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MINISTRY OF SCIENCE AND TECHNOLOGY



MK Yadav Sir

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INDIAN EXPRESS Page 13

WEEDS

(Syllabus: GS Paper 3 – Agriculture)

Going after the weeds

Win-win tech push for direct-seeded rice and zero-tillage wheat: a new non-GM herbicide-tolerant technology has the potential to reduce the environmental footprint of India's two major cereal crops



HARISH DAMODARAN



A farmer in his direct-seeded rice field in Haryana's Jind district. *Harish Damodaran*

CULTIVATING RICE using less water and not burning the leftover straw after harvesting, and wheat without any ploughing and land preparation, has been the holy grail for agricultural scientists and policymakers concerned over the ecological footprint of the two cereal grain crops.

There has been some breakthrough with the breeding of varieties/ hybrids, both in the public and private sectors, that can "tolerate" the application of a herbicide, Imazethapyr, to control weeds and grasses that affect the growth of crop plants by competing for nutrients, water and sunlight.

In the current kharif season, two basmati varieties (Pusa Basmati 1979 and Pusa Basmati 1985) and two non-basmati rice hybrids (Sava 134 and Sava 127), developed by the Indian Agricultural Research Institute (IARI) and Savannah Seeds Pvt Ltd respectively, have been commercially planted. These varieties contain a mutated acetolactate synthase (ALS) gene that enables farmers to spray Imazethapyr to control weeds such as *Echinochloa colona* (*jangli chawal*), *Cyperus rotundus* (*motha*) and *Trianthema portulacastrum* (*punthar-chattu*).

In the coming rabi (spring-winter) season, Mahyco Pvt Ltd is expected to launch wheat varieties called Goal and Mukut, which too, are amenable to application of Imazethapyr in order to control *Phalaris minor* (*gulli danda*), *Chenopodium album* (*bathua*) and other such major weeds. The company, which is based in Jalna, Maharashtra, and Savannah Seeds (the South Asian subsidiary of the Texas-headquartered RiceTec Inc.), have formed a joint venture to take their Imazethapyr-tolerant 'FullPage' direct seeded rice (DSR) and 'FreeHit' zero-tillage (ZT) wheat technologies to farmers for "more climate-smart and sustainable" cropping.

How do rice and wheat farmers control weeds now?

Currently, farmers flood their paddy fields, and do 3-4 ploughings for wheat — mainly to control weeds.

In normal rice cultivation, paddy seeds are raised into young plants in nurseries before being uprooted and replanted in the main field around 30 days later. The field is first "puddled", or tilled in standing water, to break up the clods and churn the soil to make it soft.

For the first 2-3 weeks after transplanting, the field has to be irrigated every 1-2 days to maintain a water depth of 4-5 cm. This is necessary to prevent weed growth — water acts like a natural herbicide, preventing weed seeds from germinating, and killing already-emerged seedlings. Farmers continue giving water once a week over the remaining 105-110 days of the crop. (The total crop duration from seed to grain is 155-160 days.)

In all, the traditional puddling-cum-transplantation route requires up to 30 irrigations, each of which consumes more than 200,000 litres of water per acre. Puddling alone consumes water equivalent to three irrigations. The labour cost of transplanting is between Rs 4,000 and Rs 5,000 per acre.

To grow wheat, farmers burn the stubble from the previously-harvested paddy crop. They also plough the field, initially twice using a harrow or cultivator, followed by an irrigation and either one more ploughing with a rotavator, or two with a harrow/ cultivator. All this is done before sowing the wheat seeds, primarily for weed management.

And how do the herbicide-tolerant solutions work?

DSR and ZT wheat basically replace water and repeated field ploughings with the chemical herbicide Imazethapyr to take care of weeds.

DSR seeds can be sown directly, without the need for nurseries, puddling, transplanting, and flooding of fields. Only laser levelling of land before sowing, which costs about Rs 1,200 per acre, is recommended to ensure uniform placement of seeds and fertiliser, as well as distribution of water. Overall, there is a roughly 30% saving of water, apart from labour costs of transplanting and weed management, and fuel used for puddling.

