THE HINDU ANALYSIS

28th March 2024

by saurabh pandey

THE HINDU

Date:- 27/3/24 Name:- Vijaya

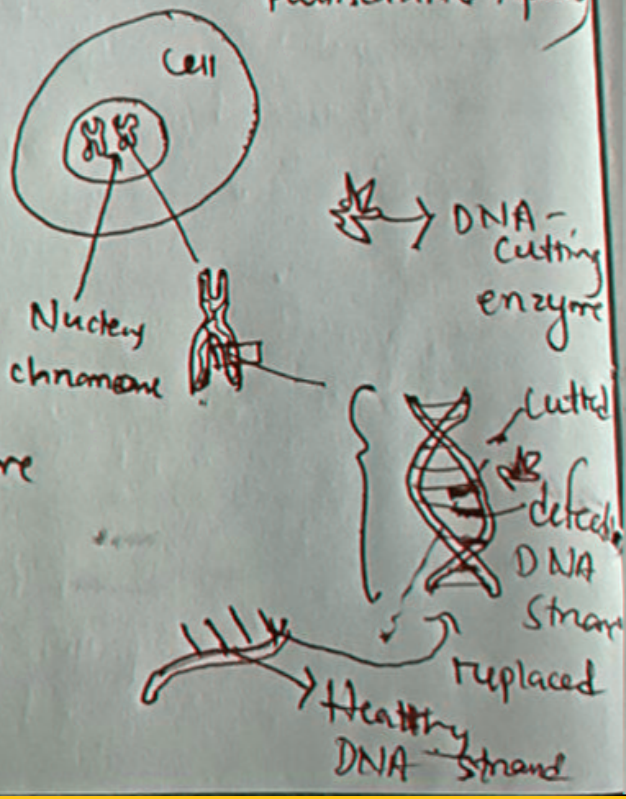
Q. What role CRISPR Technology can play in developing personalised medicine?

Ans:- In certain types of diseases linked with hereditary genetic having stapling relating with DNAs mostly preferred can be cure by gene-editing technologies, where the specific portion of the genetic material is being replaced by the artifical/organized healthy genetic material as like as the organ transplation occurs in general level on broad level or we can say in macroscopic level, whereas gere-editing technology is in acute microscopic level.

A type of gere-editing technique is CRISPR/cas9.

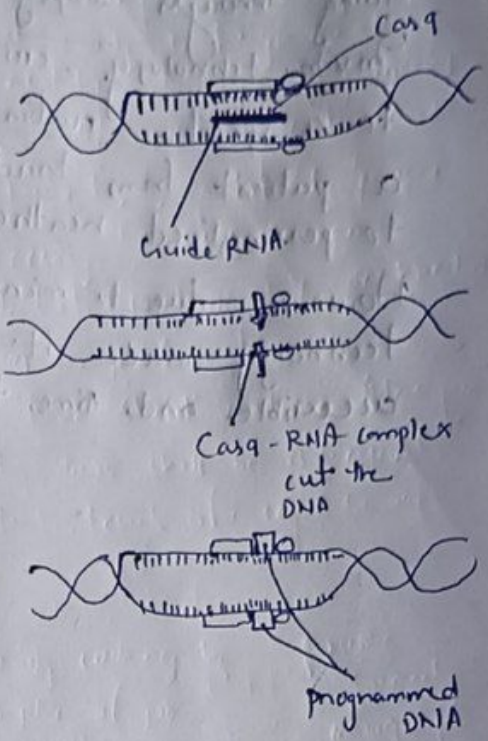
Working of CRISPR (clustered Regularly Interspaced Short Palindromic Repeats)

Here is given right side of this segment of this paper, how the gere-editing techniques work - by detaching the detected DNA strand by DNA cutting enzyme a healthy DNA strand is replaced.



In case of CRISPR:

At first step the Cas9 protein attach with the guide RNA attached to the RNA in a cell. Then the Cas9 - RNA complex cuts the double strands of the DNA and At last Stage programmed or organized DNA may be Inserted at the cut.



Now If we talk about the personalized medicine method, we have to consider the different types of medical approach the uses Information about a patient's gene, environment, lifestyle and other chanacteristics to prevent, diagnose, or treat disease with different doses of medicine.

If we can take case scenario of biopsy of cancer cells or In case of Sickle cell Aremia case CRISPR method is probably the most Latest version of finding solution through personalized medicine which also shows the adaptibility of different human beings body is different and by this technology much more efficiently patients are treating now-a-days without having any side effects as the traditional medicine method have.

>>
Next page

Going through Biopsy model of healthcare via invivo/ invitro technology, crispr technology, an organoid model designing can save to a specific nabinalized drug a patient from traditional method of medicine system to personalized healthcare system.

However, due to microscopic / intricate work of this technology made it too expensive and not much accessible and time taking procedure also.

Telegram channels

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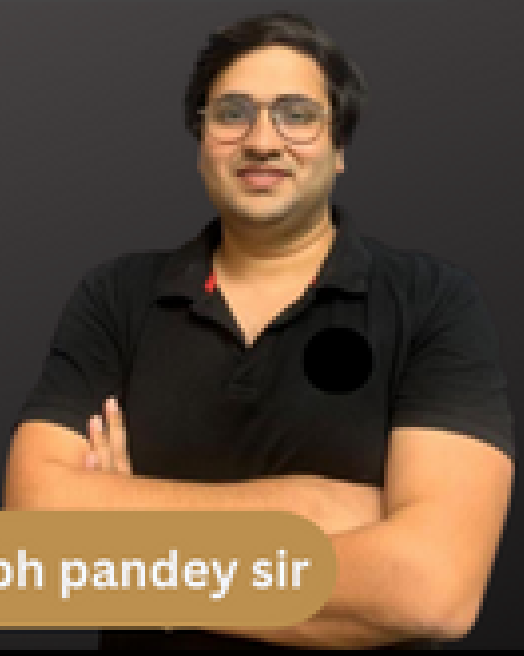

