

# Space Botany and Astro-Agriculture

Botany · Practice Test · 20 Questions

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**1. Which plant was the first to be grown to full maturity and produce seeds in microgravity on the International Space Station?**

- A) *Arabidopsis thaliana*
- B) *Zinnia hybrida*
- C) *Lactuca sativa*
- D) *Triticum aestivum*

**2. What is the primary purpose of the 'Veggie' (Vegetable Production System) plant growth facility on the ISS?**

- A) Tourism marketing
- B) Fresh food production for crew
- C) Studying space-based genetic mutations
- D) Generating oxygen as a primary life support

**3. In microgravity, why do plant roots struggle to orient themselves?**

- A) Lack of sunlight
- B) Lack of gravitational stimulus (gravitropism)
- C) Extreme atmospheric pressure
- D) Lack of soil nutrients

**4. Which light spectrum is most crucial for photosynthesis in space-grown crops to maximize growth efficiency?**

- A) Green and yellow
- B) Blue and red
- C) Ultraviolet
- D) Infrared

**5. What was the first plant species to flower in space, grown on the Salyut-7 space station?**

- A) *Arabidopsis*
- B) Tomato
- C) *Arabidopsis thaliana*
- D) Sunflowers

**6. How do plants in space receive water since traditional irrigation fails in microgravity?**

- A) Manual spraying
- B) Hydroponic mats and wicks
- C) Free-floating water spheres
- D) High-pressure steam

**7. What negative effect does the lack of gravity have on plant cell wall development?**

- A) Increased lignin production
- B) Reduced cell wall thickening
- C) Rapid senescence
- D) Excessive fruit size

**8. Which of these is a major challenge in providing CO<sub>2</sub> to plants in space environments?**

- A) CO<sub>2</sub> is toxic to space stations
- B) The absence of photosynthesis
- C) Maintaining proper gas exchange without natural convection
- D) The scarcity of carbon in space

**9. What is the 'Advanced Plant Habitat' (APH) primarily used for on the ISS?**

- A) Commercial flower exports
- B) Controlled environment plant physiology research
- C) Studying the effects of vacuum on seeds
- D) Creating ornamental space gardens

**10. In space missions, what is the main reason 'Thale Cress' is frequently used as a model organism?**

- A) It produces edible fruit
- B) It has a small, well-sequenced genome
- C) It requires no water
- D) It grows best in high radiation

**11. What phenomenon causes water and nutrients to stay attached to plant roots in microgravity?**

- A) Surface tension
- B) Magnetic attraction
- C) Vacuum pressure
- D) Static electricity

**12. Which mission utilized the 'Plant Habitats' to study the gene expression of plants under spaceflight conditions?**

- A) Apollo 11
- B) ISS Expeditions
- C) Voyager 1
- D) Mars Pathfinder

**13. What specific plant hormone is investigated in space for its role in 'nastic' movements?**

- A) Auxin
- B) Ethylene
- C) Absciscic acid
- D) Gibberellins

**14. What is the primary way scientists test plant resilience to cosmic radiation?**

- A) Exposing seeds to vacuum
- B) Exposing seeds to high-energy particle accelerators
- C) Growing them on the Moon
- D) Genetic modification using Martian soil

**15. Which of these plants was successfully harvested for consumption on the ISS in 2015?**

- A) Outredgeous red romaine lettuce
- B) Commercial strawberries
- C) Potatoes
- D) Corn

**16. In a space-based hydroponic system, what replaces traditional soil to anchor plant roots?**

- A) Ceramic beads
- B) Slow-release fertilizer pads and wicks
- C) Gelatin
- D) Cotton wool

**17. Why are micro-green varieties often selected for space experiments?**

- A) They grow rapidly and require little space
- B) They require no light
- C) They grow best in pure nitrogen
- D) They are resistant to zero gravity

**18. The study of plant behavior in response to light in the absence of gravity is known as what?**

- A) Heliotropism
- B) Phototropism
- C) Geotropism
- D) Hydrotropism

**19. What is the effect of ionizing space radiation on plant seed germination rates?**

- A) It increases germination significantly
- B) It often results in DNA damage and lower viability
- C) It has no effect
- D) It makes the plants grow larger

**20. What component of the space environment is intentionally simulated in the 'Veggie' facility using LEDs?**

- A) Solar irradiance
- B) Night-time temperature drops
- C) Planetary gravity
- D) Atmospheric nitrogen levels