

Gulmohar Newsletter

Astrobotany

Botany department

“ All about Astrobotany

Team
Gulmohar



GULMOHAR
NEWSLETTER

FROM THE EDITOR'S DESK

A warm welcome to the first edition of the GULMOHAR NEWSLETTER for the year 2023-2024.

Recently ,India witnessed the landing of Chandrayaan 3 on the moon! Recall why Chandrayaan 3 is so important: to carry out various studies to learn about the life on the moon . On the similar lines lets witness some fascinating examples of space plants ! In this edition , we bring to you many articles related to "ASTROBOTANY ",which is the study of plant in space environment. Further we have added a mention of a movie that is similar to our theme. Last but not the least , don't forget to check out the amazing PHOTO GALLERY.

We hope you find this edition interesting , and you eagerly await for our upcoming edition!
HAPPY READING!

EDITOR ,
PRIYA VISHWKARMA

ASTROBOTANY is an applied sub- discipline of botany the study of plant in space environment. It is a field of science concerned with the interaction between plant biology and the space environment. Russian scientists 'KONSTANTIN TSIOLKOVAKY ' was one of the first to discuss photosynthetic life as a resource in space agricultural system. The term 'Astrobotany' was coined by Soviet astronomer and astrobiology pioneer 'GAVRILL ADRIANOVICK TIKHOV' in the year 1945. He is considered the father of astrobotany. Astrobotany not only includes the growth of plants in outer space but also the discovery of vegetation in outer space. Plants can be grown in the space in a specialized , controlled environment. They can also be consumed as a food and provide a refreshing atmosphere. Plants metabolize carbon dioxide in the air to produce valuable oxygen and help control cabin humidity. Thus, growing plant in the space may provide a psychological benefit to human spaceflight crews.



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"Learning gives creativity,
Creativity leads to thinking,
Thinking leads to
knowledge, Knowledge
makes you great."
-A P J ABDUL KALAM

THE MYSTERY OF SPACE SAKURA

We all have seen humans successfully travelling to space and returning back, what if the same was done to plant seeds?? Let us unravel a similar story of the 'Space Sakura'.

In November 2008, a Japanese astronaut 'Koichi Wakata' left for the International Space Station. Along with him he took seeds of cherry blossom which were collected from 14 different regions from all over Japan. 'Wakata' returned to Japan after about 8 months and 4100 orbits of the Earth and brought the cherry blossom seeds along with him. Some of these seeds were given to research centers and the rest of them were returned back to the places from where they had been collected. Many of these seeds were sown. This is when the strange mystery begins !!

THE STRANGE OBSERVATIONS :

In April 2014, when the sapling was only four years old, it started blooming which is 6 years ahead than the actual time taken by the cherry blossoms to bloom !! The early blooming sapling was from the seed that had been originally collected from the 'Chujohime Seiganzakura' from the Ganjoji Temple in Gifu city of Japan.



The Strange observations :

Many botanical groups had tried to breed this tree using the seeds but failed miserably, they could only breed the tree using the method of grafting. And they did not actually expect that the plant could grow from the seeds that had travelled to space.

THE MYSTERY OF SPACE SAKURA



Unravelling the mystery

Japan Manned Space Systems Corporation, a Tokyo-based private-sector consortium of 55 companies, organized the cherry seeds' half-a-year stay in space to see whether or how microgravity would affect them. They wanted to use the seeds to boost Japan's tourism and also to draw the attention of children towards science. 'Kaori Tomita -Yokatani', a researcher who took part in the project and was baffled by the results stated that there was a possibility that exposure to stronger cosmic rays made the process of sprouting and development very fast. She also mentioned that the chance of cross pollination with another species could not be ignored!



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https://soraneews24-com.cdn.ampproject.org/v/s/soraneews24.com/2014/04/18/space-sakura-have-returned-to-earth-with-cherry-blossom-superpowers/amp/?amp_gsa=1&_js_v=a9&usqp=mq331AQIUAKwASCAAgM%3D#amp_tf=From%20%251%24s&aoh=16936719730783&referrer=https%3A%2F%2Fwww.google.com&share=https%3A%2F%2Fsoraneews24.com%2F2014%2F04%2F18%2Fspace-sakura-have-returned-to-earth-with-cherry-blossom-superpowers%2F

What do you think could have caused this change in the growth of the cherry blossoms ??Above all this 'Space Sakura' still stands tall today and is almost 14 years old now . Would you want to visit this mystery space plant!!

