Crop Diversification

For Prelims: Crop Diversification, Agroforestry

For Mains: Crop Diversification and its benefits, Need to practice Crop Diversification.

Why in News?

In the annual **Economic Survey**, the Department of Economic Affairs said that there is an urgent need for **Crop Diversification** in view of the **severe water stress in areas** where paddy, wheat and sugarcane are grown as well as to increase oil seed production and reduce dependency on imports of cooking oil.

What is it?

- Crop diversification refers to the **addition of new crops or cropping systems to agricultural production** on a particular farm taking into account the different returns from value-added crops with complementary marketing opportunities.
    - **Cropping System**: It refers to the **crops, crop sequences and management techniques** used on a particular agricultural field over a period of years.
    - **Types**: Major cropping systems in India are sequential-cropping, monocropping, intercropping, relay Cropping, **mixed-cropping** and alley cropping.
- Many farmers also use the **mixed crop-livestock system** to increase their standards of living and income.
    - **Animal husbandry or Animal Agriculture** is the branch of science dealing with the practice of breeding, farming and care of farm animals (livestocks) such as cattle, dogs, sheep and horses by humans for advantages.
    - It refers to livestock raising and selective breeding. It is a branch of agriculture.

What is the Need for Crop Diversification?

- **Adversities and Climatic Vagaries:**
    - A farmer may confront a series of adversities and climatic vagaries during agricultural production, such as **erratic rainfall, stone hail, drought, flood, and so on.**
    - In addition, challenges like **post-harvest losses, storage and unavailability of accessible proper marketing** are further aggravating the problem.
        - Currently, the **human-wildlife and / or human-crops conflict,** forest fires, **organic matter deficit soil, monoculture, plant disease and infestation,** migration **and the reluctance of youth** towards agriculture are a new array of problems.
- **Problems in Maintaining Input Cost:**
    - For more than five decades, Indian agriculture has been facing severe problems related to an increase in input cost to increase productivity.
    - However, the **productivity proportional to input maintains** for a certain time before plateauing and then progressively declines in many cases.
- **Following Same Pattern extract Specific Nutrients from the Soil:**

- Farmers have been using the **common government-promoted Green Revolution cropping pattern** — rice-wheat-rice for a longer time to enhance productivity.
- Unilaterally, **following the same cropping pattern** for a longer period of time has **extracted the specific nutrients from the soil, resulting in soil deficiency** in those nutrients along with a declined **population of microfauna in the soil.**
    - The **microfaunal population is responsible for the mobilisation and absorption of particular nutrients** in the crop rhizosphere.
    - Reduction of the microfaunal population in the soil is a serious issue because **without microfaunal activities,** the **soil is lost to self-perpetuate** and its ecology for crop production.
- The mono-cropping pattern also **reduces resource-use efficiency.**
- Furthermore, **mono-cropping patterns** have more chances to be **attacked by the same types of insects and pests,** which in turn are controlled by pumping the insecticides and pesticides.

What is Agroforestry and its role in Sustaining Crop Diversification?

- **About:**
    - It is a **part of primitive and tribal agriculture** nourished with indigenous technical knowledge.
    - Agroforestry is a **land-use system** that includes trees, crops and / or livestock in a spatial and temporal manner, balancing both ecological and economic interactions of biotic and abiotic components. It harnesses the complementarity between trees and crops for efficient utilisation of available resources.
    - Agroforestry is practiced for **diversification around the world** in different spheres of biological, ecological, economical and sociological considerations.
        - In North America, for instance, **farmers preferred agroforestry over agriculture** to improve their economic gain and natural resource conservation.
        - In Europe, **agroforestry trees are dominated by oaks, pines, junipers and firs.** In Australia, Pinus radiata and Eucalyptus globulus while in the African continent, coffee, cocoa, coconut, oil palm, and rubber are common agroforestry trees on farms.
        - The home gardens of the **southern part of India are a classic example** of maintaining temporal and spatial arrangement for crop diversity, with trees resulting in sustainable productivity from the unit area.
- **Role in Sustaining Crop Diversification:**
    - Agroforestry can **generate food, feed, fruits, fibre, fuel, fodder, fish, flavour, fragrance, floss, gum and resins as well as other non-wood products** for food and nutritional security. It can also **support livelihoods and promote productive**, resilient agricultural environments in all ecologies.
    - Agroforestry **contributes to a multifunctional production system** which enhances biodiversity due to the creation of diverse habitat for macro- and micro-organisms and maintaining landforms for future generations.
    - It provides **opportunities to integrate traditionally grown crops**, with other commercial crops such as cereals, oilseeds, pulses, vegetables, fruits in agrihorticulture, hortisilviculture, silvolericulture, silvofloriculture, silvimedicinal, agrihortisilviculture, aquaforestry, silvipasture, hortipasture.

Way Forward

- Although **there are challenges which can not be ignored**, crop diversification provides an opportunity to double farmers income and create food security for the nation.
- Therefore, the **government must promote crop diversification by purchasing crops produced** other than wheat and rice at **Minimum Support Price.** This could also help conserve the dwindling supply of underground water.
- Agricultural emissions can also be limited through smarter livestock handling, technology-enabled monitoring of fertilizer application, simple changes in field layout and other, more efficient agricultural techniques.

Source: DTE