

BIO ILLUMINATY

2022-23



SRI SATHYA SAI COLLEGE FOR WOMEN, BHOPAL

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INTERNATIONAL YEAR OF MILLETS

2023

The United Nations General Assembly at its 75th session in March 2021 declared 2023 the International Year of Millets.

India is the largest producer of millet in the world.



India Accounts for 20 % of global production and 80 % of Asia's production.

Shree Anna

It is a common term to categorise small-seeded grasses that are often termed Nutri-cereals or dryland-cereals and includes sorghum, pearl millet, ragi, small millet, foxtail millet, proso millet, barnyard millet and Kodo millet, among others .

India's Wealth, Millets for Health



WHY MILLET?

Sorghum (Cholam)

- Improves metabolism
- Crop is also grown for hay and fodder
- Is resistant to drought and heat

NUTRITIONAL VALUE OF MILLET (per 100g)

Calories | 119 Protein | 3.5gm
Fat | 1.0gm Calcium | 3.0mg
Carbs | 23.7gm

Pearl millet (Cumbu)

- Widely grown variety of millet
- Helps in minimising type 2 diabetes

The crop is drought resistant; millets are easily available and easy to store

Lowers the risk of cardiovascular diseases

Millet is high in protein, vitamin B, iron, calcium and phytochemicals

Brings down the incidence of colon cancer, constipation and gastro-intestinal complications

Gluten-free, rich in antioxidants and easy to digest

Kodo millet (Varagu)

- Rich in polyphenols, an antioxidant compound and fibre
- Good for diabetes

Barnyard millet (Kudiraivali)

- High in fibre, calcium and phosphorous
- Has low glycemic index and helps in type 2 diabetes

Little millet (Samai)

- High in iron content
- Beneficial in diabetes and stomach-related diseases

Foxtail millet (Thinai)

- Mostly grown in east Asia
- Controls blood sugar and cholesterol

Finger millet (Ragi)

- Popular in south India
- Rich in calcium, protein and iron
- Has anti-oxidant and anti-diabetic properties

MILLET VS RICE

- Rice contains 130 calories (per 100g) as against 119 calories in millet
- Rice is high in carbohydrates (28.7g) than millet (23.7g)
- Millet has a high calcium content (3mg) than rice (1mg)

Proso millet (Pani varagu)

- Extensively cultivated in India, Nepal, Russia, Ukraine and Turkey
- Is fit for dry-land and no-till farming

YLANG-YLANG FLOWERS IN HALDWANI FOREST, A FIRST IN NORTHERN INDIA

Ylang –ylang ,a flower Native to Philippines, flowered for the first time in an aromatic garden in Haldwani forest division of Uttarakhand.



THE FLOWER IS ALSO CALLED AS “QUEEN OF PERFUMES”,IS KNOWN FOR ITS INTENSE AROMA.

Ylang-ylang ,scientifically known as *Cananga odorata*, grows well in humid lowland tropics or moist valleys. It is valued for essential oils,and is extensively used in perfumery industry.

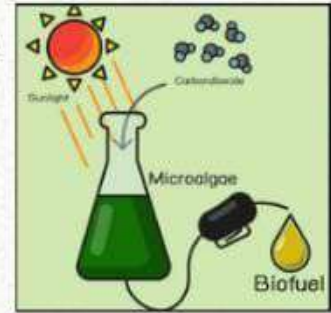
Essential oil from the flower contains medicinal properties that can be used to cure malaria, asthma, blood pressure and joint pain.This species serves multiple purposes as it provides wood as timber and is used in medicines and cosmetics.



MICROBIAL BIOTECH IN WASTE MANAGEMENT: WASTE NOT, WANT NOT

11 August, 2023

Climate change is a worldwide problem with severe consequences for the environment. Applying microbial biotechnology to waste management offers a sustainable and eco-friendly alternative that does not rely on the extraction and burning of fossil fuels. More specifically, bioremediation reduces dependence on non-renewable resources and contributes to a more circular economy, where waste is converted into useful products, such as bioplastics, that can be reused without affecting product quality.



Microalgae: A Sustainable Approach to Wastewater Treatment

Microalgae offer a sustainable solution for wastewater treatment by absorbing excess nutrients and organic pollutants. They also reduce sludge buildup, saving on disposal costs. Microalgae biomass can be used to produce various bio-based products, including animal feedstock and biofuels, promoting environmental sustainability and circular economy practices. This approach helps combat wastewater pollution and greenhouse gas emissions while generating revenue from valuable products.



Microalgae cultivation facility provides a sustainable approach to wastewater treatment and management.



Rows of microalgae containers, removing CO2 from the air and converting to usable products, fuels, chemicals and food.

Benefits of a Microbial Approach to Waste Management

The benefits of using microorganisms, like microalgae, for wastewater treatment and waste management are clear. Not only does it allow for the conversion of organic waste into biogas or biofuels that can be utilized to power homes and businesses, reducing the reliance on fossil fuels and lowering concentrations of greenhouse gas emissions, but it also helps solve a capacity issue. Microbial biotechnology that converts waste into useful products, such as compost, bioplastics, and fertilizers, reduces the amount of waste deposited into landfills, thereby prolonging the lifespan of existing landfills and diminishing the need for new ones.