BY Saurabh pandey sir

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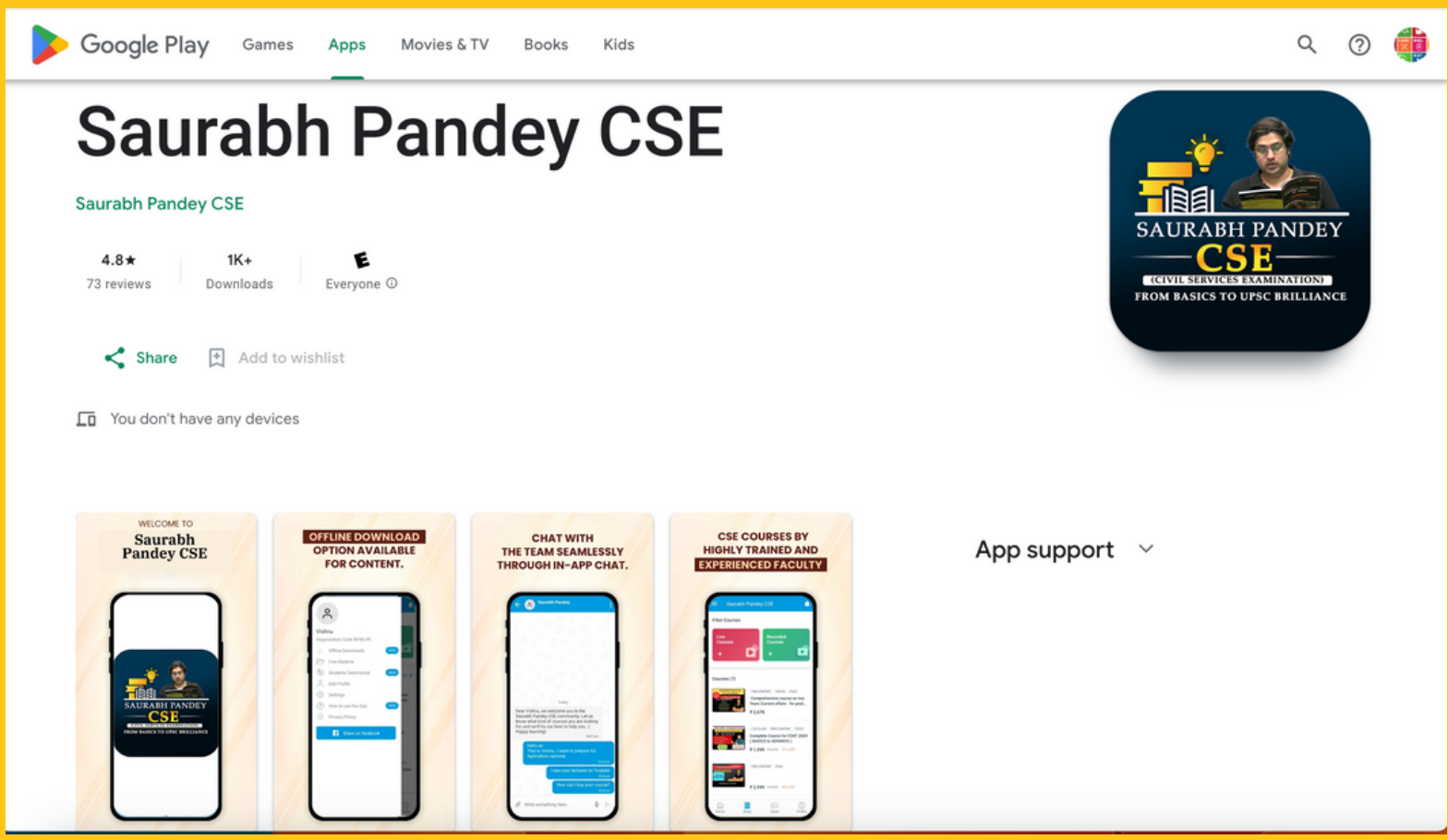

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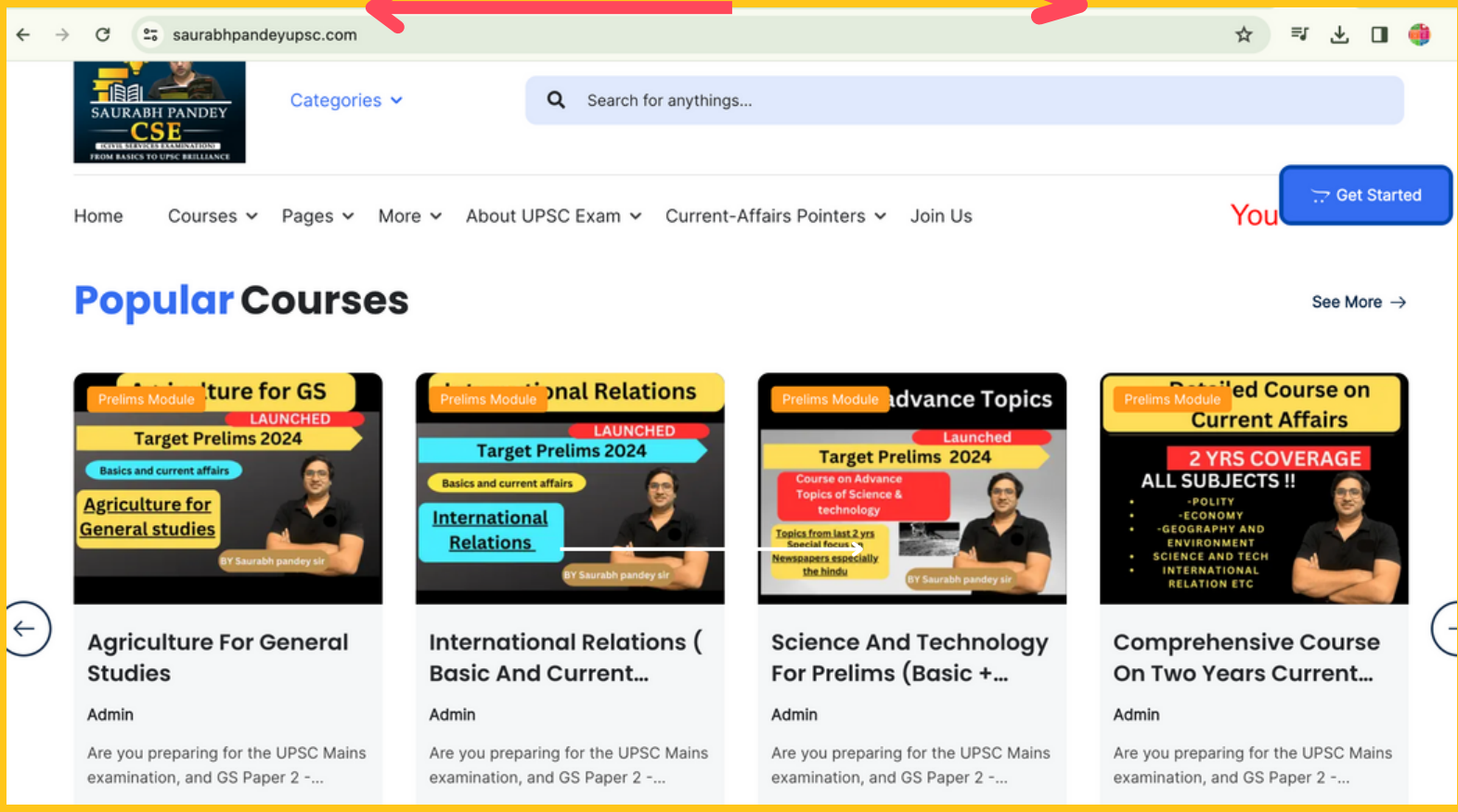

