Homogeneous vs heterogeneous boosting

- In homologous boosting, a person is injected with the same vaccine that was used for the two previous doses.
- In heterologous boosting, a person is injected with a different vaccine from that was used for the primary dose
- In heterologous boosting "A person who got two doses of Moderna (mRNA vaccine), would get jabbed with a different vaccine type such as Covaxin (Inactivated/Dead Virus) or Sputnik Light (Non-Replicating Viral Vector),
- According to a study published by Lancet, homologous boosters increased neutralizing antibody titers by a factor of 4 to 20, whereas heterologous boosters increased titers by a factor of 6 to 73.
- For all clinical outcomes considered, heterologous boosters showed higher vaccine effectiveness than homologous boosters, providing additional support for use of a mix-and-match approach.

THE HINDU

Genetic modulation

- The Green Revolution of the 1960s brought about a marked improvement in the yield of agricultural crops such as rice and wheat.
- It was based on the use of newly developed high-yielding crop varieties in conjunction with the intense use of irrigation, chemical fertilizers and pesticides.
- India saw a threefold increase in rice yield per hectare.
- Fifty years later, some negative effects of this intense methodology are becoming apparent nitrogen fertilizers and agrochemicals pose environmental hazards; water is often in short supply; and agricultural soil is increasingly fatigued.
- To obtain more food for the world's growing population, forests and grasslands would have to be converted to farms in order to produce food.
- This, in turn, would enormously strain our ecosystems.

USE OF GENES

- When a second copy of a single gene (called OsDREB1C) is added to rice, it improves photosynthesis and nitrogen use, speeds up flowering and absorbing nitrogen more efficiently offering larger and more abundant grains.

- The change helps the plant absorb more fertilizer, photosynthesis, and accelerate flowering, all of which could contribute to larger harvests.

Rice exports

- India is the world's largest exporter of rice. It exported 18.75 million metric tons to over 150 countries during the year 2021-22, thereby earning $6.11 billion
- A key point is that the researchers have added the same gene again, and not any foreign one.
- This is best described as genetic modulation. It is not a genetic modification (GM) and neither is the result a transgenic plant, carrying elements from another donor.
- "India has exempted crops with certain kinds of genetic modifications from the regulations previously imposed on the commercialisation of all genetically modified crops".
- For example, BT cotton involves the transfer of the gene from the bacterium called Bacillus thurigiensis (BT) to be transferred to normal cotton.

THE HINDU

Noble gases in moon

- Researchers at ETH Zurich discover the first definitive proof that the Moon inherited indigenous noble gases from the Earth's mantle.
- They show that the Moon inherited the indigenous noble gases of helium and neon from Earth's mantle.
- Noble gas mass spectrometer named "Tom Dooley" the researchers were able to measure sub-millimetre glass particles from the meteorites and rule out the solar wind as the source of the detected gases.
- Mass spectrometry is an analytical tool useful for measuring the mass-to-charge ratio (m/z) of one or more molecules present in a sample.
- These measurements can often be used to calculate the exact molecular weight of the sample components as well.

THE HINDU

Flash floods

Flood:

- An overflow of water onto normally dry land.
- The inundation of a normally dry area caused by rising water in an existing waterway, such as a river, stream, or drainage ditch.
- Ponding of water at or near the point where the rain fell. Flooding is a longer-term event than flash flooding: it may last days or weeks.

- Flash flood: A flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours.
- Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them.
- They can occur within minutes or a few hours of excessive rainfall.
- They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam.
- Flash Floods can be caused by a number of things, but is most often due to extremely heavy rainfall from thunderstorms.
- Flash Floods can occur due to Dam or Levee Breaks, and/or Mudslides (Debris Flow).
- The intensity of the rainfall, the location and distribution of the rainfall, the land use water content, vegetation types and growth/density, soil type, and soil water content all determine just how quickly the Flash Flooding may occur, and influence where it may occur.
- Urban Areas are also prone to flooding in short time-spans and, sometimes, rainfall (from the same storm) over an urban area will cause flooding faster and more-severe than in the suburbs or countryside.
- The impervious surfaces in the urban areas do not allow water to infiltrate the ground, and the water runs off to the low spots very quickly.

THE HINDU