Mahyco claims that 'FreeHit' ZT technology makes it possible to sow wheat directly, without burning the paddy stubble or even preparing the land. Farmers can use a tractor-mounted Super Seeder machine with rotavator that cuts the standing stubble and mixes it in the soil.

Alternatively, they can use a Happy Seeder without rotavator that only cuts and leaves the crop residue on the field. Either way, sowing is done with no tillage, saving costs and time.

Imazethapyr is to be sprayed along with Metribuzin, a selective herbicide already used in wheat, when the crop is about 25 days old.

Are the Imazethapyr-tolerant rice and wheat hybrids/ varieties genetically modified (GM) crops?

No, they just have an ALS gene that has undergone mutation. This gene is already present in rice and wheat — it is not introduced from soil bacteria or other unrelated species, as is the case with Monsanto's 'Bollgard' Bt cotton and the still-to-be-approved GM hybrid mustard bred by scientists at Delhi University's Centre for Genetic Manipulation of Crop Plants.

The ALS gene codes for an enzyme (protein) that helps synthesise essential amino acids for plant growth and development. Imazethapyr sprayed on normal paddy and wheat binds itself to the ALS enzymes, inhibiting their production of the amino acids. The herbicide will then kill the crop along with the weeds, as it cannot distinguish between the two.

The IARI, Savannah Seeds, and Mahyco-bred varieties/ hybrids, however, contain a mutated ALS gene whose DNA sequence — the order of chemical bases or "letters" that spell out the instructions to a cell's protein-making machinery — has been altered using a chemical mutant or radiation. As a result, the ALS enzymes no longer have binding sites for Imazethapyr and the amino acid synthesis isn't inhibited. The plants can now "tolerate" the herbicide, which only kills the weeds.

But aren't farmers already growing rice through DSR?

DSR cultivation at present is based on two herbicides: one "pre-emergent" (Pendimethalin, applied within 24 hours of sowing) and the other "post-emergent" (Bispyribac-sodium, after 20-25 days). But these are not effective against all weeds. Imazethapyr is a broad-spectrum herbicide with a wider weed-control range. It is also safer, as the ALS gene is not present in humans and mammals, and the chemical will not bind itself to them.

IARI has distributed 200 quintals of seeds of its two Imazethapyr-tolerant basmati varieties for planting this season. At 8 kg/ acre, this can cover 2,500 acres. Savannah Seeds' rice hybrids have been planted on 15,000 acres across Punjab, Haryana, western Uttar Pradesh, Madhya Pradesh and Chhattisgarh.

The adoption of DSR and ZT — conferring benefits of reduced water and fuel consumption, plus no environmental pollution from crop residue burning — is likely to be better with herbicide-tolerant technologies. And their not being GM may help, too.

Context: Agricultural scientists and policymakers have long sought sustainable methods for rice and wheat cultivation, emphasizing water-efficient rice farming without burning straw residues and no-till wheat farming to reduce the ecological impact of these staple crops.

Weeds

- **About**: These are unwanted and undesired plants that negatively impact human welfare by interfering with the use of land and water resources. They may alternatively be called "plants out of place.
- **Competition with Desirable Plants:** In agricultural lands, forests, aquatic systems, etc., weeds compete with desirable and beneficial plants.
- **Impact:** Weeds pose a serious problem in non-cropped areas like industrial sites, road and rail lines, airfields, landscape plantings, water tanks, waterways, etc.
    - Weeds generate more losses to agriculture than any other type of agricultural pest.
- **Global Presence:** Around 3%, or 8000 species, of the approximately 250,000 plant species that exist in the globe act as weeds.
- **Weeding Method:** It is the process of eliminating weeds from a field. This is an effective pre-harvest method for managing crop yield and ensuring crop protection.

Weed Control Method

- **Chemical Control:** Herbicides are utilized to suppress weeds by defoliating, desiccating leaves or stems, or altering the plant's growth patterns.
- **Mechanical Control**: It employs powered equipment and tools to manage weed infestations with minimal manual labor, ensuring minimal soil disturbance.
- **Biological Control:** It uses infections or insects to damage weeds, with bio-control agents usually sourced from the same region as the weed species.
- **Manual Control:** It involves removing weeds by hand or with small tools, minimizing soil disturbance and reducing the risk of erosion and weed seed germination.
- **Herbicide-Tolerant Solutions**: Direct Seeded Rice (DSR) and Zero Tillage (ZT) wheat methods use chemical herbicides, such as Imazethapyr, to manage weeds, replacing the need for water and repeated ploughing. DSR allows for direct sowing of paddy seeds without nursery, puddling, or flooding.

