Food production will of course be critical for lunar living. The leaders will be growing plants first in small quantities for research to see how they perform in the lunar environment (radiation, partial gravity), then to supplement key nutrients the existing lunar diet might lack over time (likely with pick and eat type crops such as leafy vegetables, fruiting plants like peppers and micro greens) and finally to replace calories and associated up-mass at some future time based on the expansion of human presence and activity (staple crops such as potatoes, wheat etc.). Here we discuss a start-up proof-of-concept farm where tests can be carried out to validate plans for a later, full-scale farm. The concept will take advantage of previous work on Earth and in low earth orbit including experiments aboard the International Space Station, and will be designed for variation of all relevant parameters. Examples of variables will be the fractional duration and intensity of sunlight or artificial light sent to trays of growing crops from a primary mirror tracking the Sun around the horizon and the organization of planting, fertilizing and harvesting of products. It’s expected that LED lighting will provide the light source in a majority of concept applications. LED’s allow us to tailor specific light recipies optimal for the plant types we select. This is how things are done today in Controlled Environment Agriculture (CEA) on Earth. The organization and sequencing of planting operations is important as is water and nutrient delivery, harvesting and waste product recycling. The role automation, robotics and food safety are very important since we are likely not going to be sending farmers anytime soon and crew time for lunar exploration will be the priority. Ultimately we must plan to include the farm as part of a bioregenerative life support. The crops will be partly spread out on the surface and partly arranged in a sloping list, covered by a transparent cover equipped with provisions for cleaning. Among the concepts to be tested will be the delivery of water from a source in a lunar mine.

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