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Study unravels the recipe that gives Kashmiri rice variety unique aroma

Aromatic rice has great value worldwide for its potential to enhance dining experiences and appeal to the health-conscious. SKUAST researchers said mushk budiji's export potential could be maximised by cultivating it in places where the environment causes its flavour to be expressed the most

Hirra Azmat

The Kashmir Himalayas are known for the cultivation of mushk budiji, an indigenous rice variety distinguished by its rich aroma and unique taste. Recently, scientists at the Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST), Srinagar, reported that altitude and temperature play an important role in the development of this aroma.

In a study recently published in *Nature Scientific Reports*, they have reported identifying around 35 aromatic compounds in the variety at altitudes between 5,000 and 7,000 feet across the valley.

Mushk budiji was on the verge of extinction for some time due to various factors. Chief among them was the prevalence of rice blast disease, its low yield, and lack of profitability. But a revival programme launched in 2007 by SKUAST scientists saw the crop make a slow comeback.

Gaurav Zinta, senior scientist at the CSIR-Institute of Himalayan Bioresource Technology in Palampur, Himachal Pradesh, said the study "serves as a foundational work to understand the intricate relationship between altitude and aroma development in an indigenous rice variety." He wasn't involved in the study.

Undehusked mushk budiji rice. HIRRA AZMAT/SPECIAL ARRANGEMENT

GC-MS and e-nose

"Surprisingly, there hasn't been any comprehensive study conducted to determine the most suitable locations for the cultivation of mushk budiji," Syed Zameer Hussain, professor and head of the Division of Food Science and Technology, SKUAST and corresponding author of the study, said. "Motivated by this gap in knowledge, we decided to conduct a study of selected locations on the flavour profile of mushk budiji using gas chromatography-mass spectroscopy (GC-MS) and an 'electronic nose'."

These locations spanned Kupwara near the region's northern edge to Khudwani in Anantnag in the south.

GC-MS is an analytical method used to reveal the presence of volatile compounds present in organic mixtures extracted from geological, environmental, and biological samples. The e-nose is a tool fit with various sensors as well as an artificial intelligence (AI) component; it assessed the flavour attributes of rice samples.

Based on these studies, the scientists identified 35 volatile organic compounds (VOCs) in mushk budiji rice samples. Of these, the concentration of aldehydes (molecules containing the functional group -CH=O) ranged from 6.33% to 29.09% and alcohols (-OH) from 0.47% to 30.34%. According to Ufaq Fayaz, the lead author of the study and research scholar at SKUAST, 2-acetyl-1-pyrroline (2-AP) is a known aromatic compound found in some varieties - but it was present only in mushk budiji samples collected from higher altitudes, particularly in the districts of Budgam and Kupwara.

Dr. Hussain also said 2-AP wasn't the only compound that contributed to mushk budiji's distinct aroma. The team found this through the e-nose analysis of samples from locations that lacked the presence of 2-AP. This, according to him, is "contrary to common perception".

A genetic component

The team also used "gene-expression analysis to understand the influence of various environmental factors across the eight locations," Dr. Fayaz said.

This analysis is a crucial tool for scientists to understand how genes work. It involves studying which genes are active and producing proteins in a given cell or tissue at a specific time. After the rice panicles from all the selected locations were collected, the researchers isolated RNA from each sample using standard lab protocols. (RNA is a molecule that carries genetic information from DNA and which a cell uses to make proteins.)

The researchers converted the RNA to a form more amenable to analysis. Finally, using the real-time polymerase chain reaction (RT-PCR) process, they amplified the presence of different bits of RNA pertaining to the sets of candidate genes responsible for degrading fatty acids and metabolising linoleic acid and ether lipids. In this way, the researchers were able to identify which genes were turned 'on' or 'off' and how much of each gene's RNA was present.

Dr. Fayaz added that the results from the gene-expression analysis matched those from the GC-MS and e-nose analyses - indicating that the environment guides mushk budiji's flavour profile through its genes.

Advantage for farmers

Dr. Zinta said aromatic rice has considerable value worldwide for its distinct flavour, fragrance, and quality, its potential to enhance dining experiences, and its appeal to health-conscious consumers.

To this, the SKUAST researchers said mushk budiji's export potential could be maximised by cultivating it in places where the environmental conditions cause the variety's flavour compounds to be expressed the most.

Together with "innovative packaging" to "improve the appeal of these rice varieties in the international market", their findings could "pave the way for significant economic growth in the agricultural sector," Dr. Hussain said.

> Mushk budiji was on the verge of extinction owing to the prevalence of rice blast disease, its low yield, and lack of profitability. But a programme launched in 2007 by SKUAST scientists saw the crop make a slow comeback

Nonetheless, he also flagged the need for more studies - including the need to understand the mechanisms that drive heightened gene expression in certain locations.

'An important step'

Dr. Zinta also said that while the study offers valuable insights into the flavour profile of mushk budiji rice and its correlation with altitude, it has limitations as well. One lies in the limited scope of the study: it focused solely on altitude as a factor influencing aroma development, whereas other environmental variables such as soil type and climatic conditions were considered but not extensively explored.

Additionally, although the study identified the over-expression of specific genes to be associated with the synthesis of the aroma at higher altitudes, he echoed Dr. Hussain to say the exact mechanisms linking altitude and gene expression remain to be fully elucidated. "So most of the outcomes of the work are based on correlation rather than causation."