THE HINDU Pg 10/Aug 4

FOUR RINGED BUTTERFLY

(Syllabus GS Paper 3 – Env and Eco)

After 61 years, four-ringed butterfly resurfaces in India

Rahul Karmakar
GUWAHATI



Little is known about the current distribution or population of the four-ringed butterfly. SPECIAL ARRANGEMENT

A four-ringed butterfly belonging to a family with most members in China has resurfaced in India after 61 years, a new study said.

A policeman is one of the four authors of the paper, published by the Bombay Natural History Society (BNHS), describing the great four-ring (*Ypthima cantliei*), a species of Satyrinae butterfly. The butterfly was recorded in 2018 from the Namdapha National Park by Roshan Upadhaya, a member of the Arunachal Pradesh Police, Monsoon Jyoti Gogoi of the BNHS, and Renu Gogoi and Rezina Ahmed of the Guwahati-based Cotton University's Department of Zoology.

Namdapha, straddling 1,985 sq. km. of Changlang district in Arunachal Pradesh, is India's eastern-most tiger reserve bordering Myanmar. The park has an elevation ranging from 298.7 metres above the mean sea level to 4,498.8 metres.

"The great four-ring was photographed during a survey to document the butterfly diversity in the Miao range of the Namdapha National Park during 2018-19. It was identified based on general morphological patterns and habitat," Mr. Upadhaya told *The Hindu* on Saturday. "Little is known about the current distribution or population of this species, which was last reported in 1957 from (eastern) Assam's Margherita, 61 years before our documentation," he said.

Ypthima is considered a rich genus of the family Nymphalidae which has some 6,000 species of butterflies. Of the 35 Ypthima species recorded in India, 23 have been reported from the northeast.

The highest Ypthima diversity is in China, particularly in the Yunnan and Sichuan. The diversity is also vast in Nepal, Bhutan, and Myanmar. The species has dull brown-grey wings with three yellow-ringed single eye spots (ocelli) on its hind wing and a large bi-pupilled apical ocellus obscurely ringed with yellow on the forewing above.

Context: Recently, a four-ringed butterfly was rediscovered in the Namdapha National Park after 61 years.

Four-Ringed Butterfly

- **About:** The great four-ring (Ypthima cantliei) is a member of the Satyrinae butterfly subfamily.
- **Survey Documentation**: Photographed during a survey to document butterfly diversity in the Miao range of Namdapha National Park (2018-19).
- **Identification**: Identified based on general morphological patterns and habitat.
- **Historical Record:** Last reported in 1957 from Margherita, Assam.
- **Genus Diversity**: The genus Ypthima belongs to the Nymphalidae family, which includes about 6,000 butterfly species. In India, 23 of the 35 Ypthima species are found in the northeast.
- **Global Diversity:** Highest Ypthima diversity is in China, especially in Yunnan and Sichuan provinces, with significant diversity also in Nepal, Bhutan, Myanmar, and northeastern India.

Namdapha National Park

- **Location**: Situated in Arunachal Pradesh, India.
- **Boundaries**: Flanked by the Patkai hills to the south and southeast, and the Himalayas to the north. Positioned between the Dapha bum range of the Mishmi Hills and the Patkai range.
- **Biogeographic Areas**: Part of both the Palearctic and Indo-Malayan biogeographic regions.
- **River**: Named after the Namdapha river, which originates from Daphabum and flows north-south across the park.