Challenges and Future Directions -

Microbial biotechnology holds promise for addressing climate change but faces challenges. Research and development are required to optimize its waste management applications. Regulatory and societal acceptance, particularly regarding genetically modified microorganisms, is a hurdle that necessitates clear guidelines. Despite these challenges, microbial biotechnology offers affordable, sustainable, and versatile solutions for climate change mitigation, spanning carbon sequestration, renewable energy, sustainable agriculture, and waste reduction. Leveraging microbial diversity can pave the way for a more eco-friendly world. The time to act and harness microbes' potential for a sustainable future is now.

PREDATORY BACTERIUM FEASTS ON SOIL MICROBIOME

17 July 2023



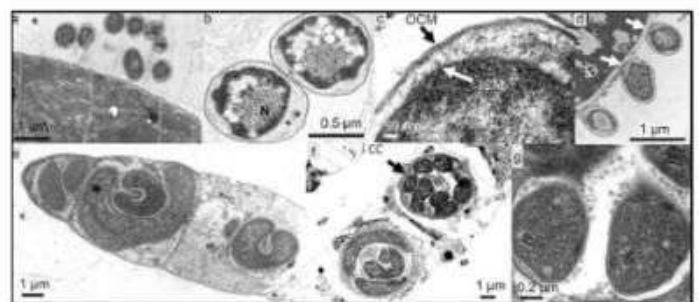
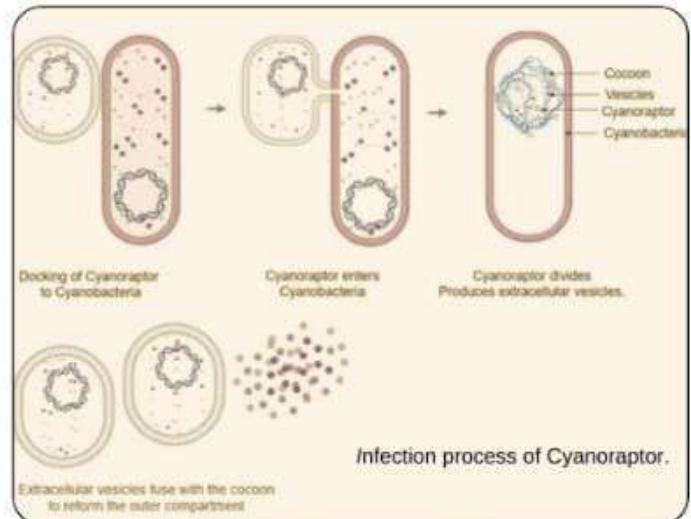
Biocrust formed over red sandstone.

Biological soil crusts, or biocrusts, are intricate communities of microorganisms that live on the top layer of bare soil, especially in arid and semi-arid environments. They include various organisms like cyanobacteria, algae, lichens, mosses, fungi, bacteria, and small invertebrates. Biocrusts play a vital role in these ecosystems, providing ecological benefits. In a recent article in *Nature Communications*, scientists introduced a new name, '*Candidatus Cyanoraptor togatus*,' for a gram negative intracellular bacterium within the Chitinophagaceae family that preys on cyanobacteria in biocrusts, with significant implications for the ecosystem.

Cyanoraptor's Predatory Strategy:

Cyanoraptor is an unusual non-motile predator that relies on the mobility of cyanobacterial prey. It "hitchhikes" with cyanobacteria, enters their cells, and uses hydrolytic enzymes for consumption. This process involves changing shape, forming a protective cocoon, and merging with extracellular vesicles. It depletes the host's nutrients, transforming cyanobacteria into ghost-like structures.

Cyanoraptor's predation causes clear areas called plaques in biocrust ecosystems, reducing microbial biomass, organic carbon, and nitrogen production. This disruption affects vital functions like moisture retention and dust trapping. Additionally, it exposes cyanobacterial biomass to other bacteria, altering the microbiome dynamics in the biocrust.



Microscopic view of various stages of Cyanoraptor's life cycle.

Protection and Future Research:

Biocrust restoration is vital, especially with climate change challenging recovery from disturbances like Cyanoraptor predation. It involves soil inoculation with biocrust material, but precautions are crucial to prevent Cyanoraptor spread during restoration.

Studying Cyanoraptor in various environments is essential for developing protective strategies for biocrust ecosystems, using techniques like plaque surveys and gene sequencing.

In summary, understanding and mitigating the impact of *Candidatus Cyanoraptor togatus* on biocrusts are essential for conserving arid and semi-arid ecosystems, critical for supporting life and ecological balance.

A new species of the wrasse genus *Iniistius* living in the Indo-West Pacific Ocean.



Iniistius bakunawa, a new species of Razor Wrasse known only from nine specimens obtained from deep trawls and artisanal fish landing sites in Dampier, Western Australia, and the Philippines respectively.

This species is distinctive in having a pale yellowish to jade green body with a large concentric black and white ellipsoid ocellus on the posterior most edge of its dorsal fin.

Named *Iniistius bakunawa* (or the eclipse-spot razor wrasse), this fish is between 15 and 17 cm (5.9-6.7 inches) long.

These wrasses have highly compressed bodies, a notch separating the first two dorsal-fin spines from the rest of the fin, and a steep forehead with a firm knife-like anterior edge — enabling them to easily dive into the sand when threatened.

Kingdom:- Animalia
Phylum:- Chordata
Class:-Actinopterygii
Order:-Labriformes
Family:-Labridae
Genus:-*Iniistius*
Species:-*bakunawa*

“New species continue to be described annually, some from colorful adventures, others from unexpected places like a public market on a humid noon in April,” the researchers said.