

Orbital Biosphere (Brand New Technique) & Meal Plan

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INTRODUCTION-

This research project introduces a brand-new concept called the Orbital Biosphere, a futuristic closed-loop agricultural technique designed specifically for microgravity conditions. It uses an artificial 3D nutrient cloud created using ultrasonic and sound-wave atomizers to grow plants without soil, water tanks, or growing trays. Organic waste from astronauts and leftover food is recycled into nutrients through specially selected fungi, forming a self-sustaining, zero-waste cycle. Bioluminescent algae provide natural lighting, while photon-beam technology supports enhanced photosynthesis. The entire system is monitored by AI sensors that regulate cloud density, nutrient concentration, and plant health, and even predict the perfect time for harvesting.

Food supply is not the only concern in long-term missions. A balanced and nutritionally complete diet plan is also essential. In microgravity, astronauts experience physiological changes such as muscle loss, weakened immunity, and reduced bone density. Therefore, the meals provided must supply the right amount of calories, proteins, vitamins, minerals, and fats to maintain health while also being convenient to grow or prepare in a space environment. These challenges highlight the need for a system that not only grows food sustainably but also supports a scientifically designed meal plan suited for life in orbit.

The motivation behind this project is the need for a more efficient, compact, and scalable space farming system that could support future orbital hotels, long-duration missions, and large space habitats. The Orbital Biosphere aims to minimize resource usage, reduce structural requirements, and maximize plant growth efficiency by using microgravity to its advantage rather than working against it. Combining this innovative farming system with a scientifically optimized meal plan ensures that astronauts or space tourists receive all essential nutrients while relying heavily on foods that can be grown in orbit.

ABSTRACT-

This project has a new technique made which is never tried yet, it is based on the technologies which can be in the future and can also be used in space. It is The Orbital Biosphere which is a closed-loop technique in which an artificial cloud is made inside which plants will be grown receiving nutrients and mist water (through soundwave automizer) from the human waste or other wastes products. The light requirements will be fulfilled by a plant called Bioluminescent Algae. After this, the harvest process will be informed through AI and even done by AI. This technique can be better than the agricultural techniques present now like hydroponics and aeroponics but only when the type of advancement in technologies would be there which is not too far away. We also have a special meal plan which is matched to the techniques being

followed in space currently. The meal plan is designed to provide perfect amount of calories and it also contains the amount of specific nutrients which are required for a person to stay healthy in zero gravity.

KEY WORDS-

Orbital Biosphere

Meal Plan

ORBITAL BIOSPHERE-

I have decided to create our own new technique named Orbital BioSphere, which is a single unit farm that involves the process of growing to recycling everything. Our technique firstly involves the plants being sown directly in a 3D nutrient cloud, or simply, a tiny fog bubble created by an ultrasonic atomizer suspended in microgravity with the help of magnetic fields. The cloud also includes mist water, which we have derived from another machine, the Soundwave Atomizer. In this, there is a ceramic disk on which water is placed, and when electricity passes through the disk, the water converts into mist, which then goes into the clouds. The cloud receives the organic matter, like human waste, food scraps, etc. Then the fungi present in the cloud will convert these into the usable nutrients at the same time, which forms a continuous loop. Special photobeams will also be passed through the clouds like LED lights to break down water molecules and CO₂ and recombine them with the micronutrients. These nutrients circulate through the whole clouds, which helps the plants get their nutrients without any fertilizers. To fulfill the light need, the bioluminescent algae will provide natural light for it, while the photon beams would supplement the optimized photosynthesis at every stage of plant growth. The plants, algae, etc. would create oxygen from CO₂ inside the room, which will form a closed loop system as they again get oxygen from the same room itself. As it is important to look after the health of the plant as well, tiny AI sensors will be attached that can adjust the cloud's growth, photon beam intensity, etc. When crops are ready, the AI guides the astronauts or some drones to collect the mature crops from the cloud itself. This technique is super innovative and saves a lot of space, and it can be used in the future when we get more supplies in space for creating the structure of the machine.

MEAL PLAN-

MEALS	FOOD	NUTRITION VALUES
Breakfast	½ Fresh berries	Calories-180kcal
	½ cup of cultured milk	Protein-9.5g
	Spirulina mixed with yogurt	Fats-6.4g
		Carbohydrates-23g
Morning Snacks		Fibre-2g
	1 bar algae protein (30g)	Calories-215 kcal
	1 banana (medium-sized)	Protein-3.3g
		Fats-11.3g

		Carbohydrates-39g Vitamins C, B, and B6
Lunch	½ cup cooked rice ½ cup of lentil stew 1 cup spinach ½ cup of Quinoa (cooked) Seaweed rice chip (4 pieces)	Calories-611kcal Protein-24.3g Fats-7.2g Carbohydrates-116g
Evening Snacks	1 cup carrot sticks 1 cup of cucumber sticks 1 tbsp nut butter	Calories-200kcal Protein-6g Fats-10g Carbohydrates-15g
Dinner	1 cup of chickpea (cooked) Mixed vegetables (1 cup) Brown rice (1/2 cup, cooked) Carrots and Celery (1/2 cup, chopped) Bell pepper halves (2), filled with millet, chopped spinach, and sunflower seeds (1 tbsp).	Calories-638kcal Protein-30g Fats-9.8g Carbohydrates-115g Fibre-2.8g
Night Snacks	Orange (sliced, 1 medium) Walnuts (1/4 cup)	Calories-230kcal Protein-5.7g Fats-20.2g Carbohydrates-19.5g Omega-3 Fatty acids-2.5g Potassium (K)- 250g
Desert	1 dark chocolate (10oz) mixed with berries Soy yoghurt (1/2 cup)	Calories-257kcal Protein-6.5g



		Fats-15.3g Carbohydrates-28g
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The total calories provided are 2,331 kcal, which is the average required amount. This meal plan provides all the required nutrients in sufficient amounts, and these plants can be grown in space easily.

THANK YOU. I would be really grateful if you accepted this.