EDITORIAL

he Indian Premier League (IPL) 2025 has returned, bigger and better than ever, igniting a cricket frenzy across the nation and beyond. The tournament, now in its 18th edition, continues to be a spectacular blend of thrilling cricket, star-studded performances, and unmatchable energy, making it the most celebrated T20 league in the world. Fans are buzzing with excitement as their favorite teams and players gear up to battle for the coveted trophy.

The IPL 2025 fever began long before the first ball was bowled. The player auction, held earlier this year, set the stage for an exhilarating season as franchises splurged on cricketing superstars and promising youngsters. From record-breaking bids to surprise picks, the auction was a spectacle in itself, adding fuel to the fire of anticipation.

Social media platforms have been abuzz with fans sharing their predictions, team rosters, and favorite moments from past seasons. Cricket lovers have adorned their homes, offices, and even vehicles with team colors and posters, showcasing their unwavering support. The excitement is palpable, with stadiums across the country selling out tickets in record

This season promises to be a visual treat for cricket enthusiasts as it features a galaxy of international and domestic stars. The likes of Virat Kohli, MS Dhoni, Rohit Sharma, and Jasprit Bumrah continue to draw massive fanbases, while international legends such as Jos Buttler, Glenn Maxwell, and Rashid Khan are ready to dazzle. The addition of new faces, including emerging talents from India and other cricketing nations, has added a fresh dimension to the league.

Each team is armed with a mix of seasoned campaigners and young guns, making the competition fierce. With every franchise boasting a balanced squad, predicting the winner has become a daunting task, further intensifying the excite-

IPL is not just about cricket; it's about the stories, the rivalries, and the emotions attached to them. The classic clashes, such as Mumbai Indians vs. Chennai Super Kings and Roval Challengers Bangalore vs. Kolkata Knight Riders, are bound to set the stage on fire. These rivalries have grown over the years, becoming an integral part of the IPL narrative, and fans eagerly await these high-octane encounters.

The IPL 2025 has also introduced a few rule changes, such as the "Impact Player" and "Free-Hit for Wides," which have sparked debates and added a layer of unpredictability to the

This year, IPL has embraced technology like never before. Advanced analytics, virtual reality fan zones, and interactive broadcasts are enhancing the viewing experience, both on television and digital platforms. Fans can now feel more connected to the action, whether they're in the stadium or watch-

Beyond the cricketing spectacle, IPL 2025 continues to be a celebration of diversity, unity, and culture. From vibrant pre-match ceremonies featuring Bollywood's biggest stars to heartwarming initiatives supporting social causes, the IPL transcends boundaries and brings people together. It is a festival where cricket is the heartbeat, and the spirit of togetherness is the soul.

As the season progresses, every team dreams of lifting the IPL trophy, but only one will emerge victorious. The drama of the playoffs, the pressure of eliminations, and the euphoria of the finals add layers of excitement to this journey. However, for fans, the true joy lies in the journey itself-the unforgettable moments, the camaraderie, and the sense of belonging to something much bigger than a sport.

IPL 2025 FEVER Cryo-Microbes: Can Frozen Bacteria Help Crops Survive Climate Change?

BHAVNEET KOUR



Climate change poses a significant threat to global agriculture, with rising temperatures, altered precipitation patterns, and an increase in extreme weather events jeopardizing crop productivity and food security. Traditional agricultural practices are increasingly insufficient to address

these challenges, prompting the exploration of innovative solutions. One promising avenue involves the utilization of psychrophilic (cold-loving) bacteria, which have evolved unique adaptations to thrive in extreme cold environments. This comprehensive article delves into the potential of these "cryo-microbes" to enhance crop resilience against climate-induced stresses. We explore their physiological and biochemical adaptations, mechanisms of plant growth promotion, potential applications in sustainable agriculture, and the chalenges associated with their implementation.

Introduction

The agricultural sector is at the forefront of the battle against climate change. As global temperatures rise, the incidence of heatwaves, droughts, and other climatic extremes has escalated, posing significant threats to crop yields and food security. Traditional agricultural practices are increasingly proving inadequate in mitigating these challenges, necessitating the exploration of novel solutions.