He also said that the GC-MS and e-nose techniques - which the researchers used to profile the rice variety's flavour - may not capture the entire spectrum of VOCs that are responsible for the aroma.

Even so, Dr. Zinta continued, "the study represents an important step towards understanding the complex interplay between environmental factors and genetic mechanisms in shaping the aroma of aromatic rice varieties like mushk budiji."

'Gene expression on global scale'

Wajid Waheed Bhat, an assistant professor and the DBT-Ramalingaswami fellow at the division of Basic Sciences and Humanities in SKUAST-Kashmir, also said the authors have examined the expression of certain genetic pathways related to the biosynthesis of lipids (fat molecules) and their degradation, and tried to correlate these findings with the rest of the metabolomic and altitudinal VOC data.

According to him, this was a much-needed first step towards understanding the biosynthesis and regulation of VOCs in mushk budiji.

"This also serves as the basis for selecting the best location with respect to altitude and climatic conditions for growing this endemic rice variety in Kashmir," Dr. Bhat said.

"However, the study would have vastly benefited by studying gene expression on a more global scale, via whole-sample transcriptome sequencing," he added.

In whole-sample transcriptome sequencing, the entire set of RNA molecules present in a sample is captured for analysis, allowing researchers to identify all active genes and their expression levels.

Performing this sequencing, according to Dr. Bhat, would have provided "a much larger picture of the genetic actors involved in this intricate network of gene regulation vis-à-vis VOC biosynthesis, and the effect of external abiotic and biotic factors."

(Hirra Azmat is a Kashmir-based journalist who writes extensively on health and environment. Her stories have appeared in various local and national publications.)

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mushk budiji,

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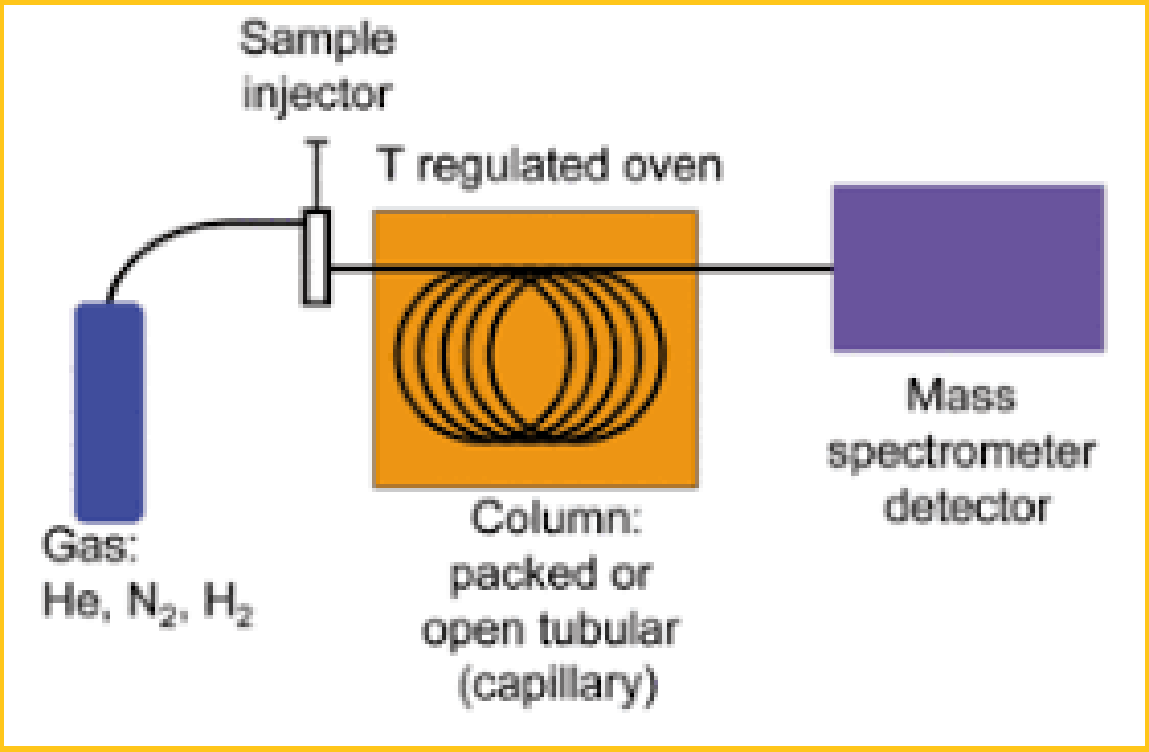
- **“GC-MS is the synergistic combination of two powerful microanalytical techniques.**
- **The gas chromatograph separates the components of a mixture in time, and the mass spectrometer provides information that aids in the structural identification of each component.”**



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A kangaroo near White Cliffs, an Outback area in the state of New South Wales, Australi . AFP

Is Australia's carbon credit scheme a 'catastrophe'?

Agence France-Presse

Australia's carbon credit scheme was undermined by damning new research on March 27, which found a world-leading reforestation project had been an underperforming "catastrophe".

Vast swathes of land across Australia's desert Outback have been earmarked for native forest regeneration meant to offset emissions as new trees suck up carbon.

But researchers have found that across almost 80% of these plantations forest growth was either stagnant or that woodlands were shrinking.

Despite this, Australia had used these projects to bank millions of tonnes in questionable carbon credits, scientists said, which are used to supposedly offset polluting industries.

"I think it can only be described, and I'm using generous words here, as a gross failure," lead author Andrew Macintosh told AFP.

Australia has set aside almost 42 million hectares under the scheme, an area larger than the landmass of Japan. Researchers said it was "one of the world's largest" natural carbon offset projects.

Officials claim that since 2013, the native forest spreading across this land has sucked up more than 27 million tonnes of carbon.

But the peer-reviewed study, which used satellite imagery to chart forest growth, has cast serious doubt on this figure.

Despite its growing vulnerability to climate-linked natural disasters, Australia remains one of the world's biggest exporters of gas and thermal coal

"They should be showing really strong increases in tree cover," said Dr. Macintosh, a former chair of the government body responsible for tracking Australia's carbon offsets. "And it's not there, we're not seeing it."

Each tonne of carbon sequestered by these forests is chalked up as a single carbon credit. These credits are then bought by mining companies, airlines, and other heavily polluting industries to offset their emissions.

Dr. Macintosh said Australia was, in essence, selling carbon credits that didn't exist.