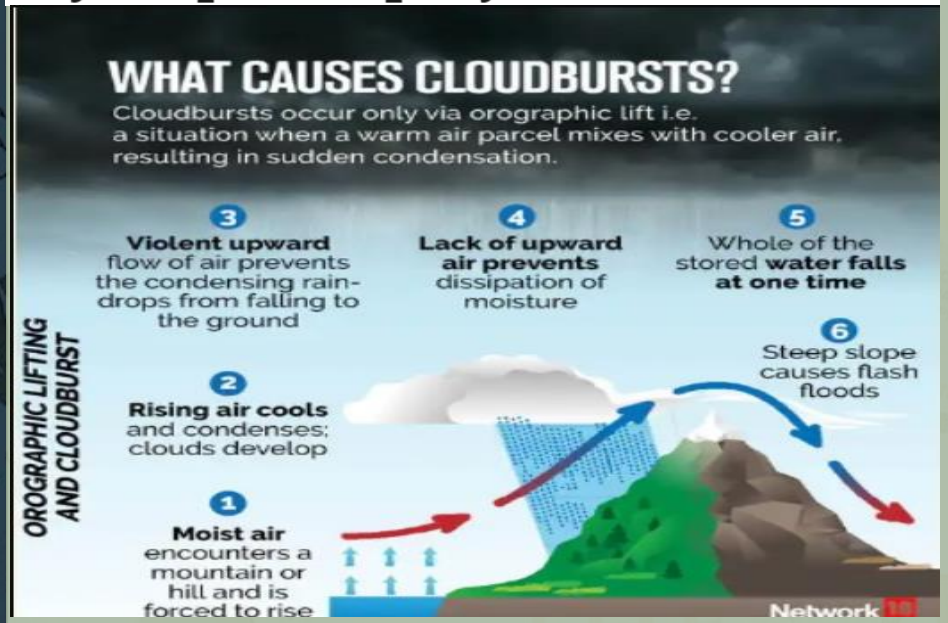
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Aug 4

CLOUDBURSTS

(Syllabus: GS Paper 3 – Disaster Mangement)

Himachal cloudbursts: Are hydropower projects to blame?



Impact of Climate Change

- **Increasing Cloudbursts:** Climate change is expected to raise the frequency and intensity of cloudbursts.
- **Temperature Correlation**: The rise in global surface temperatures by 1°C is linked to increased monsoon extremes and cloudbursts.
- **Future Projections:** Expected temperature rises of 1.5°C by 2040 and 2°C by 2060 may worsen cloudburst events.

Context: A recent cloudburst in Himachal Pradesh triggered flash floods, resulting in multiple fatalities and leaving several people missing. The floods caused significant destruction, washing away buildings, bridges, and roads, officials reported.

Cloudbursts

- **Definition**: The IMD classifies a cloudburst as 10 cm or more of rainfall in an hour over a 10 km x 10 km area; 5 cm in half an hour over the same area can also be a cloudburst.
    - Not all instances of heavy rainfall are cloudbursts. These events are highly localized and often occur in areas without rainfall measuring instruments.
- **Example**: The Kedarnath flash floods, triggered by a cloud burst, represent one of the most catastrophic natural disasters in recent Indian history.
- **Mechanism:** A cloudburst happens when warm air currents lift raindrops, causing them to become heavier and denser before falling rapidly over a small area.
- **Common in Hilly Regions**: Cloudbursts are more common in mountainous regions due to orography, though they can occur in plains as well.
- **Destruction**: The heavy rainfall from cloudbursts can trigger landslides and flash floods, causing significant damage downstream.

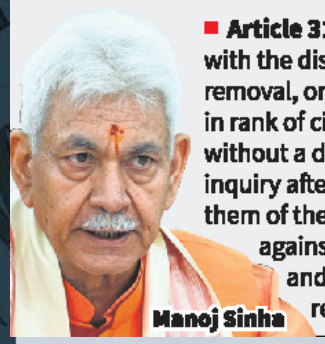
THE PRINT Aug 4

ARTICLE 311
(Syllabus: GS Paper 2 – Polity)

Five policemen, teacher sacked for narco-terror links

Sack order

Six government employees, five of them policemen, have been sacked under Article 311 of the Constitution



- **Article 311** deals with the dismissal, removal, or reduction in rank of civil servants without a departmental inquiry after informing them of the charges against them and giving a reasonable opportunity to be heard
- The decision of the authority is final
- A government spokesman says these employees had come to the adverse notice of **law enforcement and intelligence agencies**

Context: The Jammu and Kashmir Lieutenant-Governor recently invoked Article 311 of the Constitution to terminate the services of six government employees.

