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PRODUCTION OF HIGHLY NUTRITIOUS VEGETABLES FOR LUNAR EXPLORATION

Abstract

Long term lunar exploration will be highly dependent of self-sustaining strategies for food providing. This is critical to reduce the costly payload from earth. Plant growth on lunar surface represents significant challenges both technical and biological. The chosen vegetable species for human consumption in extraterrestrial expeditions should have such biological properties to meet the significant challenges that represent grow vegetables in extraterrestrial environment. Ancestral Mexican diet is plenty of vegetables of very short cycle with remarkable nutritional properties. Beside this valuable properties, the plantlets of *Amarantus sp.*and many other species form the genus *Chenopodium* have other valuable physiological characteristics such as having a very efficient photosynthetic pathway that will allow to have good yields under limiting growth conditions (metabolism C4). Among the highly valuable nutritious characteristics also this species are high in vitamin C content, reduces cholesterol and glucose content in plasma, high blood pressure and alleviate anemia. The heat popped seeds are consider a pseudo-cereal because the similar nutritional value comparable to cereals. The cultivation of short cicle vegetables is of the major importance since lunar daylight length is only two weeks. The required time from sprouting to the edible stage of the plantlet is about 25-35 days. Plantlets will need complemetary artificial lighting to complete the second half of the growing cycle. It is a very well-known fact that ultraviolet radiation (UV) radiation is one of the most important limiting factors when living organism are exposed to extraterrestrial conditions. The UV radiation in lunar atmosphere will represent significant hurdle for vegetable production for human consumption. This proyect propose an airtight polycarbonate greenhouse container which will have a top chamber saturated with ozone gas. This sealed top chamber containing ozone will serve the purpose of provide protection for the plants against the damaging UV radiation. This airtight chamber will provide water as well as all minerals required for the seedlings nutritional needs. Also the airthigh chamber could include a higher proportion of CO2 to O2 content so photosynthesis will be more efficient. This will cause higher yields of vegetable biomass.