SHORT-TERM SCIENTIFIC MISSION PROPOSAL

ACTION NUMBER: Cost-1204

STSM TITLE: SELECTION OF ROOTSTOCKS THAT SUPPORT PLANTS TO PRODUCE MORE FRUIT CHLOROPHYLL SYNTHESIS.

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Introduction-Chlorophyll synthesis and photosynthetic apparatus assembly require exposure to light and genetically defined developmental cues. Photosynthesizing chloroplasts develop in response to light, mediated by photomorphogenic signaling pathways. The sustained capacity of particular cells and tissues to form chloroplasts is strongly influenced by *Golden 2-like* and *Golden 1-like* so called *GLK2 and GLK1;* transcription factors. Fruit are able to photosynthesize during only part of their development, prior to ripening, but their photosynthesizing organelles determine many of the quality attributes of ripe fruit. Sugars, pigments and secondary metabolites needed for ripe fruit flavor and nutritional qualities depend on photosynthesis and chloroplasts in green fruit. Tomato is an optimal system to study GLK and light signaling responses because there are important consequences for crop productivity and quality. *Solanaceae, GLK2* expression is crucial for fruit to express light stimulated responses while *GLK1* is sufficient in leaves (Powell et.al, 2012). The goal is to investigate the interplay between rootstock and scion fruit chlorophyll content. Rootstock effects can drastically alter fruit characteristics. There are many reports on changes in fruit quality resulting from grafting, but first of all the rootstocks characteristics should be determined.

In our proposal we intended to determine the effectiveness of the *GLK2* and *GLK1* genes on rootstocks which have dark green tomato fruit, using Semi-Quantitative PCR technique. Additionally, chlorophyll contents, °BRIX, sugar ingredient as well as lycopene profiles of the fruits will be analyzed as a common methods. Results evaluated will lead us to work on further experiments as grafting and genes expression of chlorophyll in fruit.

Materials and Methods

As rootstock materials, we selected around different 16 accession lines and 36 heirloom tomato genotypes. Tomato fruit will tag 3-4 days post anthesis (dpa), when they reach 0.5 cm diameter. Therefore all analyzes will be realized on the same age immature green fruits (10-25 dpa). The rootstocks will grow in typical greenhouse conditions. Based on abundance of *GLK1* and *GLK2* primes (Table 1), plants will be selected for further determinations. Furthermore, chlorophyll, soluble solid contents (^{o}BRIX), sugar and lycopene profiles will analyze in fruits.

Table 1. Sequences of tomato *GLK1* and *GLK2* primers.

Sequences	**Forward Primer**	**Reverse Primer**
SlGLK1	ATGGAAAGTTTCGCGATAGGAGGA	CTATGCACAAGTTGGTGGTATTTTA
SlGLK2	ATTTTCTCTCTTTTGATGTCACC	CYTTGATAATGTGGATGCCAAAA