Australia's Clean Energy Regulator said "a number of reviews have confirmed the integrity" of these carbon offsets.

The regulator said it "only issues carbon credits where a project can demonstrate regenerating native forest".

Australian Climate Change and Energy Minister Chris Bowen said the assumptions underpinning the scheme remained "basically sound".

Climate policy has long been a fraught affair in Australia, set back by a decade of political brawling dubbed the "climate wars".

Despite its growing vulnerability to climate-linked natural disasters, Australia remains one of the world's biggest exporters of gas and thermal coal.

The peer-reviewed research was published in the *Nature Communications journal, Earth & Environment*.

Australia has committed to cutting carbon emissions by 43% by 2030 from 2005 levels, on a path to reaching net-zero emissions by 2050.

Australia's carbon dioxide emissions per person are among the highest in the world at 15.3 tonnes, surpassing U.S. levels, World Bank figures show.

Is Australia’s carbon credit scheme a ‘catastrophe’?

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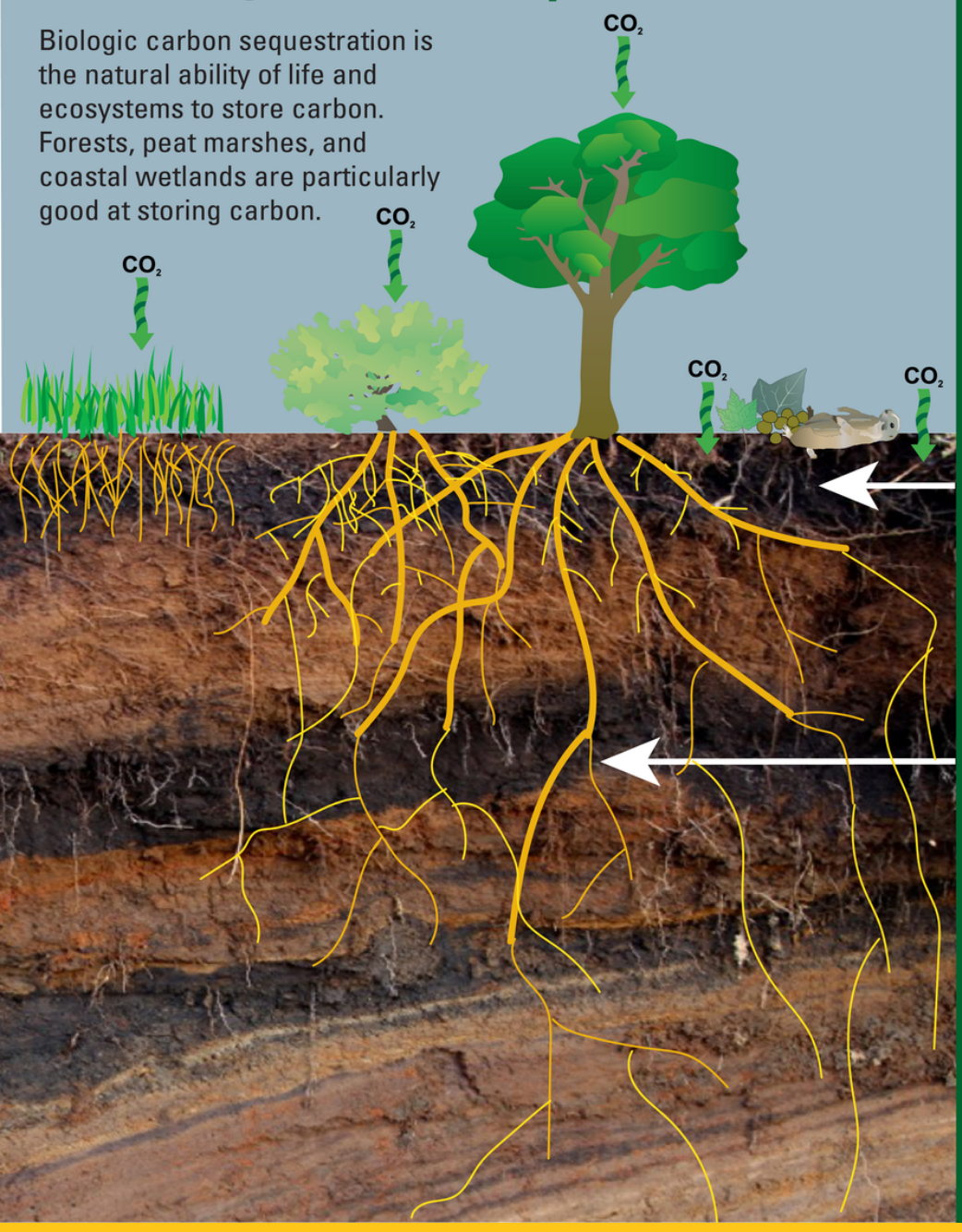
Biologic Carbon Sequestration

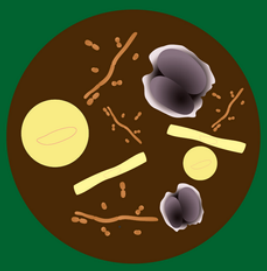
Biologic carbon sequestration is the natural ability of life and ecosystems to store carbon. Forests, peat marshes, and coastal wetlands are particularly good at storing carbon.



USGS
science for a changing world

U.S. Geological Survey studies plants and animals. Scientists identify which ecosystems naturally store higher levels of carbon.

Microbes break down plants and animals through decomposition



Plants store carbon in their bark, tissues, and root systems

Blue carbon is the term for atmospheric carbon captured by oceans and coastal wetland ecosystems

- Vast swathes of land across Australia's desert Outback have been earmarked for native forest regeneration meant to o□set emissions as new trees suck up carbon.
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WTO's investment facilitation negotiations are not illegal

One of the significant developments at the 13th Ministerial Conference (MC13) of the World Trade Organization (WTO) in Abu Dhabi was the non-adoption of the agreement on investment facilitation for development (IFD). Despite opposition from countries such as India, negotiations for an IFD agreement at the WTO were launched in 2017 on a plurilateral basis by 70 countries. This was done through a process known as the Joint Statement Initiative. The IFD agreement was finalised in November 2023. Today, around 120 of 166 WTO member countries (more than 70% of the membership) back the IFD agreement. This agreement aims to create legally binding provisions to facilitate investment flows.

