Legume Organoleptic and Nutritional Analysis

L.E. Spencer[1], T., Sirmons[2], R.M. Wheeler[3], M.W. Romeyn[3]

[1]Amentum, Kennedy Space Center, FL USA, [2]Wyle Laboratories, Johnson Space Center, TX USA, [3]NASA, Kennedy Space Center, FL USA

Long-duration missions beyond low Earth orbit will encounter challenges in maintaining adequate nutrition and acceptability in the food system. In situ production of fresh produce can supplement nutrients deficient in the stored diet. Currently there is a limited number of crops that can be reliably grown for space crop production. Recent challenges with Veggie plant growth technical demonstrations (i.e. Tokyo Bekana Chinese cabbage interveinal chlorosis and necrosis when grown under elevated CO2 (~3000ppm) and narrow-band LED lighting) have highlighted the necessity to conduct rigorous ISS-relevant crop screening on the ground. Additionally, crops must be selected to address specific nutritional deficits as identified by HRP, with an emphasis on having a large diversity of crops available to meet nutritional requirements and crew acceptability. A variety of crop types are necessary to address known nutritional deficits in the stored astronaut diet, to include leafy greens (vitamin C, vitamin K, potassium), tomatoes and peppers (vitamin C, potassium, lycopene), and legumes (vitamin B_1).

Legumes are being evaluated for biological performance and suitability under ISS-like environmental conditions as well as nutritional content and acceptability. Legumes are one of the few pick and eat crop types that is an excellent source of Vitamin B_1. In FY21-22 Biological and Physical Sciences (BPS) is funding screening of 32 legume crop cultivars at KSC, 16 of which will be down-selected based on horticultural performance and informal taste testing for further horticultural assessment and analysis. HRP in FY21-22 is funding organoleptic and nutritional analysis of these 16 down-selected legume cultivars to determine the most promising candidates for future space applications. Nutritional analysis will include full elemental, proximate (fat, protein, calories, carbohydrates, ash), and vitamins B_1, C, K.

This new work is currently postponed due to Covid-19.