NASA GROWN PLANTS ON SPACE

Astronauts aboard the international space station (ISS) have been on a mission to cultivate edible plants in microgravity for nearly two years and after few failed growth cycle NASA has confirmed that the first ever bunch of zinnia flower are now blooming in space . The picture of colorful zinnia flower shared by the space agency is from January 22, 2016 and is clicked by astronaut Scott Kelly. "This zinnia was grown in orbit as part of the Veggie facility aboard the International Space station. Scientists have been studying plants in space since the 1970s, but this particular experiment was started on the ISS in 2015 by NASA astronaut.

Kjell Lindgren, the space agency said."Our space garden isn't just for show: learning how plants develop in orbit will help us understand how to grow crops off the Earth, providing a valuable source of fresh food on long-term missions to the Moon, Mars, and beyond," it added. NASA informed that its astronauts have also grown lettuce, tomatoes, and chile peppers on the ISS, among other vegetables—with plenty more plants to come.

This flowering crop trial began on November 16, 2015, when NASA astronaut Kjell Lindgren actuated the Veggie system and its lodging" pillows" containing zinnia seeds." The gruelling process of growing the zinnias handed an exceptional occasion for scientists back on Earth to more understand how plants grow in microgravity, and for astronauts to exercise doing what they 'll be assigned with on a deep space charge independent gardening," a NASA press release dated August 7, said.



Space Flower History

In late December, Kelly found that the plants "weren't looking too good",and told the ground team, "You know, I think if we're going to Mars, and we were growing stuff, we would be responsible for deciding when the stuff needed water. Kind of like in my backyard, I look at it and say 'Oh, maybe I should water the grass today.' I think this is how this should be handled." Then, the Veggie team on Earth created what was dubbed "The Zinnia Care Guide for the On-Orbit gardener,"and gave basic guidelines for care while putting judgement capabilities into the hands of the astronaut who had the plants right in front of him.

NASA GROWN PLANT ON SPACE

Growing plants in space

The Vegetable Production System, known as Veggie, is a space garden residing on the space station. Veggie's purpose is to help NASA study plant growth in microgravity, while adding fresh food to the astronauts' diet and enhancing happiness and well-being on the orbiting laboratory. The Veggie garden is about the size of a carry-on piece of luggage and typically holds six plants. Each plant grows in a "pillow" filled with a clay-based growth media and fertilizer. The pillows are important to help distribute water, nutrients and air in a healthy balance around the roots. Otherwise, the roots would either drown in water or be engulfed by air because of the way fluids in space tend to form bubbles. In the absence of gravity, plants use other environmental factors, such as light, to orient and guide growth. A bank of light emitting diodes (LEDs) above the plants produces a spectrum of light suited for the plants' growth.

Since plants reflect a lot of green light and use more red and blue wavelengths, the Veggie chamber typically glows magenta pink. Scientists are also studying data to see how addressing the lighting in the veggie plant growth facility can affect mineral composition and there will be tests to determine the light recipe.



References

<https://www.nasa.gov/content/growing-plants-in-space>

NASA'S PIONEERING MISSION: SENDING FUNGI INTO SPACE FOR MEDICINAL ADVANCEMENT

Introduction

In a ground-breaking endeavour NASA, the renowned space agency, has embarked on a mission that might seem straight out of science fiction but holds immense promise for the future of medicine. NASA's recent mission involves sending fungi into space with the goal of harnessing their unique properties for medicinal purposes. This innovative project represents a significant step forward in the quest to explore and exploit the potential of microorganisms beyond Earth.

