lung, mouth, and colon cancer, coronary heart diseases, cataracts and possibly macular degeneration. Although the tomato is the richest source of lycopene among all fruits and vegetables, its concentration in the fruit of commercial cultivars is rather low, on average ranging from 30 to 60  $\mu\text{g}$  lycopene/g fresh tomato tissue. Previously, attempts have been made to genetically develop tomatoes with high fruit lycopene content, some with limited success. At Penn State, Dr. Foolad has developed tomatoes which have lycopene content much greater than varieties with *crimson* gene and in both determinate and indeterminate growth habit.

**Invention Description**

Using different traditional breeding techniques, Dr. Majid Foolad has developed tomato breeding lines having fruit lycopene content from 100 - 200  $\mu\text{g}$  lycopene/g fresh fruit tissue. The high fruit lycopene content of these lines do not have any obvious undesirable effects on other plant characteristics. New cherry tomato lines have been developed, which are in F10 generation and have fruit lycopene content up to 200  $\mu\text{g}$  lycopene/g fresh fruit tissue. These lines also have other desirable horticultural characteristics, including high yield, and are available in both determinate and indeterminate growth habits with fruit diameter ranging from 1.5 to 3 cm in different lines. Other high lycopene fresh-market tomatoes such as grape, plum and medium to large round tomatoes, have also been developed using modified backcross breeding techniques. Grape tomatoes of pear-shaped, plum-shaped and elongated (cylindrical) fruit and in both determinate and indeterminate growth habits are available. Plum and round (oblate and globe) tomatoes are available with determinate or semi-determinate growth habit. Inbred lines of processing type tomatoes with high fruit lycopene content and exceptional fruit yield are in the pipeline and will be available within 1-2 years. We also have developed experimental hybrids from crosses between our inbred lines for field trials. Quantitative trait loci (QTLs) responsible for the high fruit lycopene content in these materials have been identified and genetically mapped. Molecular markers linked to these QTLs are available.

**Patent Status**

Provisional patent application filed 3/18/08 – 61/037,542

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