In Abu Dhabi, these 120 countries wanted to include the IFD Agreement as a plurilateral agreement (PA) within Annex 4 of the WTO Agreement. It is critical to recall that while the WTO is a multilateral trade organisation, Article II.3 of the WTO Agreement categorically allows for PAs. These PAs bind those WTO member countries that accept them and do not create rights or impose obligations on the remaining members.

Prabhash Ranjan

teaches at the Faculty of Legal Studies, South Asian University

India's concerns

The IFD Agreement, among other things, will require states to augment regulatory transparency, and streamline administrative procedures to bolster foreign investment inflows. Importantly, this agreement does not contain provisions on market access, investment protection, and investor-state dispute settlement (ISDS). ISDS, which allows foreign investors to bring treaty claims against the state admitting investment, has been a contentious issue in recent years. Given the existing structure of the WTO's dispute settlement mechanism, where only states can bring legal claims against other states, it is implausible that ISDS can be a part of it.

India and South Africa played a crucial role in not letting the IFD agreement become a part of the WTO rulebook. India does not seem to be exceedingly concerned about the text of the IFD agreement. Instead, India's principal concerns are twofold. First, the question of whether investment can be part of the WTO. And second, the process followed to make the IFD agreement a part of the WTO rulebook.

> India should reconsider its defensive approach towards plurilateral agreements such as the investment facilitation for development agreement

Investment is not trade

On whether investment can be part of the WTO, India's chief contention is that investment *per se* is not trade. In other words, investment could or could not result in cross-border trade. This argument flies in the face of economic literature supporting an inextricable linkage between trade and investment. According to the Organisation for Economic Co-operation and Development, about 70% of international trade occurs through global value chains, which are characterised by trade and investment, thus proving the close relationship between the two.

Therefore, it is unsurprising that several modern-day free trade agreements, such as the Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership include detailed investment provisions covering both facilitation and protection. Interestingly, India's newly minted trade agreement with the European Free Trade Association also contains provisions on investment, though it is restricted to facilitation and promotion measures.

Regarding the process followed in negotiating the IFD Agreement, India's foremost assertion is that there is no mandate to conduct negotiations on investment. India argued that in 2004, the WTO's General Council decided that the talks on the relationship between trade and investment – one of the so-called 'Singapore issues' because it was introduced at the 1996 WTO Singapore ministerial conference – would not take place as part of the Doha round of negotiations launched in 2001.

India also referred to the decision taken at the 2015 WTO Nairobi ministerial decision, which says that "any decision to launch negotiations multilaterally on [new] issues would need to be agreed by all members". Since all countries never agreed to launch negotiations on an IFD Agreement, according to India, IFD negotiations and the subsequent text that came up for adoption are illegal.

India is correct in arguing that there is a negative mandate to launch negotiations on the relationship between trade and investment. But two questions arise. First, does this negative mandate cover all aspects of investment, including facilitation? It is important to recall that the dropped investment agreement proposed at the 1996 Singapore ministerial focused on issues such as market access and investment protection. So, can the negative mandate include everything and anything on investment at the WTO?

Second, the negative mandate is to launch negotiations on new issues multilaterally. Will this also apply to negotiations launched on a plurilateral basis? The negotiations on an IFD agreement were launched not on a multilateral basis. While Article X.9 of the WTO Agreement states that the decision to add an agreement to the existing set of PAs listed in Annex 4 can be made 'exclusively by consensus', nothing in the agreement requires consensus to launch negotiations for a PA.

An essential function of the WTO is to update existing rules and make new ones to govern the increasingly complex nature of international trade. However, the WTO's decision-making process remains deadlocked because of the colossal difficulties in arriving at consensus. From this perspective, PAs such as the IFD agreement are essential for reinvigorating the WTO's stalemated legislative function. India, which will soon be the third biggest economy, should reconsider its defensive approach towards PAs, as in the proposed IFD Agreement in the WTO.

The views expressed are personal

Investment Facilitation for Development

- Originally launched in spring 2017 by a group of developing and least-developed WTO members, the Investment Facilitation for Development (IFD) Initiative aims to develop a global agreement on IFD to improve the investment and business climate and make it easier for investors in all sectors of the economy to invest, conduct their day-to-day business and expand their operations.
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The hindu analysis by saurabh pandey sir

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- After over six years of intense work — comprising preparatory work under ‘structured discussions’ and negotiations, all conducted in a transparent and inclusive manner, the WTO members participating in the IFD Initiative finalized the IFD Agreement in November 2023 (INF/IFD/W/52).
- This most-favoured-nation-based, plurilateral agreement is open for all WTO members to join. Unlike multilateral agreements, plurilateral agreements under the WTO are binding only on those members that have accepted them.

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- In February 2024, following a thorough ‘language consistency review’, the IFD participants finalized the IFD Agreement in all three official WTO languages (INF/IFD/W/55).
- Currently, the IFD Initiative boasts participation from over 120 WTO members spanning all regions, representing three-quarters of the WTO membership.
- This includes over 85 developing economies, among which 25 are least-developed economies.
- In the margins of the upcoming 13th WTO Ministerial Conference (MC13), the WTO Members participating in the IFD Initiative will convene a Ministerial event on Investment Facilitation to officially mark the finalization of the IFD Agreement and publicly release it.

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India’s concerns

- The IFD Agreement, among other things, will require states to augment regulatory transparency, and streamline administrative procedures to bolster foreign investment inflows.
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On sustainable building materials

Why is addressing energy inefficiency in residential buildings important? What is Residential Envelope Transmittance Value? Why are Autoclaved Aerated Concrete (AAC) blocks the optimal building material with respect to embodied energy and construction time?

EXPLAINER

Satish Kumar
Stuti Goyal
Dharini Sridharan

The story so far:

India is witnessing an unprecedented construction boom, with over 3,00,000 housing units erected annually. This growth brings economic opportunities and improved living standards but also poses significant environmental challenges. The building sector, a major energy consumer, accounts for over 33% of India's electricity usage, contributing to environmental degradation and climate change. The India Cooling Action Plan forecasts an eight-fold increase in cooling demand between 2017 and 2037, emphasising the need for thermal comfort while reducing active cooling demand.

How can the construction sector become energy efficient?

