

## Feeding the World Through Sustainable Agriculture

The Institute of Biochemistry, Food Science and Nutrition

**The Robert H. Smith Faculty of Agriculture, Food and Environment**

### ***Passion fruit as a Functional Food***

***Dr. Oren Tirosh and Dr. Alon Samach of the Robert H. Smith Faculty's Institute of Biochemistry, Food Science and Nutrition and the Smith Institute of Plant Sciences and Genetics are researching and developing functional foods that contain nutraceutical properties. These nutraceuticals are believed to play an important role in brain function and are particularly vital to people as they age.***

It has been documented that age-related changes in the nutritional status of older people may have a profound impact on brain function. Among the elderly population, particular nutrient deficiencies have been found, including insufficient amounts of omega-3 fatty acids, B-vitamins, and antioxidants. Scientists and medical professionals are increasingly concerned that this deficit of nutraceuticals may exacerbate pathological processes in the brain.

Currently, little is known about whether or not consuming particular nutrients can help protect the brain neuron cells. To meet this challenge of neuroprotection, Dr. Oren Tirosh has developed a means to evaluate neuroprotection in the laboratory by using cell lines.

In nature, there are two subspecies of Passion fruit named Yellow (*P. edulis* Sims f. *flavicarpa* Deg.) and Purple (*P. edulis* Sims f. *edulis*) Passion fruit. In Israel, the commercially grown cultivar 'Passion dream' is likely a F1 (first generation) hybrid caused by crossing of the two subspecies. Dr. Samach's research team has developed additional cultivars with distinct agricultural traits that complement the commercial cultivar. When grown together, these new and older cultivars can produce high quality fruit all-year round in the Israeli climate.



Yellow passion fruit

The two Smith Faculty scientists have combined their complementary expertise by collaborating on evaluating the neuroprotective properties of extracts from edible fruit taken from different genetic lines of Passion Fruit (*Passiflora edulis*).

Extracts were given to cell lines that were exposed to environmental stress, and the protective properties were determined by the survival of the cells. The protective effect of the extracts was compared with that of a known protective antioxidant called n-acetylcysteine. The scientists discovered that extracts from some of the passion fruit lines provided better neuroprotective properties than the known antioxidant. The neuroprotective properties of the commercial line Passion Dream were relatively high, and the new cultivars gave a range of neuroprotective levels, from much lower than Passion Dream, to much higher. One line (#428) gave the highest levels of neuroprotection.

As the result of this study, the scientists determined that it is possible to breed passion fruit lines with a heightened capacity to protect neurons in the human brain. The Hebrew University scientists are currently using the #428 line as a parent in new crosses, and will select among the progeny those lines with edible fruit that can provide even higher levels of neuroprotection. New lines are already available for testing.



Purple passion fruit

The preliminary data from Passion Fruit research indicates a novel and potentially very important therapeutic effect of consuming Passion Fruit. In addition, Hebrew University experts at the Robert H. Smith Faculty have demonstrated the ability to develop new genetic lines with a potentially heightened ability to protect brains against neuron damage. Hopefully, these fruits or their extracts will be used in the future as nutraceutical products to better protect the human brain.