Article 311 of the Constitution

- **About:** It deals with the dismissal, removal, or reduction in rank of civil servants without a departmental inquiry after informing them the charges against them and giving a reasonable opportunity to be heard.
- **Protection Against**: It protects against arbitrary actions by the government, ensuring adherence to the principles of natural justice.
- **Right to Inquiry:** The article mandates that no government employee can be dismissed, removed, or demoted without an inquiry where they are informed of charges and given a chance to defend themselves.
- **Authority for Removal**: Only the appointing authority or someone of equal rank to the appointing authority can remove a civil servant.
- **Grounds for Disciplinary Action:**
  - Unsatisfactory performance or conduct detrimental to government efficiency.
  - Involvement in corruption, bribery, fraud, or other morally reprehensible acts.
- **Judicial Review**: Decisions made under Article 311 can be subject to judicial review, with possible remedies including reinstatement or compensation.

Exceptions to Article 311:

- **Security of the State**: In cases where an employee's actions threaten state security, the President or Governor can bypass the inquiry process.
- **Efficiency in Public Service**: The President or Governor can also dispense with the inquiry if deemed necessary for the efficiency or security of public service.
- **Probationary Employees**: Probationary employees can be dismissed or removed without an inquiry as they do not yet hold permanent status.

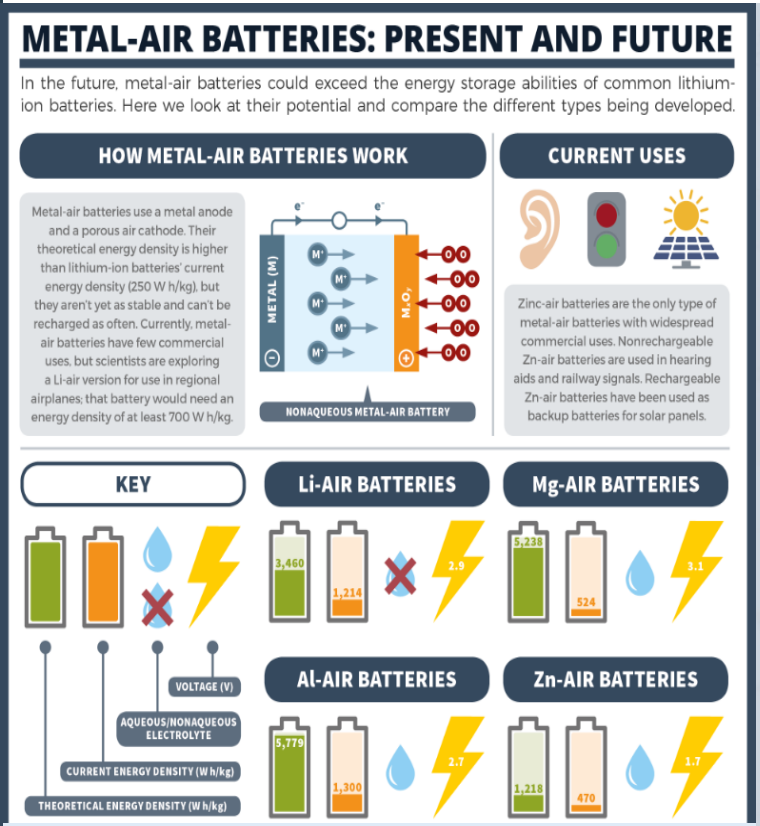
PIB

Aug 4

METAL-AIR BATTERIES

(Syllabus: GS Paper 3 – Sci and Tech)

Durable efficient battery for energy solutions in remote sub-zero conditions



Context: Researchers from CSIR-CMERI, Durgapur, have developed a new cathode material that can serve as a catalyst in Metal-air batteries, potentially enhancing battery performance.