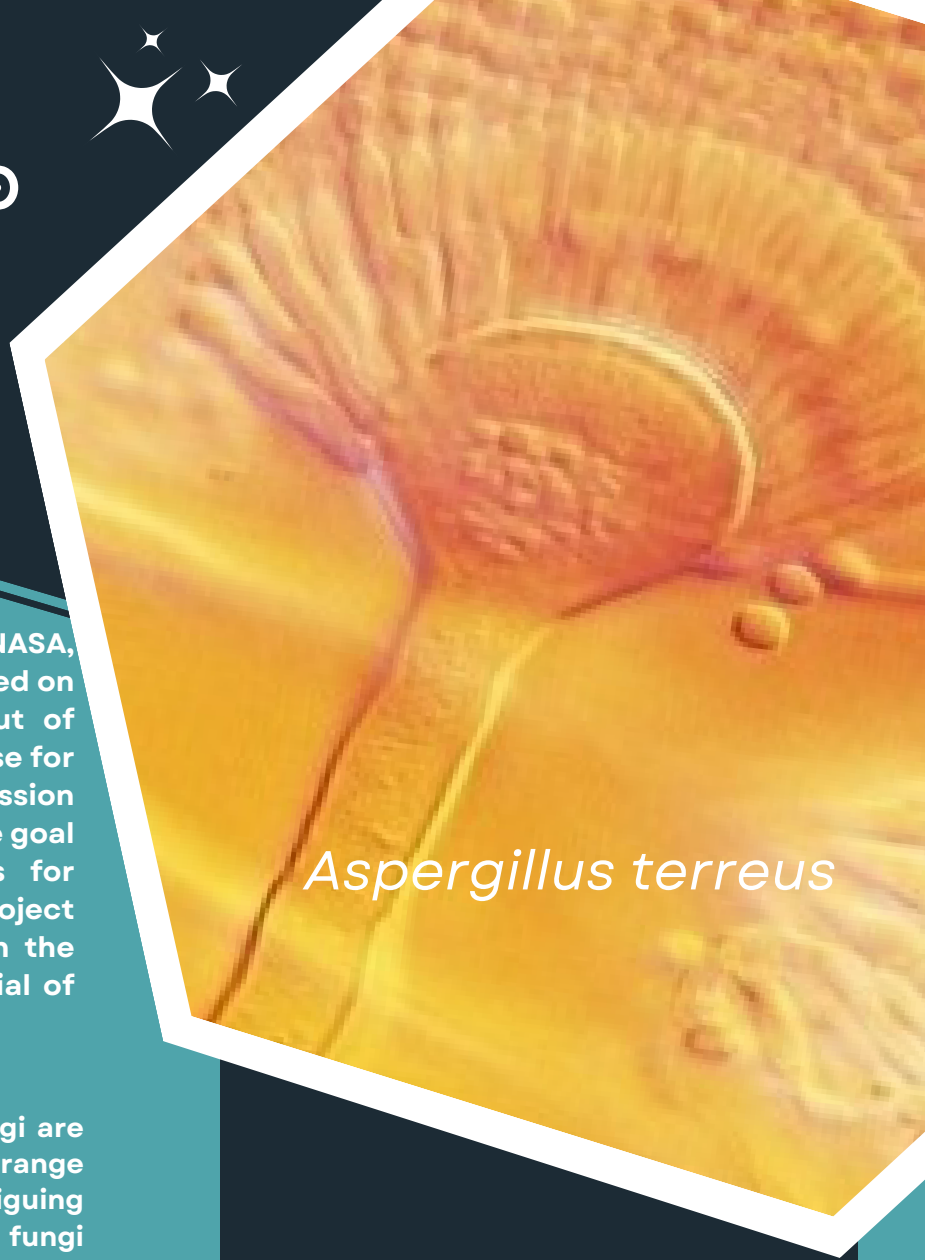
The Fungi in Space:

Why fungi, you might wonder? Fungi are incredibly diverse microorganisms with a range of characteristics that make them intriguing subjects for scientific exploration. Some fungi produce compounds with extraordinary medicinal properties, including antibiotics, enzymes, and bioactive molecules that could have applications in treating various diseases

NASA's mission involves sending selected fungal strains to the International Space Station (ISS) aboard resupply missions. On the ISS, these fungi are exposed to microgravity and cosmic radiation, conditions that are impossible to replicate on Earth. Scientists are keen to observe how these extreme environments affect fungal growth and metabolism.

POTENTIAL MEDICINAL APPLICATIONS:

The fungi chosen for this mission have a history of producing valuable compounds. For example, species of *Penicillium* are known for producing penicillin, a cornerstone antibiotic. Another strain, *Aspergillus terreus*, can produce the cholesterol-lowering drug lovastatin. By studying how these fungi adapt and evolve in space, researchers hope to enhance their capacity to produce these beneficial compounds.



