SCIENCE CENTRE NEWS LETTER

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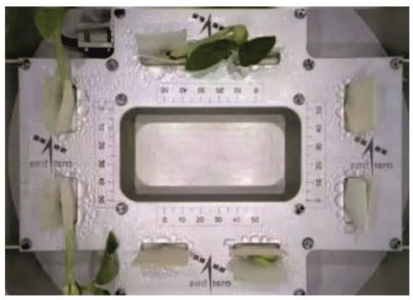
WHAT'S NEW IN SCIENCE?

ISRO's plant experiment delivers stunning results in Space: Plant leaves grow in micro gravity.

The Indian Space Research Organization (ISRO) has achieved a remarkable milestone with its Compact Research Module for Orbital Plant Studies (CROPS) aboard the PSLV-C60 mission launched on 30th December, 2024. The CROPS experiment is designed to study how plants adapt and grow in the unique environment of Space.

The cowpea seeds sent into space have successfully sprouted their first leaves, making a significant advancement in understanding plant growth in microgravity conditions.



Within just four days of the launch, ISRO announced on 4th January, 2025 that the eight cowpea seeds had germinated aboard the POEM-4(PSLV Orbital Experimental Module-4) platform, which utilizes the spent fourth stage of the PSLV rocket for scientific experiments. The Successful sprouting of leaves is a promising indicator of the experiment's potential to provide insights into plant biology in Space.

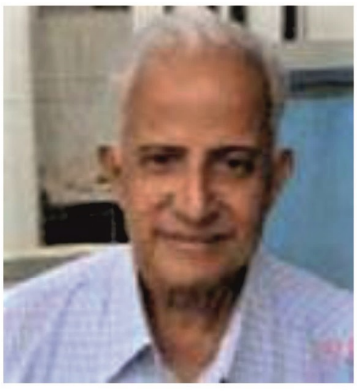
The CROPS experiment is crucial for future long-duration Space missions, particularly as humanity aims for deeper Space exploration. Understanding how plants grow and thrive in microgravity could help develop sustainable life support systems for astronauts during extended missions.

Author: Sibu Kumar Tripathi
Main Source:
https://www.indiatoday.in/science/story/leaves-have-emerged-isros-plant-experiment-delivers-stunning-results-in-space-2660386-2025-01-06

SCIENTIST OF THE MONTH

Subramania Ranganathan

Subramania Ranganathan was born on 2nd February 1934 in Tamil Nadu. He completed B.Sc (Bachelor of Science) in Chemistry and M.Sc (Master of Science) degree in 1957 from Madras University. Before moving to US (United State) to pursue his doctoral studies on a Sloan Kettering Foundation fellowship, he worked at the Biochemistry Department of the Central Leather Research Institute for a short while. In the US (United State), he enrolled at Ohio State University at Harold Shechter's laboratory and secured Ph.D (Doctor of Philopsophy) in 1962.



During his Post-Doctoral days, Ranganathan worked closely with Robert Burns Woodward (an American Organic Chemist) and was known to have assisted the latter in his work on – WoodwardHoffmann rules. It was during this time, he accomplished the total synthesis of Cephalosporin C (antibiotic). Later, basing his researches on Synthetic and Mechanistic Organic Chemistry, he identified new methodologies for the Synthesis of Prostaglandins, a group of biologically active compound.

Subramania Ranganathan received the Basudev Banerjee Medal in 1975, the Shanti Swarup Bhatnagar Prize in 1977, R. C. Mehrotra Endowment Gold Medal in 2000, the Silver Medal of the Chemical Research Society of India in 2001 and the Best Teacher Award by the Indian National Science Academy in 2014. He died on 8th January 2016.