Addressing energy inefficiency in residential buildings is crucial, given India's rising energy and cooling demand due to economic growth, urbanisation, heat islands, and climate change. Initiatives like the Eco-Niwas Samhita (ENS) and the Residential Energy Conservation Building Code are steps in the right direction. The ENS introduces the Residential Envelope Transmittance Value (RETV), a metric measuring heat transfer through a building's envelope. Lower RETV values lead to cooler indoor environments and decreased energy usage. For optimal efficiency, improved occupant comfort, and lower utility expenses, it's recommended to maintain an RETV of 15W/m2 or less. However, current construction trends favour fast-paced, energy-intensive techniques with active cooling strategies, leading to compromises in thermal comfort. There needs to be more widespread knowledge about climate-appropriate design and architecture, with perceptions of high first costs as a barrier to the design and construction of climate-responsive buildings needing to change.

Reduce energy: Workers at a construction site in Mumbai on March 1. AFP

What materials are optimal?

Our analysis across four warmer climate cities in India highlighted the popularity of materials like Autoclaved Aerated Concrete (AAC) blocks, red bricks, fly ash, and monolithic concrete (Mivan). Despite concerns about sustainability, monolithic concrete construction was favoured by building developers for its speed, strength, quality, and scalability, with over 60% of buildings under design and construction phases opting for it, especially in high-rise buildings and skyscrapers.

The RETV evaluation for these buildings revealed that AAC blocks consistently had the lowest RETV across all climatic conditions, indicating their potential as a thermally efficient material. Based on literature review, a comparison of building materials for a 100 sq. ft wall area displayed substantial differences in embodied energy (the energy associated with the manufacturing of a product), with monolithic concrete having an embodied energy 75 times greater than AAC. When considering the estimated construction time for a 100 sq. ft room, red bricks required the longest time, while Mivan construction required the least. Mivan technology offered faster construction of buildings compared to traditional masonry work, particularly for taller structures.

Measuring materials

An analysis of different building materials through different parameters

	AAC**	Red brick	Monolithic concrete
RETV**	10 W/m2	16 W/m2	22 W/m2
Construction time (100 sq.ft. room)	10-13 days	11-14 days	10-12 days
Embodied energy (100 sq.ft. wall)	187 MJ	1,755 MJ	1,41,510 MJ

**values are indicative in nature. | **Residential Envelope Transmittance Value. Autoclaved Aerated Concrete*

Sustainability concerns are prominent across all materials. Red bricks exhibit moderate embodied energy, contributing to resource depletion, emissions, and waste. While AAC blocks have lower embodied energy, they still contribute to emissions and waste. Monolithic concrete, despite its quick construction time, presents the highest embodied energy, significant environmental impact, and sustainability challenges. Hence, AAC blocks offer a better balance between embodied energy and construction time than red bricks and monolithic concrete.

What next?

India has significant untapped potential for innovative building materials. Interdisciplinary collaborations with sustainability experts to delve deeper into integrated design and optimise strategies like building orientation, Window Wall Ratio (WWR), U-value (rate of heat transfer) of walls, roofs and window assemblies, glazing performance, active cooling systems, etc., can unlock the potential for a sustainable built environment. The construction industry's preference for Mivan as a prime building material raises sustainability concerns, including high embodied carbon and thermal discomfort. Sustainable construction requires innovation from building materials manufacturers to develop cost-effective, scalable, durable, fire-resistant solutions with superior thermal performance and climate resilience. In conclusion, the journey toward sustainable construction is challenging but essential for a greener future. By re-imagining construction design and practices, manufacturing innovative walling materials, and fostering a culture of sustainability, we can create resilient and energy-efficient structures that align with environmental goals and significantly improve the quality of life for the masses.

Satish Kumar is President and Executive Director, AEEE. Stuti Goyal is Research Associate, AEEE and Dharini Sridharan is Senior Research Associate, AEEE.

THE GIST

- Addressing energy inefficiency in residential buildings is crucial, given India's rising energy and cooling demand due to economic growth, urbanisation, heat islands, and climate change.
- Red bricks exhibit moderate embodied energy, contributing to resource depletion, emissions, and waste. While AAC blocks have lower embodied energy, they still contribute to emissions and waste. Monolithic concrete, despite its quick construction time, presents the highest embodied energy, significant environmental impact, and sustainability challenges.
- India has significant untapped potential for innovative building materials.

How can the construction sector become energy efficient?

- Addressing energy inefficiency in residential buildings is crucial, given India's rising energy and cooling demand due to economic growth, urbanisation, heat islands, and climate change. Initiatives like the Eco-Niwas Samhita (ENS) and the Residential Energy Conservation Building Code are steps in the right direction.
- The ENS introduces the Residential Envelope Transmittance Value (RETV), a metric measuring heat transfer through a building's envelope.
- Lower RETV values lead to cooler indoor environments and decreased energy usage. For optimal efficiency, improved occupant comfort, and lower utility expenses, it's recommended to maintain an RETV of 15W/m2 or less.

The hindu analysis by saurabh pandey sir

What is MIVAN Technology??

- Mivan, short for 'Aluminum Formwork System,' is a modern construction technology that involves the use of aluminum alloy formworks for casting concrete.
- "Unlike the traditional RCC method, which relies on timber and plywood, Mivan employs lightweight, high-strength aluminum panels that are easy to handle and reusable.