One such solution lies in the realm of microbiology. Microorganisms have long been recognized for their symbiotic relationships with plants, aiding in nutrient acquisition, disease resistance, and stress tolerance. Among these, psychrophilic bacteria-microbes that not only survive but thrive in cold environments-have garnered attention for their potential applications in agriculture. These bacteria have evolved unique mechanisms to function under extreme conditions, and harnessing their capabilities could offer innovative strategies to enhance crop resilience in a changing climate.

Understanding Psychrophilic Bacteria

Psychrophilic bacteria are microorganisms that have adapted to grow optimally at temperatures ranging from -20°C to +10°C. They are predominantly found in polar regions, alpine soils, deep ocean waters, and other perpetually cold environments. The study of these bacteria has unveiled a plethora of unique physiological and biochemical adaptations that enable their survival and functionality under extreme cold conditions. Physiological and Biochemical Adaptations

1.Enzyme Functionality at Low Temperatures: Psychrophilic bacteria produce cold-active enzymes that remain functional at low temperatures. These enzymes possess a flexible structure, allowing them to catalyze biochemical reactions efficiently in cold environments. This flexibility, however, often renders them more susceptible to thermal denaturation at moderate temperatures.

2.Membrane Fluidity Maintenance: To prevent their cellular membranes from becoming rigid in cold temperatures, psychrophiles modify their lipid composition. They increase the proportion of unsaturated fatty acids, which maintain membrane fluidity and ensure proper function of membrane-bound proteins and transport processes.

3.Antifreeze Protein Production: Many psychrophilic bacteria synthesize antifreeze proteins (AFPs) that inhibit the for-

mation and growth of ice crystals within their cells. These proteins bind to small ice crystals, preventing them from enlarging and causing cellular damage

4.Cryoprotectant Accumulation: These bacteria accumulate compatible solutes, such as trehalose and glycerol, which act as cryoprotectants. These molecules stabilize proteins and cellular structures, protecting them from damage caused by freezing and thawing cycles.

5.Efficient Nutrient Uptake Systems: In nutrient-scarce cold environments, psychrophilic bacteria have developed highly efficient nutrient uptake systems. These systems allow them to scavenge and utilize limited resources effectively, ensuring their survival and growth.

Mechanisms of Plant Growth Promotion

The unique adaptations of psychrophilic bacteria not only ensure their survival but also confer benefits to plants, particularly in cold and stress-prone environments. The mechanisms through which these bacteria promote plant growth

1.Phosphate Solubilization: Phosphorus is a vital nutrient for plant growth, but in many soils, it exists in insoluble forms, making it unavailable to plants. Psychrophilic phosphate-solubilizing bacteria (PSB) can convert these insoluble phosphates into soluble forms that plants can readily absorb. This process is especially beneficial in cold soils where phosphorus availability is limited. Studies have demonstrated that the application of psychrophilic PSB can enhance phosphorus uptake in crops, leading to improved growth and yield.

2. Nitrogen Fixation: Some psychrophilic bacteria possess the ability to fix atmospheric nitrogen, converting it into forms usable by plants. This natural fertilization process reduces the need for synthetic nitrogen fertilizers, promoting sustainable agricultural practices.

3. Production of Plant Growth Regulators: Psychrophilic bacteria can produce phytohormones such as indole-3-acetic acid (IAA), which stimulate root elongation and overall plant growth. The enhanced root system improves water and nutrient uptake, bolstering plant resilience against environmental

4.Induction of Stress Tolerance: Exposure to psychrophilic bacteria can trigger systemic resistance in plants, enhancing their ability to withstand abiotic stresses such as cold, drought, and salinity. This induced resistance is mediated through the activation of specific plant defence pathways and the expression of stress-responsive genes

5.Biocontrol of Plant Pathogens: Certain psychrophilic bacteria exhibit antagonistic activity against plant pathogens. They produce antimicrobial compounds and compete with pathogens for space and nutrients, thereby reducing the incidence of diseases. This biocontrol property is particularly valuable in cold regions where the prevalence of certain pathogens may increase due to changing climatic conditions.

