UPSC CURRENT AFFAIRS NOTES 23-04-2024

ETHYLENE OXIDE

The recall of Everest Fish Curry Masala from India by the Singapore Food Agency due to the alleged presence of a pesticide, ethylene oxide, has raised concerns about food safety and regulatory compliance.

Details

Ethylene Oxide Contamination

Ethylene oxide is a pesticide not authorized for use in food.

It is typically used to fumigate agricultural products to prevent microbial contamination.

While ethylene oxide is allowed for sterilizing spices under Singapore's Food Regulations, its presence in food beyond permissible limits is concerning.

About

Ethylene oxide (EO) is an important organic compound widely used in various industrial processes.

Chemical Structure and Properties:

Chemical Formula: C2H4O

Molecular Weight:05 g/mol

Physical State: Ethylene oxide is a colorless gas at room temperature and pressure.

Boiling Point:7°C

Melting Point: -111.3°C

Density:52 g/cm³ (at 0°C)

Production Methods:

Ethylene oxide is primarily produced by the catalytic oxidation of ethylene. Two main methods are commonly used:

Direct Oxidation: Ethylene and oxygen are reacted over a silver catalyst at high temperatures (around 250-300°C) and pressures (around 1-2 MPa).

Chlorohydrin Process: Ethylene reacts with hypochlorous acid or its salts to form ethylene chlorohydrin, which is then treated with a base to produce ethylene oxide.

Uses:

Ethylene oxide finds extensive application in various industries due to its versatility:

Sterilization: It is widely used for sterilizing medical equipment and supplies due to its ability to penetrate packaging and kill bacteria, viruses, and fungi.

Chemical Intermediates: Ethylene oxide is a precursor to many other chemicals, including ethylene glycol, which is used in antifreeze and polyester production.

Surfactants: It is used in the production of surfactants for detergents, cosmetics, and personal care products.

Textiles: Ethylene oxide is used for treating textiles to impart wrinkle resistance and shrink resistance.

Pesticides: It serves as a raw material for manufacturing certain pesticides.

Challenges:

Flammability: Ethylene oxide is highly flammable and can form explosive mixtures with air.

Toxicity: It is highly toxic and a known carcinogen. Prolonged exposure to ethylene oxide vapor can cause respiratory irritation, headaches, nausea, and, in severe cases, central nervous system depression and damage.

Reactivity: Ethylene oxide is reactive with many materials, including metals, leading to corrosion and degradation.

Handling: Proper ventilation, personal protective equipment (PPE), and engineering controls are necessary when handling ethylene oxide to minimize exposure risks.

Environmental Impact:

Air Pollution: Emissions of ethylene oxide contribute to air pollution and can form smog.

Water Pollution: Discharges of ethylene oxide into water bodies can harm aquatic life.

Global Warming Potential: Ethylene oxide is a greenhouse gas with a high global warming potential.

MPOX VIRUS

The mpox family of viruses is known to be able to evade selective evolutionary pressures by duplicating genes or accumulating mutations and expanding its genome or contracting it by deleting or inactivating genes.

In a recent study, scientists reported the part of the mpox genome where these changes happen.

Details

Mpox virus, a member of the poxvirus family, exhibits dynamic evolutionary mechanisms, including the use of 'genomic accordions,' to adapt and infect humans.

Recent research has highlighted the significance of genomic accordions in driving viral evolution and shaping disease outbreaks.

Historical Context

Poxviruses, including smallpox and mpox, have been significant threats to public health, with smallpox alone causing millions of deaths before its eradication.

The 2022-2023 outbreak of mpox, previously known as 'monkeypox,' garnered global attention, underscoring the need for understanding the virus's evolutionary dynamics.

Evolutionary Mechanisms

Mpox virus exhibits genomic plasticity, allowing it to duplicate genes, accumulate mutations, and expand or contract its genome in response to evolutionary pressures.

This genomic flexibility enables the virus to evade host immune responses, optimize replication efficiency, and enhance transmission dynamics.

Genomic Accordions

Genomic accordions refer to rhythmic expansions and contractions of the viral genome, characterized by repetitive sequences and variable regions.

In mpox virus, genomic accordions play a crucial role in modulating viral fitness, pathogenicity, and host range through gene duplications, deletions, and rearrangements.

Recent study

A study published in April 2024 in Nature Communications identified specific genomic regions, notably 6.4-kb-long sections, as genomic accordions influencing human-to-human transmission and virulence.

These sections are found to strongly influence the virus’s human-to-human transmissibility and contain variations in genes affecting viral evolution.

Outbreak Dynamics:

Mpox genomes are classified into distinct clades, with different lineages exhibiting varying degrees of virulence and transmissibility.

The 2022 outbreak, predominantly associated with clade IIb, highlighted the role of genomic accordions in enhancing human-to-human transmission and global spread.

Outbreak in the DRC:

A subsequent outbreak in the Democratic Republic of the Congo (DRC) underscored the emergence of a distinct lineage within clade I, exhibiting increased human-to-human transmission and mortality.

Genomic analysis of virus samples provided insights into the evolutionary origins and transmission dynamics of the outbreak.