Metal-Air Batteries

- **About:** Metal-air batteries are energy storage systems based on electrochemical charge/discharge reactions between a positive "Air Electrode" (cathode) and a negative "Metal Electrode" (anode).
- **Composition**: The negative electrode is typically made from metals such as Li, Zn, Al, Fe, or Na, while the positive electrode usually contains porous carbon material and a catalyst.
- **Electrolyte Types:** The electrolyte in these batteries can be aqueous or non-aqueous, as seen in Li-Air systems.

Advantages of Metal-Air Batteries

- **Higher Energy Density**: Metal-air batteries offer a higher energy density compared to lithium-ion batteries.
- **Accessibility:** They utilize readily available metals in India, making them more accessible than lithium-ion batteries.
- **Cost-Effective Production**: Local production of these batteries helps reduce import costs.
- **Environment-Friendly**: They are recyclable and present a safer alternative to lithium-ion batteries, which can pose environmental hazards.

Applications of Metal-Air Batteries

- **Large-Scale Stationary Storage**: Suitable for large-scale stationary energy storage applications.
- **Transportation:** Can be used in various transportation applications.
- **Renewable Generation**: Effective for storing energy from renewable sources.

PIB Aug 4

OSMOLYTE
(Syllabus: GS Paper 3 - Sci and Tech)

Osmolyte - protein interaction study can help treatments for Alzheimer's & Parkinson's

Context: A recent study shows that Small molecules called osmolytes help proteins maintain their structure and function under stressful conditions.

Osmolyte

- **Definition**: Osmolytes are small molecules that stabilize proteins and prevent their misfolding.
- **Function of Osmolytes**: It stabilize proteins and prevent misfolding, which is crucial for proper protein function and could be targeted for drug development.
- **Impact on Proteins:** Misfolded proteins are dysfunctional, leading to potential diseases.
- **Drug Development:** Osmolytes are vital for protein stability and may be used in creating new drugs.
- **About the Study:**
  - **Method Used**: Researchers employed covalent magnetic tweezers to study protein folding and interactions with osmolytes.
  - **Target Protein**: The study centered on Protein L and its interaction with Trimethylamine N-oxide (TMAO) and trehalose.
  - **Potential Applications**: Findings could contribute to developing treatments for neurodegenerative diseases like Alzheimer's and Parkinson's.
- **Implications for Disease Treatment:**
  - **Potential for Drug Development**: Insights into osmolyte interactions with proteins could lead to better treatments for neurodegenerative diseases and conditions related to protein misfolding.
  - **Publication and Impact:** The research, published in Nanoscale, could enhance the understanding of osmolyte functions and aid in designing more effective drugs.

ABP

Aug 4

MARITIME PARTNERSHIP EXERCISE

(Syllabus: GS Paper 2 – IR)

INS Tabar Participates In Maritime Partnership Exercise With Russian Navy 'Reinforcing Strong Bilateral Naval Ties'

Context: Indian Navy successfully conducted the Maritime Partnership Exercise (MPX) at the Baltic Sea.

Maritime Partnership Exercise (MPX)

- **About:** It is a multilateral event organized by the Indian Navy, involving naval forces from various foreign countries.
- **Objective**: The aim of MPX is to enhance the Indian Navy's operational capabilities and strengthen its partnerships with friendly nations.
- **Operational Enhancement**: The exercise improves the ability of different naval forces to operate together seamlessly, crucial in times of crisis or conflict.
- **Diplomatic and Military Ties**: MPX fosters stronger diplomatic and military relationships between participating nations, contributing to regional and global stability.
- **Tactical Training:** Participating navies train and refine their tactics, techniques, and procedures, leading to improved operational effectiveness.
- **2024 Exercise:** It featured cooperation between India and Russia, involving naval ships from both countries: INS Tabar (India) and Soobrazitelny (Russia).
- **Activities Conducted**: The exercise included complex naval manoeuvres such as communication drills, search-and-rescue tactics, and replenishment at sea procedures.
- **Significance**: The Indian Navy's participation in the 328th Russian Navy Day Parade and MPX marks a key step in maritime cooperation for regional peace and security.

BUSINESS STANDARD

Aug 4

MAHILA SAMMAN SAVINGS CERTIFICATE

(Syllabus: GS Paper 2 – Govt. Policies)

Centre unlikely to extend Mahila Samman Savings Certificate scheme

Context: The Centre is unlikely to extend the Mahila Samman Savings Certificate scheme beyond its March 2025 deadline, according to official sources.