Table 1: Summary of Physiological and Biochemical Adaptations in Psychrophilic bacteria

ADAPTATION	DESCRIPTION
Enzyme Functionality	Production of cold-active enzymes with flexible
	structures
Membrane Fluidity	Increased unsaturated fatty acids in membranes
Maintenance	
Antifreezr Protein Production	Synthesis of proteins preventing ice crystal growth
Cryoprotectant Accumulation	Accumulation of solutes like trehalose and glycerol
Nutrient Uptake Systems	Development of efficient nutrient acquisition
	mechanisms

Potential Applications in Sustainable Agriculture

The unique properties of psychrophilic bacteria offer several promising applications in sustainable agriculture, particularly in enhancing crop resilience to climate change:

1.Cold-Active Enzymes in Agriculture: Psychrophilic bacteria produce cold-active enzymes that function efficiently at low temperatures. These enzymes can be harnessed to improve soil nutrient availability and promote plant growth in cold cli-

2.Bioremediation of Cold Soils: Psychrophiles can degrade pollutants in cold environments, aiding in the bioremediation of contaminated agricultural lands. This process restores soil health and ensures safer crop production.

3.Development of Cold-Tolerant Crops: Insights into the genetic and metabolic pathways of psychrophilic bacteria can inform the development of genetically modified crops with enhanced cold tolerance, extending the growing season in cool-

Table 2: Applications of Psychrophilic bacteria in

agriculture	
Application	Description
Cold-Active Enzymes	Enhance soil nutrient availability in low temperatures
Bioremediation	Degradation of pollutants in cold soils
Cold-Tolerant Crop Development	Genetic insights for breeding frost-resistant crops

Challenges and Considerations

While the potential benefits are significant, several challenges must be addressed to effectively integrate psychrophilic bacteria into agricultural practices:

1.Cultivation and Mass Production: Scaling up the cultivation of psychrophilic bacteria requires specialized equipment to maintain low temperatures, which can be energy-intensive and costly.

2. Survivability in Variable Climates: Introducing coldadapted bacteria into environments with fluctuating temperatures may affect their survival and efficacy. Strategies to ensure their persistence are necessary.

3. Regulatory and Biosafety Concerns: The use of genetically modified organisms or the introduction of non-native species into ecosystems raises regulatory and ecological considerations that must be carefully managed.

4.Public Acceptance: Educating stakeholders, including farmers and consumers, about the benefits and safety of using psychrophilic bacteria is crucial for widespread adoption.

Conclusion

Psychrophilic bacteria present a novel and promising approach to enhancing crop resilience in the face of climate change. Their unique adaptations to cold environments can be leveraged to develop sustainable agricultural practices, particularly in regions prone to low

However, realizing their full potential requires addressing challenges related to cultivation, environmental adaptability, regulatory frameworks, and public perception. Collaborative efforts among scientists, policymakers, and agricultural communities are essential to harness the benefits of these remarkable microorganisms for future food security.

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The fight against TB must be intensified

RAMESH SARRAF DHAMORA

rndia has been battling a disease called TB for quite some time. But now a scary study has come out regarding TB. India is expected to have 60 million TB cases and 8 million deaths between 2021 and 2040, according to a study in the journal Plus Medicine. According to the study. India is likely to lose not only lives but also more than \$146 billion in gross domestic product (GDP). Researchers at the London School of Hygiene and Tropical Medicine UK said low-income middle-class families were more vulnerable as a result. They may suffer health burdens, while wealthier families may suffer financial bur-

The World Health Organization (WHO) has released the Global Tuberculosis (TB) Report The report includes data from 193 countries with more than 99 percent of the world's population and TB cases in This report provides a comprehensive and up-to-date assessment of the TB epidemic and progress in disease prevention, diagnosis and treatment at global, regional and country levels. According to the main findings of the report, in 2023, there were about 2.52 million TB cases in India. That was up from 2.42 million cases in The total increase in global TB cases in India and Indonesia from 2021 to 2023 was 45 per cent. The five countries of the world, India, Indonesia, China, the Philippines and Pakistan, accounted for 56 percent of the total global TB patients.