Aspergillus terreus

Understanding the Impact of : Microgravity:

Microgravity, the condition in which objects appear weightless, has a profound effect on biological systems. In the absence of gravity, fungi may behave differently, leading to changes in their metabolic processes and the production of bioactive compounds. This mission provides a unique opportunity to explore these alterations and potentially harness them for medicinal purposes.

NASA'S PIONEERING MISSION: SENDING FUNGI INTO SPACE FOR MEDICINAL ADVANCEMENT

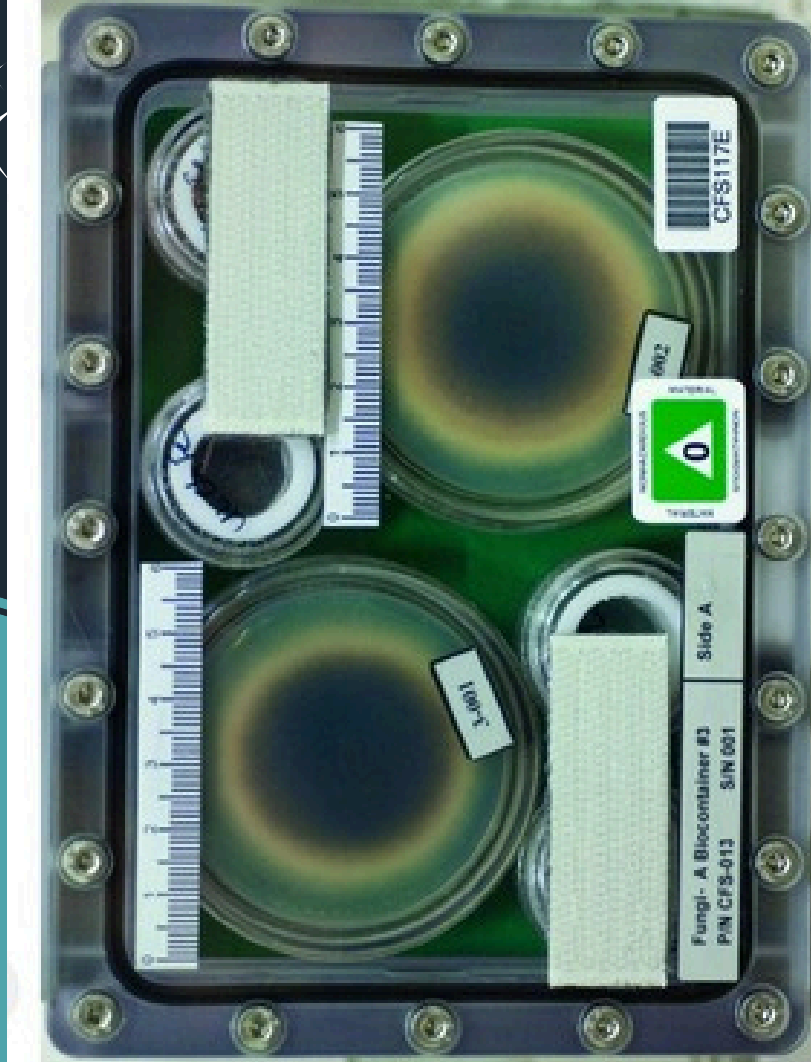
The Road Ahead:

NASA's project to send fungi into space for medicinal research is still in its early stages, but the implications are far-reaching. The insights gained from this mission could pave the way for the development of new pharmaceuticals, more efficient drug production processes, and a better understanding of how microorganisms adapt to extreme environments.

Furthermore, this endeavour showcases the collaborative nature of space exploration. NASA is partnering with pharmaceutical companies and research institutions to ensure that the knowledge gained from this mission is applied effectively in the field of medicine.

CONCLUSION

NASA's decision to send fungi into space for medicinal research represents an exciting and forward-thinking approach to scientific exploration. It highlights the agency's commitment to pushing the boundaries of human knowledge and applying that knowledge for the betterment of society. As we look to the future, the potential for groundbreaking discoveries in medicine through the study of fungi in space is both intriguing and full of promise.



