Mars Exploration (3)
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PRODUCING WHEAT ON MARS

Abstract

Introduction: Wheat can be seen as a food present in many different cultures around the World. There are a great variety of possible meal preparations with wheat: pasta, noodles, bread, pizza, chapathi, etc. Based on the versatility, wheat could be a very interesting food option to be produced on Mars. This is the reason to consider why we need to try to answer the question: why should we cultivate wheat and what would be the feasibility to produce wheat on Mars? This research presents a discussion to go deeper in these both questions and give directions for its answers.

Methodology and results: to determine the feasibility to produce wheat in a Mars station, was defined following steps: 1) Consult the literature to determine production per hectare / meter2. Was identified 60 sacks / hectare or 4-5 tones by hec. This means, 400 g by m2. 2) Determine area of production: in the concept of a greenhouse module of 25 m of circumference and presenting 4 shelves. The area of cultivation would be 100 m2. This module will be presenting 100 m2 to produce food. In this consideration it would be possible to produce 40kg of wheat. 3) Determine the quantity of wheat production during a year: considering the number of days in the production cycle in the year. Wheat cycle = 100-170 days. In the year there could be two cycles, i.e. around 85 kg. 4) Determine the amount of calories that the food can generate: Noodles in 1kg can generate 3600 calories. 5) Visualize the quantity of calories to feed an astronaut: a regular person on Earth, according to World Health Organization, presents the consumption of 2500 Calories. 6) Determine how many days the 100m2 wheat cultivation would supply: considering that astronauts consume an average of 2500 calories each: The 85 kg production could generate 309.176 calories. This quantity of calories would supply 123 days in terms of food for only one astronaut.

Discussion: Even though wheat can be an interesting food that forms a base to produce a great variety of meals, it is very disappointing to identify that 100m2 would provide only 85kg of wheat during an entire year and provide necessary food only for 4 months to 1 astronaut. In this case, it would be more recommendable to transport the wheat from Earth, also modified to contain more nutrients, instead to produce this food in the greenhouse. The greenhouse would be used to produce other plants. Also it is necessary to have deeper discussions to determine: 1 - Energy, water and oxygen required; 2 -Management demands (working hours); 3 - Losses and risks; 4 - Carbon dioxide management and control; 5 - Height of the plant; 6 - Types/ size of the root and 7 - Recycled sources supply from sanitation system 8 - Protocols/ time schedules to be followed 9 - Effective light systems (natural/artificial) All these steps are important to determine what could be the best crop in terms of efficiency related to nutrients, to be grown/cultivated on Mars. It is recommendable continued studies considering different crops, also doing experiments in analog habitats.