India has seen an 18 per cent decline in TB cases between 2015 and 2023. This is well below the World Health Organization's 50 percent reduction target by 2025. Similarly, TB-related deaths have declined by only 24 per cent against the target of 75 per cent. Globally, in 2023, 8.2 million people will see new cases of TB. This is the highest number since the WHO began monitoring in 1995. In 2023, TB will once again become the leading infectious disease, surpassing

TB is an infectious disease. which is spread by coughing, sneezing or spitting from infected people. It usually affects the lungs. But it can spread to any part of the body. There is a cure for this disease pro-

vided people take the medicine regularly. TB (World Tuberculosis) Day is celebrated all over the world on 24th March every year. On this day, people are made aware about TB or tuberculosis. A huge population in India is living below the poverty line. TB will not be completely stopped until poverty is eradicated in the country

According to a report, India has a

weak healthcare infrastructure and a severe shortage of health workers. In addition, the difficulty in detecting the disease at an early stage and getting the right treatment remains a challenge. India has the highest burden of TB in the world. That is why Prime Minister Narendra Modi has made TB eradication a priority in the country. It aims to reduce new TB cases by 95 percent and reduce TB deaths by 95 percent. The government is giving Rs 500 per month as cash assistance to TB patients undergoing treatment in the country. TB is caused by bacteria called microbacteria. These bacteria grow in the lungs and cause lesions. These germs can attack the lungs, skin, joints, spine, throat, bones, intestines and so on. Six to seven crore people worldwide suffer from the disease and 2.5 to 3 million people die from it every year. TB is one of the top 10 causes of death from diseases in the world.

It is estimated that about 800 people die daily from TB in India. About 10 per cent of TB cases in India are among children. But only six percent of the cases are reported. The World Health Organization says only 58 per cent of TB cases are reported in India. More than a third of cases either go unrecorded or go untreated.

The major reason for this is that the non-government sector hospitals have yet to develop a system for recording TB. The organization estimates that there are about one million more TB patients in the country who have not been identi-

The World Health Organization has said that India is not serious about tackling TB. In his Global TB Report he also questions our data. According to him, India has reported more cases of TB. In fact, patients are far more than that. Due to incorrect data from India, the global assessment of the disease

has not been accurate. Several new forms of TB have emerged in recent times. Many mental illnesses have emerged as a major cause of TB. We need to change attitudes about this disease. The government will have to go beyond the traditional ways. The government must work with the private sector to develop sive plans to tackle TR

TB is linked to nutrition. Hungry stomach reduces the ability to fight diseases. Therefore, the poor are more likely to suffer from TB. Nutrition should be considered to mean a balanced diet. Therefore, it is not possible to eradicate TB by providing treatment alone. This will be possible while people in the country also get a balanced diet to maintain immunity.

Until a few years ago, TB was considered an incurable disease. TB patients were kept separate from the house and treated as if they were untouchable. But now there is adequate treatment and medicine for TB in the country. With regular medication by TB patients, the TB patient is completely cured in nine months. The government must provide more funds for expansion of health facilities in the budget for effective prevention of TB disease. TB awareness programs have to be conducted across the country to sensitize people about TB. TB can be controlled only by increasing the number of health centers in rural areas of the country. According to experts, the government must launch a concrete campaign in this area and also ensure that lack of money does not stand in the way of overcoming this deadly disease. If this does not happen, the death toll will continue to

The commitment that the government has made to eradicate TB needs to be implemented immediately.

The theme of World Tuberculosis Day 2025 is Yes We Can End TB. Commit, invest, deliver results.

It provides an opportunity to consider ongoing efforts to eliminate TB and encourage stronger commitment at local, national and international levels. including combating the growing threat of drugresistant TB.

(The author is an independent journalist accredited by the Government of Rajasthan)

Creativity Reimagined: How India's WAVES Summit 2025 Will Reshape Global Entertainment

■ CHAITANYA K PRASAD

n a world hungry for authentic stories and innovative entertainment. India is all set to revolutionize the global media landscape. The World Audio Visual Entertainment Summit (WAVES) ign't just another media & entertain ment stakeholder-it represents a transformative vision that will redefine how creators, policymakers, and audiences worldwide engage with content. Set to unfold from May 1-4, 2025, in Mumbai, WAVES emerges as perhaps the most visionary initiative undertaken by Ministry of Information & Broadcasting for the creator ecosystem, establishing a new gold standard for global entertainment forums.

For decades, India has been a storytelling powerhouse, captivating the world with its films, music, and digital content. Yet, despite its sheer creative output, the country has rarely dictated the terms of engagement in the global entertainment WAVES seeks to change that narrative. This isn't just about showcasing Indian creativity-it's about shaping the global conversation around media, entertainment, and technology. If Dayos is the nerve centre of economic policy and Cannes the temple of cinema, WAVES aims to define the future of entertainment through innovation creation and collaboration of key stakeholders- 'The Sangam of Artistic Brilliance'.