Coloured fungi in space

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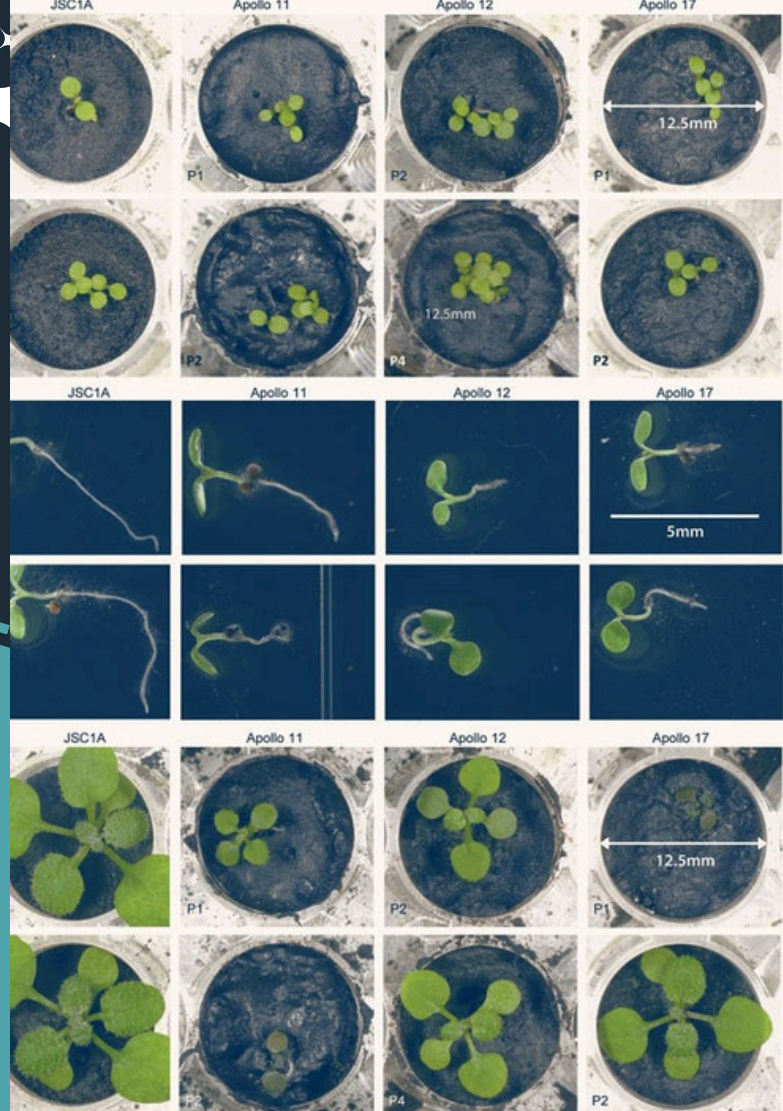
BLOSSOMING IN MOON DUST: THE FUTURE OF LUNAR HORTICULTURE

INTRODUCTION

In a major breakthrough for space exploration scientists have successfully grown plants in lunar soil for the first time. The study, conducted by researchers at the University of Florida, found that the thale cress plant was able to germinate and grow in small amounts of lunar regolith. The lunar regolith is a fine and powdery material that covers much of the Moon's surface. It is made up of tiny grains of rock and dimpacts. These been blasted off the surface by meteorite impacts. The regolith is also very poor in nutrients, which made it a challenge to grow plants in it. However, the researchers were able to overcome this challenge by adding nutrients to the lunar regolith. They also used a special growth medium that helped to protect the plants from the harsh environment of the Moon.

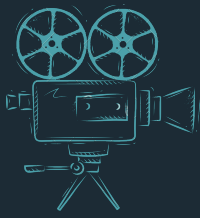
NEXT STEPS

The next steps in this research will involve further studies to optimize the growth of plants in lunar soil. Researchers will also need to investigate the long-term effects of space travel on plants, in order to ensure that they are safe to eat. Once these challenges have been addressed, it will be possible to start growing plants on the Moon as a part of long-term missions.

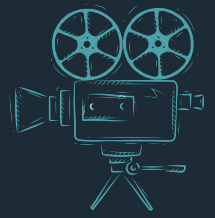


Implications of this:

The successful growth of plants in lunar soil has a number of implications for future space exploration. First, it shows that it is possible to produce food and oxygen on the Moon, which could help to sustain long-term missions. Second, it provides a new way to study the effects of space travel on plants, which could help to improve the design of future spacecraft. Third, it could lead to the development of new agricultural techniques that could be used to grow food in other harsh environments, such as Mars.