Main Source:
https://en.wikipedia.org/wiki/Subramania_Ranganathan

SCIENCE FACTS FEBRUARY 2025

3 February 1966	:	The unmanned Soviet Luna 9 spacecraft makes the first controlled rocket-assisted landing on the moon.
4 February 1896	:	German Physicist Friedrich Hund (Known for his work on atoms and molecules) was born.
7 February 1979	:	Pluto moves inside Neptune's orbit for the first time since either was discovered.
8 February 1834	:	Russian Chemist Dmitri Mendeleev (Best known for formulating the periodic law) was born.
9 February 1789	:	German inventor of the stenography Franz Xaver Gabelsberger was born.
9 February 1910	:	French Biochemist Jacques Monod (Co-winner of the 1965 Nobel Prize in Physiology or Medicine for their discoveries concerning genetic control of enzyme and virus synthesis) was born.
11 February 1808	:	Anthracite coal is first burned as fuel, experimentally
12 February 1777	:	French Chemist Bernard Courtois (Credited with first isolating iodine, making early photography possible) was born.
12 February 1804	:	German Physicist Heinrich Lenz (Formulated Lenz's law in electrodynamics) was born.
13 February 1910	:	American Physicist and eugenicist William Shockley (Co-winner of the 1956 Nobel Prize in Physics for their researches on semiconductors and their discovery of the transistor effect) was born.
14 February 1869	:	Scottish Physicist Charles Wilson (Co-winner of the 1927 Nobel Prize in Physics for his invention of the cloud chamber) was born.
14 February 1917	:	American mathematician Herbert A. Hauptman (Co-winner of the 1985 Nobel Prize in Chemistry for their outstanding achievements in the development of direct methods for the determination of crystal structures) was born.
15 February 1861	:	French Physicist Charles Edouard Guillaume (Winner of the 1920 Nobel Prize in Physics in recognition of the service he has rendered to precision measurements in physics by his discovery of anomalies in nickel steel alloys) was born.
15 February 1873	:	German Chemist Hans von Euler Chelpin (Co-winner of the 1929 Nobel Prize in Chemistry for their investigations on the fermentation of sugar and fermentative enzymes) was born.
17 February 1888	:	German Physicist Otto Stern (Winner of the 1943 Nobel Prize in Physics for his contribution to the development of the molecular ray method and his discovery of the magnetic moment of the proton) was born.
19 February 1473	:	Polish mathematician and astronomer Nicolaus Copernicus (Who formulated a model of the universe that placed the Sun rather than Earth at its center) was born.
19 February 1859	:	Swedish Chemist Svante Arrhenius (Winner of the 1903 Nobel Prize in Chemistry in recognition of the extraordinary services he has rendered to the advancement of chemistry by his electrolytic theory of dissociation) was born.
21 February 1895	:	Danish Biochemist Carl Peter Henrik Dam (Co-winner of the 1943 Nobel Prize in Physiology/ Medicine for his discovery of Vitamin K) was born.
21 February 1953	:	Francis Crick and James D. Watson discover the structure of the DNA molecule.
22 February 1857	:	German Physicist Heinrich Hertz (First conclusively proved the existence of the electromagnetic waves) was born.
26 February 1903	:	Italian Chemist Giulio Natta (Co- winner of the 1963 Nobel Prize in Chemistry for work on high density polymers) was born.
26 February 1946	:	Egyptian Chemist Ahmed H. Zewail (Known as the father of femtochemistry) was born.
27 February 1942	:	American Chemist Robert H. Grubbs (Co- winner of the 2005 Nobel Prize in Chemistry for his work on olefin metathesis) was born.
28 February 1935	:	Nylon is invented by Wallace Carothers.

U.N. – United Nations

WHO – World Health Organization

UNESCO – United Nations Educational Scientific & Cultural Organization

Answers: 1) a, 2) c, 3) b, 4) a, 5) b

Timings
Tuesday to Sunday
& Public Holidays
9.30 am to 4.30 pm

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बहुजनहिताय बहुजनसुखाय

SCIENTIFIC QUESTION

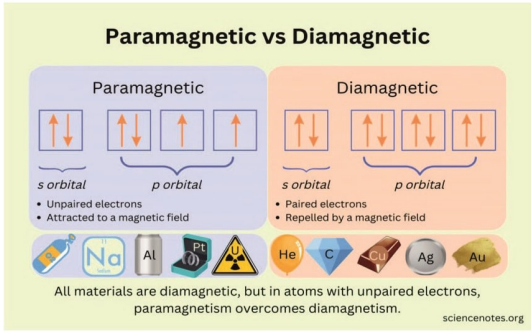
What is the difference between Diamagnetism and Paramagnetism?

Magnetism is a property of materials that comes from the movement of electric charges, particularly the electrons in atoms. The magnetic behavior of a material depends on how its electrons spin and move. When a material responds to an external magnetic field, its behavior can be classified into different types of magnetism: diamagnetism, paramagnetism, ferromagnetism, and so on. Diamagnetism and paramagnetism are two weak types of magnetism found in different materials. Here, comparision between diamagnetism and paramagnetism is explained.

Diamagnetism

What is Diamagnetism?

Diamagnetism is the property of materials that causes them to create an opposing magnetic field when placed in an external magnetic field. As a result, these materials are slightly repelled by the external magnetic field. Diamagnetic materials do not have any permanent magnetic properties of their own. Their magnetic behavior comes from how the electrons react to the external magnetic field.



How Does Diamagnetism Work?

In diamagnetic materials, the atoms or molecules do not have unpaired electrons or permanent magnetic properties. When an external magnetic field is applied, the movement of electrons in their orbits is altered, creating tiny magnetic fields that oppose the external magnetic field. This happens because the electron orbits change in such a way that they generate a small current which creates a magnetic field in the opposite direction to the applied field.

Characteristics of Diamagnetism:

1. Weak and Negative Magnetic Effect: Diamagnetic materials are weakly repelled by the magnetic field, but the effect is very small.

2. No Permanent Magnetic Moment: Diamagnetic materials don't have a permanent magnetic moment; their magnetic properties only appear when exposed to an external field.