Mahila Samman Savings Certificate Scheme:

- **About**: It is a risk-free scheme tailored for women and girls of all ages.
- **Launched by**: Department of Economic Affairs, Ministry of Finance.
- **Announced:** Budget 2023-24
- **Tenure:** 2 Years
- **Deposit Limits:** Minimum deposit is Rs 1,000, and any sum in multiples of Rs 100 can be deposited, with a maximum limit of Rs 2 lakh.
- **Eligibility:**
  - **Individual Women**: Any individual woman can open an account.
  - **Minor Accounts:** Guardians can open accounts on behalf of minor girls.
- **Payment on maturity**: The deposit shall mature on completion of two years from the date of the deposit and the Eligible Balance may be paid to the account holder on maturity.
- **Benefits:**
  - The scheme provides attractive and secure investment options to all girls and women.
  - The scheme offers an attractive and fixed interest of 7.5% interest compounded quarterly with flexible investment and partial withdrawal options with a maximum ceiling of ₹2,00,000/-.

INDIN EXPRESS Page 15

MONETARY POLICY COMMITTEE

(Syllabus: GS Paper 3 – Economy)

Why Monetary Policy Committee is likely to keep repo rate steady

HITESH VYAS
MUMBAI, AUGUST 4



THE RESERVE Bank of India's (RBI) six-member Monetary Policy Committee (MPC), which is scheduled to meet from August 6-8, is likely to keep the repo rate – the key policy rate – unchanged at 6.5 per cent, due to risks from higher food inflation. Experts said that the six-member MPC is also expected to continue with the monetary policy stance of withdrawal of accommodation.

What is expected?

In the monetary policy, which will be announced on August 8, the rate-setting panel of the RBI is likely to maintain status-quo for the ninth consecutive policies, market experts said.

"We expect the RBI MPC to keep the policy repo rate unchanged at the August 8 meeting at 6.50 per cent, with a 4:2 vote in favor, retain the monetary policy stance of 'withdrawal of accommodation', sound relatively optimistic on growth, and continue to reiterate the commitment to the 4 per cent headline inflation target," Goldman Sachs said in a report. In the June policy, two external members – Ashima Goyal and Jayanth R Varma – voted for a 25 basis points (bps) reduction in the repo rate – the rate at which the RBI lends money to banks to meet their short-term funding needs. One basis point is one-hundredth of a percentage point.

The RBI has been raising concerns over elevated food inflation over the past many months as it could derail the disinflation path. Headline inflation, as measured by year-on-year (y-o-y) changes in the all-India consumer price index (CPI), edged up to 5.1 per cent in June 2024 from 4.8 per cent in May. The increase in inflation is attributed to food inflation which firmed up to 8.4 per cent in June compared to 7.9 per cent in the previous month.

Under the flexible inflation targeting regime, the RBI has to maintain CPI in the 2-6 per cent range. It has been targeting to bring inflation down to 4 per cent on a durable basis.

Will RBI revise GDP and inflation projections?

Deutsche Bank's Chief Economist (India & South Asia) Kaushik Das said that the RBI is expected to keep its FY25 real GDP (gross domestic product) growth forecast unchanged at 7.2 per cent year-on-year (y-o-y). The RBI's inflation forecast is higher than the Deutsche Bank's projection of 6.9 per cent y-o-y and the latest Economic Survey's projection of 6.5-7 per cent. In the June 2024 policy, the RBI raised its FY25 real GDP forecast by 20 bps to 7.2 per cent, from an earlier estimate of 7 per cent. It has projected CPI to be at 4.5 per cent in the current fiscal.

EXPLAINED

"As far as CPI inflation is concerned, we think there could be some upside risks to RBI's forecast of 4.5 per cent average for FY25, particularly after the July telecom tariff hike, but it is not clear to us whether the RBI will revise its CPI forecast higher at this stage," Das said. "Our own CPI inflation forecast for FY25 is slightly higher at 4.6 per cent average, factoring in the telecom tariff hike and other risks, particularly related to food inflation," he noted.