MOVIE REVIEW

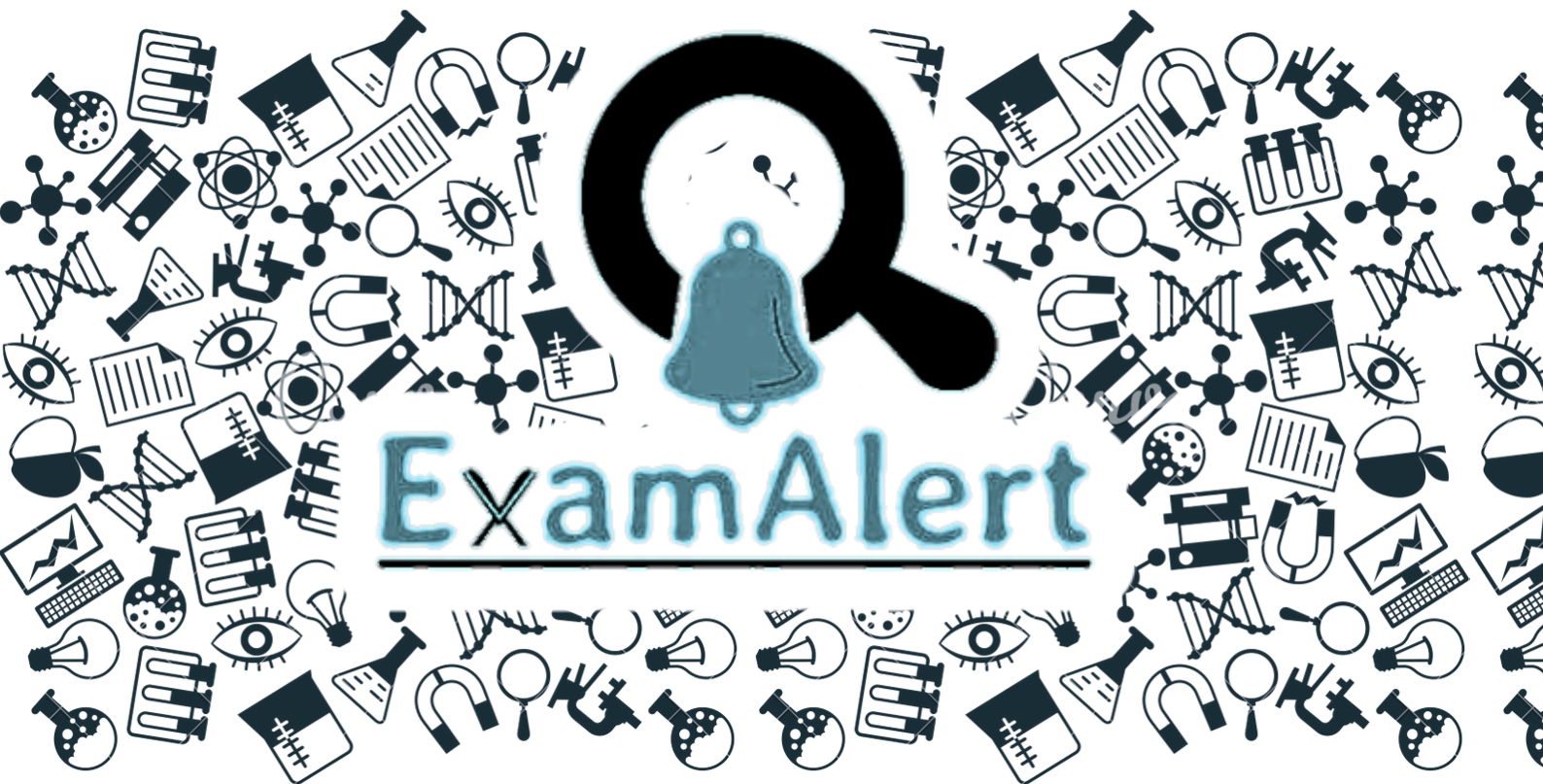


"The Martian" movie was directed by Ridley Scott and Matt Damon acted as Mark Watney.