WAVES is not just about big-picture strategy-it's about real opportunities for creators, businesses, and investors. The Bharat Pavilion will celebrate India's storytelling legacy, tracing its evolution from ancient epics and folklore to AI-driven content and immersive digital storytelling. This is India telling the world: our stories are timeless, but our storytelling is cutting-edge. At the same time, the WAVES Bazaar, a first-of-its-kind year-round global content marketplace, is set to transform how content is bought, sold, and distributed. Moving beyond the traditional festival-driven acquisition model, this digital-first platform will enable constant global transactions, ensuring that content creators from India and beyond have access to an always-on monetization ecosystem.

Recent successes like "Dune: Part Two" winning the 2025 Oscar for Best

Visual Effects with significant Indian VFX contributions exemplify the creative potential WAVES aims to showcase and nurture on a global platform. But beyond all the industry talk, what makes WAVES truly different is one-time event-it is a long-term strategy to position India as the global headquarters of entertainment innovation. As the global M&E industry moves toward a \$3 trillion valuation by 2030, India is making its case not as an outsourcing hub, but as a global leader in entertainment production, policy, and investment. The summit's integration of content creation, financing, policy discussions, and emerging technologies makes it a launchpad for the future of entertain-

The summit's ambitions extend beyond showcasing talent to fostering international cooperation through the Global Media Dialogue. This diplomatic initiative, aims to create a truly global ecosystem that connects creators and industry stakeholders across continents under India's leadership. The Global Media Dialogue will culminate in the landmark 'WAVES Declaration 2025'-a visionary roadmap for the global media and entertainment fraternity that will establish the foundation for an enduring World Entertainment Forum. This declaration will address critical industry trends and challenges while proposing inclusive frameworks that benefit creators worldwide.

One of the most groundbreaking initiatives at WAVES is WaveXcelerator, a startup incubator designed specifically for creative entrepreneurs. With the rise of AI-generated content, interactive media, and virtual production, the need for structured mentorship, funding, and market access has never been greater. WaveXcelerator ensures that India not only fosters cutting-edge storytelling but also builds the businesses that will define the next decade of entertainment. By integrating investment facilitation with intellectual property protection, India is signalling to the world that it is serious about creating a sustainable creative economy.

A major highlight of WAVES is its focus on talent discovery and mentorship. Through its Create in India Challenges, the summit has already identified 725 top-tier creators across

esports, and broadcasting. These selected talents will participate in CreatoSphere, an interactive hub filled with live competitions, masterclasses, and collaborative projects, ensuring its big-picture vision. This is not a that the best new voices in entertainment emerge from India and onto the global stage. This structured talent pipeline underscores India's ambition to be not just a content hub, but a talent powerhouse.

> The summit's Thought Leaders Track will bring together CEOs, media executives, policymakers, and creative pioneers to tackle some of the biggest questions in entertainment today: What does the future of storytelling look like? How will AI reshape content creation? What new monetization models will define the streaming era? How do we balance creativity with regulation? These aren't just conference buzzwords-they're the real debates shaping the future of entertainment, and WAVES will be at the centre of them WAVES' strategic objectives align perfectly with global industry needs: driving sector growth, nurturing innovation through emerging technologies like AI and immersive experiences, empowering young talent, and facilitating meaningful cultural exchange between Indian and international media professionals. The benefits extend far beyond the summit itself. WAVES positions India to attract substantial investment in its creative industries, solidify its leadership in global entertainment, strengthen its contribution to the worldwide creative economy, and develop a skilled workforce prepared for the industry's future demands. By focusing on diverse areas-from content creation and financing to gaming, animation, music, and IP development-WAVES addresses the full spectrum of media and entertainment challenges and opportunities in an increasingly interconnected world.

> As the countdown to May 1, 2025 begins, the world is paying attention. WAVES isn't just a media summit-it's a movement. A movement where creativity meets commerce, tradition meets technology, and India meets the world on its own terms. The entertainment industry is at an inflection point, and India is making sure that when the next chapter is written, it's written in bold letters, with WAVES at its center.

(The writer is former Civil Servant)