What happens to lending rates if repo rate is left steady?

With RBI expected to leave the repo rate steady at 6.5 per cent, all external benchmark lending rates (EBLR) that are linked to the repo rate will not increase, giving relief to borrowers as their equated monthly instalments (EMIs) will not increase. However, lenders may raise interest rates on loans that are linked to the marginal cost of fund-based lending rate (MCLR), where the full transmission of a 250 bps hike in the repo rate between May 2022 and February 2023 has not happened.

When is RBI expected to cut repo rate?

Economists expect the RBI to deliver the first cut in the repo rate in December 2024. Bank of Baroda's Economist Aditi Gupta believes that the RBI is likely to monitor incoming data and continue to exercise caution before deciding on cutting rates.

"We believe that the nearest possibility of a rate cut is December 2024," she said.

Icra's Chief Economist and Head of Research and Outreach, Aditi Nayar, said that if the food inflation outlook turns favourable on the back of a normal distribution of rains in the second half of the monsoon season, and in the absence of global or domestic shocks, a stance change is possible in October 2024. "This could be followed by a 25 bps rate cut each in December 2024 and February 2025, with an extended pause thereafter," Nayar said.

Context: The Reserve Bank of India's Monetary Policy Committee is expected to maintain the repo rate at 6.5%, citing concerns over rising food inflation.

Monetary Policy Committee (MPC)

- **About**: It was established based on the **recommendation of the Urjit Patel** Committee.
- **Set up**: Under Section 45ZB of the RBI Act of 1934 by the Union government.
- **Composition:** It is a 6 member committee. There are in total three internal members and three external experts. The RBI **Governor and Deputy Governor are also members** of the MPC Committee.
- **Objectives:** To improve the repo rate, reverse repo rate, liquidity, etc.
- **Instruments of Committee**: Repo rate, Reverse Repo rate, Marginal Standing Facility (MSF), Bank Rate, Cash Reserve Ratio (CRR), Statutory Liquidity Ratio (SLR), Open Market Operations (OMOs)
- **Repo rate:** The Repo Rate is the interest rate at which the Reserve Bank of India (RBI) loans money to commercial banks.
- **Reverse repo rate**: Reverse repo is the inverse contract to the repo rate. The reverse repo rate is the rate at which the RBI borrows funds from the country's commercial banks.
- **Relation Between Repo Rate and Inflation**
  - In the event of inflation, central banks increase repo rate as this acts as a disincentive for banks to borrow from the central bank. This ultimately **reduces the money supply in the economy** and thus helps in arresting inflation.
  - The central bank takes the contrary position in the event of a fall in inflationary pressures. Repo and reverse repo rates form a part of the liquidity adjustment facility.

PIB

Aug 4

STANDARDISED PRECIPITATION INDEX' (SPI)

(Syllabus: GS Paper 3 – Env and Eco)

Environmental hazards in the North-Eastern States

SPI Range	Category
More than +2.0	Severely wet
1.5 to 1.99	Very wet
1.0 to 1.49	Moderately wet
-0.99 to +0.99	Near normal
-1.0 to -1.49	Moderately dry
-1.5 to -1.99	Severely dry
Less than -2.0	Extremely dry

Context: The India Meteorological Department has recently used the 'Standardised Precipitation Index' (SPI) to analyze trends in precipitation and drought conditions across India.

Standardised Precipitation Index' (SPI)

- **About:** It is a relatively new drought index based solely on precipitation.
- **Developed by:** The World Meteorological Organization (WMO)'s expert team on climate indices to characterize a meteorological drought on different timescales.
- **Time Scales Affected**:
  - **Short Time Scales**: Processes such as dry land agriculture are influenced by precipitation over a month or two.
  - **Medium Time Scales**: Shallow wells, small ponds, and smaller rivers are affected over several months.
  - **Long Time Scales**: Major reservoirs, aquifers, and large natural bodies of water experience changes over several years.
- **Purpose**: To assign a single numeric value to precipitation, making it comparable across regions with different climates and to determine the rarity of a drought.
- **SPI Calculation**: SPI is designed to show simultaneous wet and dry conditions on various time scales, with separate values calculated for each time scale.

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