This movie was about an astronaut Mark Watney who goes on a trip with his fellow astronaut to Mars. There they get hit by a huge storm and they presume that Mark Watney is dead and they leave Mars without him. When he finds himself alone, he tries to live on Mars until people would come back to help him.

As Mark Watney is a Botanist, he plans to grow potatoes in order to have a food source for the time he is stranded on Mars alone. He grows potatoes by rigging up a greenhouse using plastic sheeting and covering the floor with the soil which is on the surface of Mars. He cut the potatoes in half and plants them and he also figures out how to water the plant, how to give the plant enough light source that it can grow well and how to give them correct nutrients.

Anith Joshiea Martin
Vrutika Waghela



NAME OF EXAM	SCHEDULED EXAM DATE	EXAM CONDUCTING BODIES
1.PhD entrance test for BHU, JNU, DU and BBAU.	Till September 20, 2023 (Registration date)	National Testing Agency(NTA) phd-entrance.samarth.ac.in
2.CET Haryana Group D Exam	September/October 2023 (Expected date)	Haryana Staff selection commission (HSSC) www.hssc.gov.in
3.SSC JE Exam	9th,10th and 11th October 2023	Staff selection commission (SSC) http://SSC.nic.in/
4.Indian Forest Service (main) Examination	26th November 2023(Sunday)	Union Public Service Commission www.upsc.gov.in
5.AYUSH NEET PG	From September 26, 2023 (Counselling registration)	Ministry of Ayush aacc.gov.in



PHOTO GALLERY



Hibiscus rosa-sinensis

LOCATION: DHARMASHALA
BY: K.SELVAMATHI KAMARAJ (SYBSC)
SIES COLLEGE, SION



Xerochrysum bracteatum

LOCATION: KODAIKANAL
BY: SELVAMATHI KAMARAJ (SYBSC)
SIES COLLEGE, SION



Euphorbia milii

LOCATION: BORIVALI (POISAR)
BY: SELVAMATHI KAMARAJ (SYBSC)
SIES COLLEGE, SION



Rosettes of *Riccia* Thallus

LOCATION: TAPKESHWAR MAHADEV
TEMPLE
BY: DR.V.VISHNUPRASAD
SIES COLLEGE, SION



Gloriosa superba

LOCATION: PALASDHARI
BY: PRIYA VISHWKARMA (TYBSC)
SIES COLLEGE, SION



Lagerstroemia speciosa

LOCATION: BARC, MUMBAI
BY: PRABHATH PILLAI (SYBSC)
SIES COLLEGE, SION



PHOTO GALLERY



Morinda tinctoria

LOCATION: SGNP
BY: SHRADDHA NANDEPALLI (TYBSC)
SIES COLLEGE, SION



Curcuma comosa

LOCATION: SGNP
BY: SHRADDHA NANDEPALLI (TYBSC)
SIES COLLEGE, SION



Adiantum philippense

LOCATION: PALASDHARI
BY: ARSHI KHAN (TYBSC)
SIES COLLEGE, SION



Mycentinis scorodonius

LOCATION: PALASDHARI
BY: ARSHI KHAN (TYBSC)
SIES COLLEGE, SION



Nephrolepis

LOCATION: WET N JOY
BY: ARSHI KHAN (TYBSC)
SIES COLLEGE, SION

TEAM MEMBERS

Teacher Incharge: Dr. Mahavir Gosavi (HOD, Department of Botany, SIES College)

Editor: Priya Vishwkarma

Layout designer:

Arshi Khan (Co-ordinator)

Kanak Soni (Co-ordinator)

Divya Narayanan Perumal

Selvamathi Kamaraj Nadar

Ananya Josepeter D'souza

Khan Fatema Zehra

Siddiqui Arfa Mohd Salim

Naufa Banu Abdul Jaffar

Web manager:

Talicia Lobo (Co-ordinator)

Jyoti Ragulata (Co-ordinator)

Ancy Mathew

Vrindha Vijayakumar

Laxmi Yadav

Mohaddesa Fatema Panjwani

Content writers:

Shraddha (Co-ordinator)

Anith Joshiea Martin

Vrutika Waghela

Khan Kahekasha

Sayyed Bushra Md Iqbal

Sonakshi Sanjiv Kuril

 botanynewsletter@gmail.com

 [gulmohar_botany_newsletter](https://www.instagram.com/gulmohar_botany_newsletter)

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