Genomic Surveillance:

Genomic surveillance of mpox virus facilitates early detection, tracking of transmission chains, and implementation of targeted control measures.

By monitoring genomic changes, researchers and public health authorities can anticipate emerging variants and assess the efficacy of vaccination strategies.

About Mpox

Mpox, formerly known as monkeypox, is caused by the Monkeypox virus, belonging to the same family as smallpox.

It presents with a distinctive rash and other symptoms, progressing through stages before healing, distinct from chickenpox.

History:

Identified in 1958 during monkey outbreaks; exact origin uncertain, likely linked to African rodents and primates.

First human case recorded in 1970; previously rare outside Central and West Africa.

Renamed to Mpox in 2022 by WHO to comply with modern naming guidelines.

Virus Types:

Clade I: Associated with Central Africa, causing more severe illness with mortality rates up to 10% during outbreaks.

Clade II: Endemic to West Africa, responsible for the global 2022 outbreak, less severe with survival rates over 99.9%.

Transmission:

Spread through direct contact with infected animals or materials, and close contact with infected individuals.

Higher risk of severe illness in individuals with weakened immune systems, infants under one year, those with eczema history, and pregnant women.

About Poxvirus

Poxviruses comprise a family of large, complex DNA viruses known to infect vertebrates and invertebrates, causing a range of diseases.

They exhibit unique characteristics, including their brick-shaped morphology and ability to replicate solely within the cytoplasm of infected cells.

Classification:

Poxviruses are classified into two subfamilies: Chordopoxvirinae and Entomopoxvirinae.

Chordopoxviruses infect vertebrates, while Entomopoxviruses infect insects.

Human Diseases:

Several poxviruses are known to infect humans, including Variola virus (causing smallpox), Vaccinia virus (used in smallpox vaccine), and Monkeypox virus.

Variola virus, the causative agent of smallpox, was eradicated through global vaccination efforts, with the last naturally occurring case reported in 1977.

Monkeypox virus, endemic in Central and West Africa, causes a smallpox-like disease known as mpox.

Clinical Manifestations:

Poxvirus infections typically present with characteristic skin lesions, including pustules, vesicles, and scabs.

Symptoms may vary depending on the specific virus and host factors, ranging from mild rash to severe systemic illness.

Transmission:

Poxviruses are primarily transmitted through direct contact with infected individuals or contaminated materials.

Some species exhibit zoonotic potential, with animal reservoirs playing a role in transmission dynamics.

History:

Smallpox, caused by Variola virus, plagued humanity for centuries, resulting in millions of deaths.

Intensive vaccination campaigns led to the global eradication of smallpox in 1980, marking a significant milestone in public health.

Safeguard Measures under World Trade Organization (WTO)

India and some other nations, including Switzerland, Brazil, China, Japan, Korea and Russia, have criticized the EU for deciding against terminating its safeguard measure on imports of certain steel products after carrying out a review.

About Safeguard Measures

Safeguard measures are measures introduced by a country that qualify as "emergency" actions under the WTO Agreement on Safeguards.

A WTO member may take a "safeguard" action (i.e., restrict imports of a product temporarily) under the WTO Agreement on Safeguards to protect a specific domestic industry from an increase in imports of any product which is causing, or which is threatening to cause, serious injury to the industry.

These actions are intended to prevent or mitigate serious injury to the member state's domestic industry.

Such measures, which in broad terms take the form of suspension of concessions or obligations, can consist of quantitative import restrictions or duty increases to higher than bound rates.

They are one of three types of contingent trade protection measures, along with anti-dumping and countervailing measures, available to WTO members.

The guiding principles of the agreement with respect to safeguard measures are that such measures

Must be temporary;

That they may be imposed only when imports are found to cause or threaten serious injuryto a competing domestic industry;

That they (generally) beapplied on a non-selective (i.e., most-favoured-nation, or "MFN") basis;

That they be progressively liberalized while in effect;

And that the member imposing them (generally) must pay compensation to the members whose trade is affected.

Thus, safeguard measures, unlike anti-dumping and countervailing measures, do not require a finding of an "unfair" practice.

The agreement defines "serious injury" as a significant overall impairment in the position of a domestic industry.

In determining whether serious injury is present, investigating authorities are to evaluate all relevant factors having a bearing on the condition of the industry.

Anti-Dumping Duty

Anti-dumping duty is a tariff imposed on imports manufactured in foreign countries that are priced below the fair market value of similar goods in the domestic market. The government imposes anti-dumping duty on foreign imports when it believes that the goods are being "dumped" – through the low pricing – in the domestic market. Anti-dumping duty is imposed to protect local businesses and markets from unfair competition by foreign imports. The use of anti-dumping measures as an instrument of fair competition is permitted by the World Trade Organization (WTO).

Rashtriya Arogya Nidhi Scheme

Recently, the Delhi High Court instituted a case with respect to the grant of financial assistance under the Rashtriya Arogya Nidhi (RAN) scheme and said threshold income to claim benefit was prima facie "extremely low".

About Rashtriya Arogya Nidhi Scheme

It was set up in 1997 and it is a central sector scheme.

