Mineralogical and Chemical Characterization of Zeoponic Substrates after Three Successive Crops of Radish. (S09-ming192758-Poster)

Authors:

- J.E.Gruener* - *Hernandez Engineering*
- D.W.Ming - *NASA Johnson Space Center*
- C.Galindo, Jr. - *Hernandez Engineering*
- K.E.Henderson - *NASA Johnson Space Center*
- D.R.Haddock - *University of Houston-Downtown*

Abstract:

NASA Johnson Space Center is developing a synthetic substrate that will slowly release all of the essential nutrients into solution for plant growth experiments in advanced life support system testbeds and on the Space Shuttle and International Space Station. The substrate consists of NH4- and K-exchanged clinoptilolite, synthetic hydroxyapatite and dolomite. Three crops of radish (Raphanus sativus L. cv. 'Cherry Belle') were grown successively in the same zeoponic substrate, and then the procedure was replicated with a new zeoponic substrate. Prior to the experiment, the NH4-exchanged clinoptilolite had a NH4-cation exchange capacity (CEC) of 207 cmol(c)/kg, and the K-exchanged clinoptilolite had a K-CEC of 202 cmol(c)/kg. After three successive crops of radish growth, the average NH4-CEC was 107 cmol(c)/kg, and the average K-CEC was 158 cmol(c)/kg. Thus, after three successive crops of radish growth, the zeoponic substrates had 52% of the original NH4-N and 78% of the original K remaining on zeolite exchange sites, suggesting that zeoponic substrates are capable of long-term, slow-release fertilization for multiple crop cycles.

Corresponding Author Information:

Doug Ming
NASA Johnson Space Center
Mail Code SX3
Houston, TX 77058

phone: 281-483-5839
fax: 281-483-5276
e-mail: douglas.w.ming1@jsc.nasa.gov

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