3. Not Affected by Temperature: Diamagnetism is not greatly affected by temperature changes.

4. Very Weak Effect: The magnetic effect is very weak and hard to detect unless a strong magnetic field is applied.

Examples of Diamagnetic Materials

· **Bismuth:** A very strong diamagnetic material, it is noticeably repelled by magnetic fields.

· **Graphite:** Though it's a good conductor of electricity, graphite also shows weak diamagnetism.

· **Water:** Water is also diamagnetic, but its effect is weak.

· **Copper and Silver:** These metals show weak diamagnetism and are often used in experiments involving magnetic fields.

Paramagnetism

What is Paramagnetism?

Paramagnetism is the property of materials that causes them to be weakly attracted to an external magnetic field. In paramagnetic materials, individual atoms or ions have unpaired electrons, which create small magnetic moments. .

How Does Paramagnetism Work?

In paramagnetic materials, the atoms or ions have unpaired electrons that create a magnetic moment. When a magnetic field is applied, these magnetic moments tend to align with the external field, causing the material to be weakly attracted to the field. In the absence of an external field, these magnetic moments are randomly oriented, but they line up with the field when it is applied.

Characteristics of Paramagnetism:

1. Weak Attraction: Paramagnetic materials are weakly attracted to magnetic fields.

2. Temperature Dependence: The strength of paramagnetism decreases as the temperature increases. Higher temperatures cause more random motion of particles, which disrupts the alignment of magnetic moments.

3. Permanent Magnetic Moment: Paramagnetic materials have permanent magnetic moments due to their unpaired electrons.

4. Linear Response: The magnetic response of paramagnetic materials is generally proportional to the strength of the applied field.

Examples of Paramagnetic Materials:

· **Aluminum:** Aluminum is a weak paramagnet, showing a small attraction to a magnetic field.

· **Oxygen (O_2):** Oxygen molecules are paramagnetic because they have two unpaired electrons in their molecular orbitals.

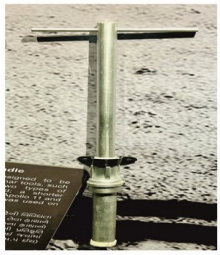
· **Platinum and Manganese:** These materials are also paramagnetic, as they have unpaired electrons that lead to weak attraction to magnetic fields.

Main Source:

https://en.wikipedia.org/wiki/Diamagnetism
https://en.wikipedia.org/wiki/Paramagnetism

KNOW THE ENTERING INTO SPACE GALLERY EXHIBIT

Space Tools – Extension Handle



` Extension handle were designed to be compatible with a variety of lunar tools such as hammer, Scoop, etc. Two types of extension handles were used, a shorter version (23.75 inch) was flown on Apollo 11 and 12 mission and a longer one (35.5 inch) was used on subsequent mission.

This exhibit is situated at "Entering Space Gallery" between Fun Science Gallery and Power of Play Gallery at the first floor of Science Centre.

PLANET MARS

Surat Municipal Corporation had organized night sky gazing event at Science Centre Surat in which Planet Mars was shown with the help of telescope on 23/01/2025 from 7:00 pm to 8:15 pm. Total 306 visitor viewed the planet in this event.

SCIENCE FAIR-2024

Surat Municipal Corporation had organized "Science Fair-2024" at Art Gallery, Science Centre Surat on 16th and 17th August, 2024 for the students of Std. 8 to 12. Lord Krishna English Medium School had participated in the Science Fair with their project on "Modern style Agriculture" under the sub theme of "Indigenous Technologies Agriculture."

The aim of the project was to make modern irrigation system to help the farmer from fire, harmful gases, less soil moisture, etc. in the field/ farm.

In this system, moisture sensor and relay was powered by 9V battery and 7805 regulator. Output of Moisture Sensor is connected to the relay in put module. If the soil has low moisture, it automatically switches on the relay. DC pump is attached to this relay. The pump will supply the water to the soil and when the soil has enough moisture the relay will automatically switched off. It can be used for four different type of work in the field.

· **Fire Extinguish System** :- In case of fire in the farm. A fire sensor can detect fire and trigger a water pump to turn on then blow out the fire.

· **Harmful Gas Detector :-** It will detect the presence of harmful gases in the field and alert the people.

· **Automatic Soil moisture Sensor:-** When the farmer forgets to water the crop, it measure the amount of water in soil and provide automatically necessary water to crop.

· **Sprinkler:-** A Sprinkler irrigation system is pressurized method for watering the crop.

QUIZ

1. Insects responsible for transmitting disease is called what?

a) Vector b) Transmitter c) Drones d) Conductor

2. Which one of the following is the largest endocrine gland in the body?

a) Adrenal b) Parathyroid c) Thyroid d) Pituitary

3. Which bacteria are helpful in the Nitrification process?

a) Acetobacter b) Nitrosococcus c) Cambylobacter d) Actinomycetes

4. Which one of the following is not a virus disease?

a) Salmonellosis b) Ranikhet Disease c) Laryngotracheitis d) Fowlpox

5. In which human body parts, strongest muscle masseter located?

a) Hand b) Jaw c) Thigh d) Chest