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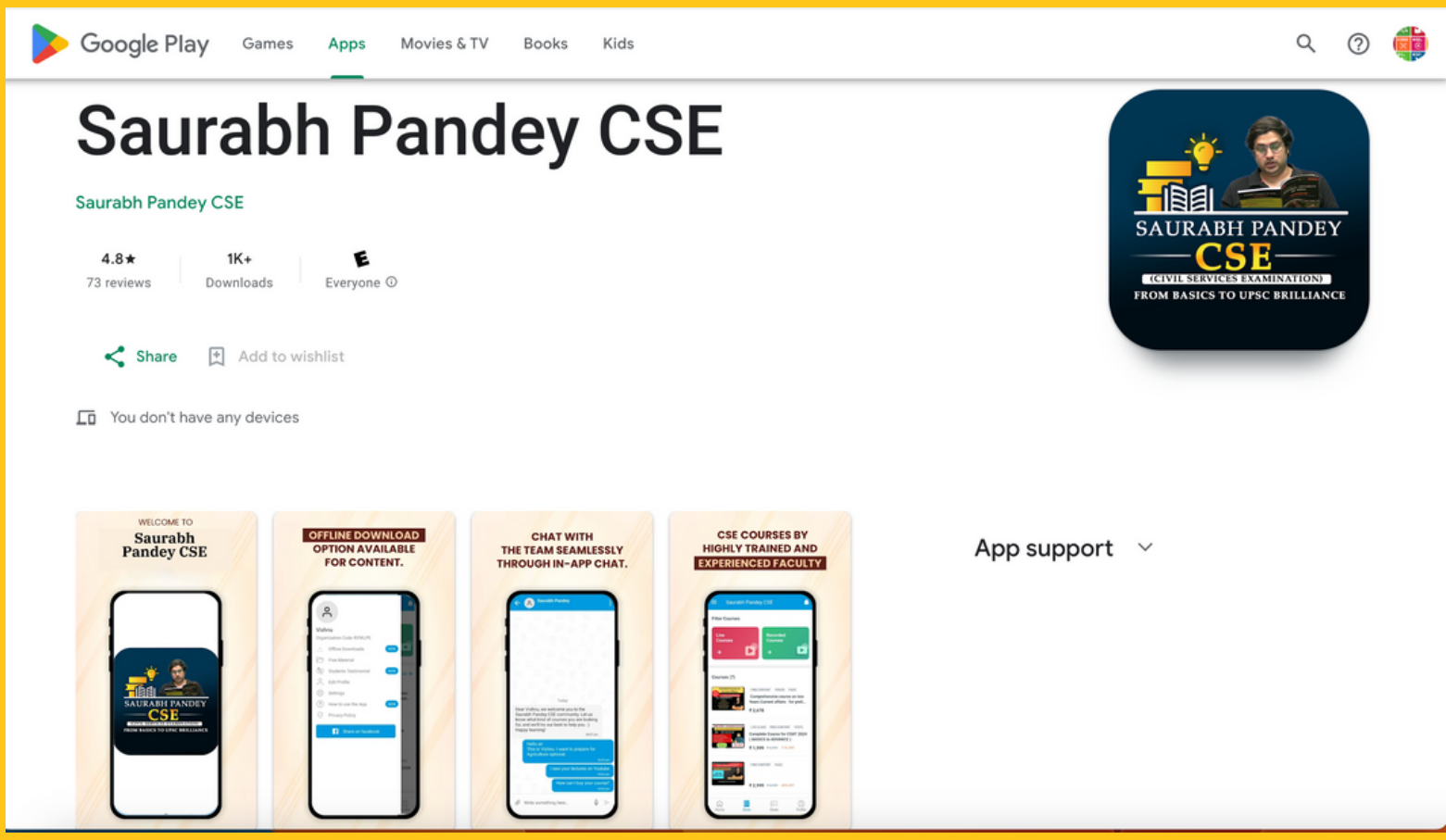

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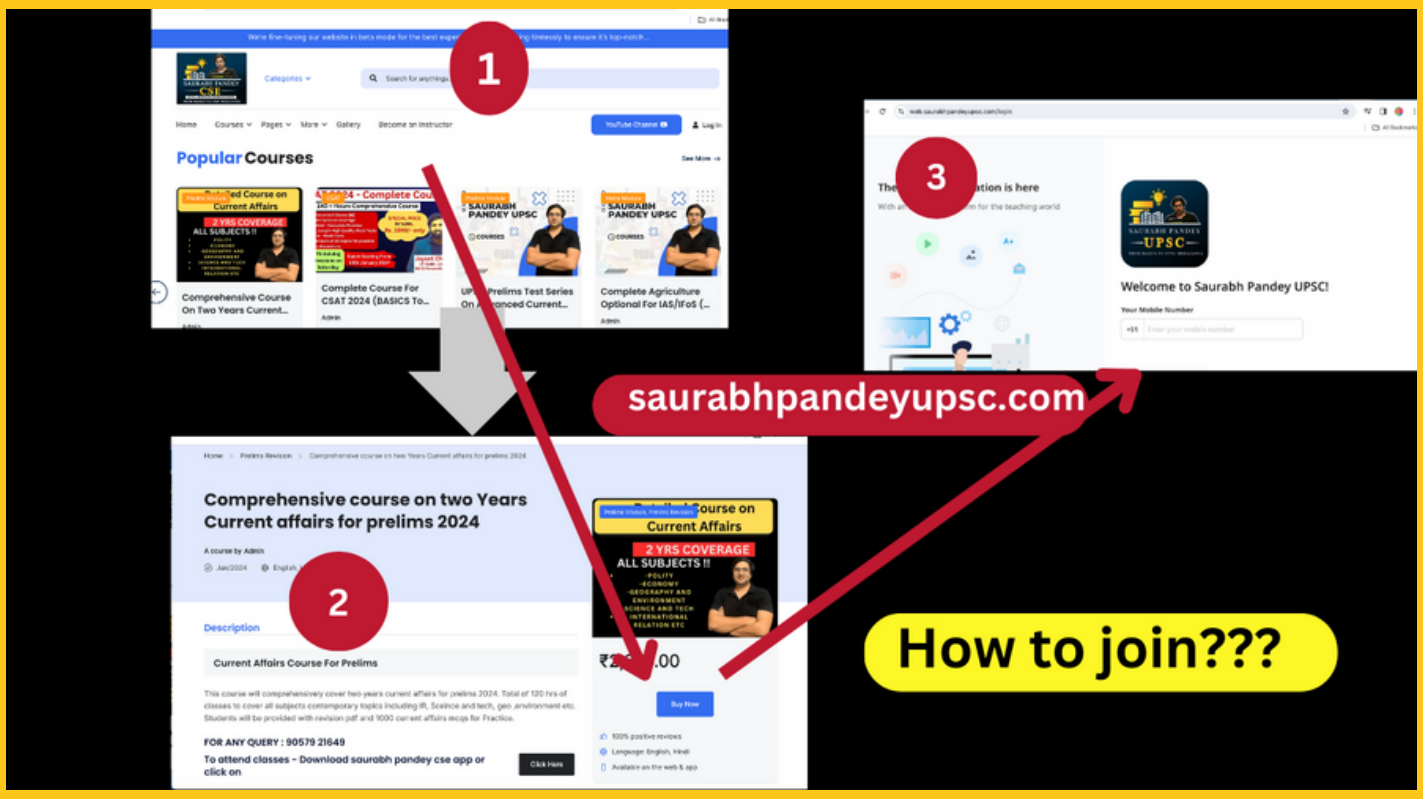

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