It provides one-time financial assistance to poor patients living below State/UT wise threshold poverty line and suffering from life threatening diseases relating to heart, kidney, liver, cancer, etc. for treatment at any of Super Specialty Government hospitals/institutes.

The Umbrella Scheme of RAN has three components as under:

Rashtriya Arogya Nidhi (RAN) - Financial assistance for treatment of life-threatening diseases relating to heart, kidney, liver, etc. at Government hospitals/institutes having Super Specialty facilities; (Maximum financial assistance is Rs. 15 lakhs)

Health Minister's Cancer Patient Fund (HMCPF) - Financial assistance for treatment of cancer at Regional Cancer Centres (RCCs)/ Tertiary Care Cancer

Centres (TCCCs) and State Cancer Institutes (SCIs); (Maximum financial assistance is Rs. 15 lakhs)

Financial assistance for poor patients suffering from rare diseases - for specified rare diseases for treatment at Government hospitals/institutes having Super Specialty facilities; (Maximum financial assistance is Rs. 20 lakhs).

Tundra Ecosystem

A study has warned the warming planet may alter the characteristics of tundra environments and could transform them from carbon sinks to carbon sources.

About Tundra Ecosystem

Tundra ecosystems are treeless regions found in the Arctic and on the tops of mountains, where the climate is cold and windy, and rainfall is scant.

Characteristics of Tundra Regions

Low temperatures: The average temperature is -34 to -6 degrees Celsius (-30 to 20 degrees Fahrenheit) in tundra region.

Short growing seasons: The summer growing season is just 50 to 60 days, when the sun shines up to 24 hours a day.

Permafrost: A layer of permanently frozen soil lies beneath the surface, which can be a few inches to several feet thick.

Minimal precipitation: Despite often being compared to deserts in terms of moisture, the tundra receives low levels of precipitation, often as snow.

Limited biodiversity: The harsh conditions of the tundra result in fewer plant and animal species compared to other biomes.

Carbon sink: The tundra acts as a significant carbon storage area due to slow decomposition rates in the cold environment.

The world has three types of tundra:

Arctic Tundra which occurs north of the taiga belt in the far Northern Hemisphere (It encompasses the land between the North Pole and the boreal forest, including parts of Canada, Russia, Greenland, Iceland, Norway, Sweden, and Finland.)

Alpine tundra which prevails above the tree line in mountains worldwide (in various mountain ranges such as the Rockies, the Andes, the Himalayas, and the Alps).

Antarctic tundra which includes several sub-Antarctic islands and parts of the continent of Antarctica

Flora: Mosses, lichens, sedges, cotton grass, birches etc.

Fauna: Arctic foxes, snow geese, polar bears etc.

Direct Tax Revenue Collection in FY24

The Central government collected a total of ₹19.58 trillion in direct tax revenue for the fiscal year 2023-24, marking a significant 17.7% growth compared to the previous fiscal year.

Revised Estimates

Initially, the government had estimated net direct tax revenue of ₹18.23 trillion for the fiscal year.

However, this estimate was revised upwards to ₹19.45 trillion in the FY25 interim budget presented.

Personal Income Tax Collection

A notable highlight of the direct tax revenue collection was the growth in personal income tax collection, which stood at ₹10.44 trillion for FY24.

This figure indicates an impressive annual growth rate of 25.23%.

Corporate Tax Collection

Tax collection from corporations also saw a healthy increase, expanding over 10% annually to reach ₹9.11 trillion for the fiscal year.

Direct Tax Buoyancy

The provisional figures indicate a direct tax buoyancy of 1.9, suggesting that the growth in direct tax collection outpaced the rate of economic expansion during the fiscal year.

Share of Direct Taxes in Overall Tax Receipts

Direct taxes are increasingly contributing a larger share to the Centre's overall tax receipts.

In FY25, it is expected that direct taxes will account for 57.4% of the total, compared to the 54.4% projected in the FY24 budget.

Growth Projection for FY25

For the fiscal year 2024-25, the government has assumed a growth rate of 13% for both corporate and personal income tax collection, as per the interim budget.

However, given the 17.7% growth rate achieved in FY24, there is speculation whether this target will be revised upwards in the full year budget in July.

Other Financial Highlights

Economic Growth Projection

The government has assumed a 10.5% economic growth rate in nominal terms for FY25.

Tax Refunds

The Central Board of Direct Taxes (CBDT) issued tax refunds amounting to ₹3.79 trillion in the fiscal year ended March, showing a substantial increase of 22.7% over the refunds issued in the previous fiscal year.

Gross Direct Tax Collection

Before adjusting for refunds, the gross direct tax collection for FY24 stood at ₹23.37 trillion, registering a robust growth rate of 18.48%.

Within this, corporate tax revenue expanded by over 13% and personal income tax collection including Securities Transaction Tax (STT) expanded by 24.26%.

Goods and Services Tax (GST) Collection

The fiscal year 2023-24 also witnessed strong Goods and Services Tax (GST) collection, with Centre and states reporting a gross GST collection of ₹20.18 trillion.