

Space Botany and Astro-Agriculture

Botany · Answer Key · 20 Questions

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 CO₂ to plants in space environments?

A) CO₂ 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