Mains Practice Question

Q. Discuss several ways in which microorganisms can help in meeting the current fuel shortage. (150 Words, UPSC Mains 2023)

15 Nov, 2023 GS Paper 3 Science & Technology

Approach:

- Start your answer with a brief introduction that discusses that the microorganisms, such as algae and bacteria, can be utilized in the production of biodiesel and bioethanol.
- Discuss how microorganism can help in meeting the current fuel shortage.
- Conclude with a solution based approach.

Introduction:

Microorganisms like algae, bacteria etc., can be used to generate several fuels, including ethanol, hydrogen, methane, lipids, and butanol out of raw organic materials, thereby converting the chemical energy in the biomass into chemical energy in the form of fuels.

Body:

Microorganism can help in meeting the current fuel shortage

- **Biofuel Production**: Certain microorganisms such as algae and bacteria can be used to produce biofuels like biodiesel and bioethanol. For example, algae can convert sunlight and carbon dioxide into lipids, which can be processed into biodiesel.
- **Biogas Production**: Microbes are used in anaerobic digestion to break down organic waste, such as agriculture residues, sewage etc. to produce biogas.
- **Hydrogen Production**: Several microorganisms can produce hydrogen gas through fermentation processes which can be further used as a clean fuel in various applications, including fuel cells, which can power vehicles.
- **Bioremediation**: Microorganisms can help in cleaning oil spills and contaminated sites by breaking down hydrocarbons which can be used to recover useful hydrocarbons from polluted areas.
- **Carbon Capture and Utilization:** Microorganisms can capture and convert carbon dioxide (CO_2) emissions from industrial processes into biofuels.

Conclusion:

The development of **pilot plants for microbial energy fuel production** is necessary to mitigate the fuel shortage and not only can it reduce the higher crude prices but also can serve the environment in a sustainable way.