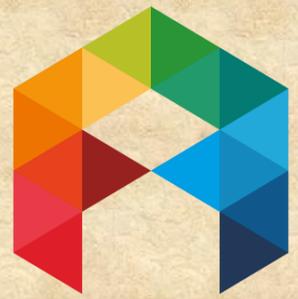
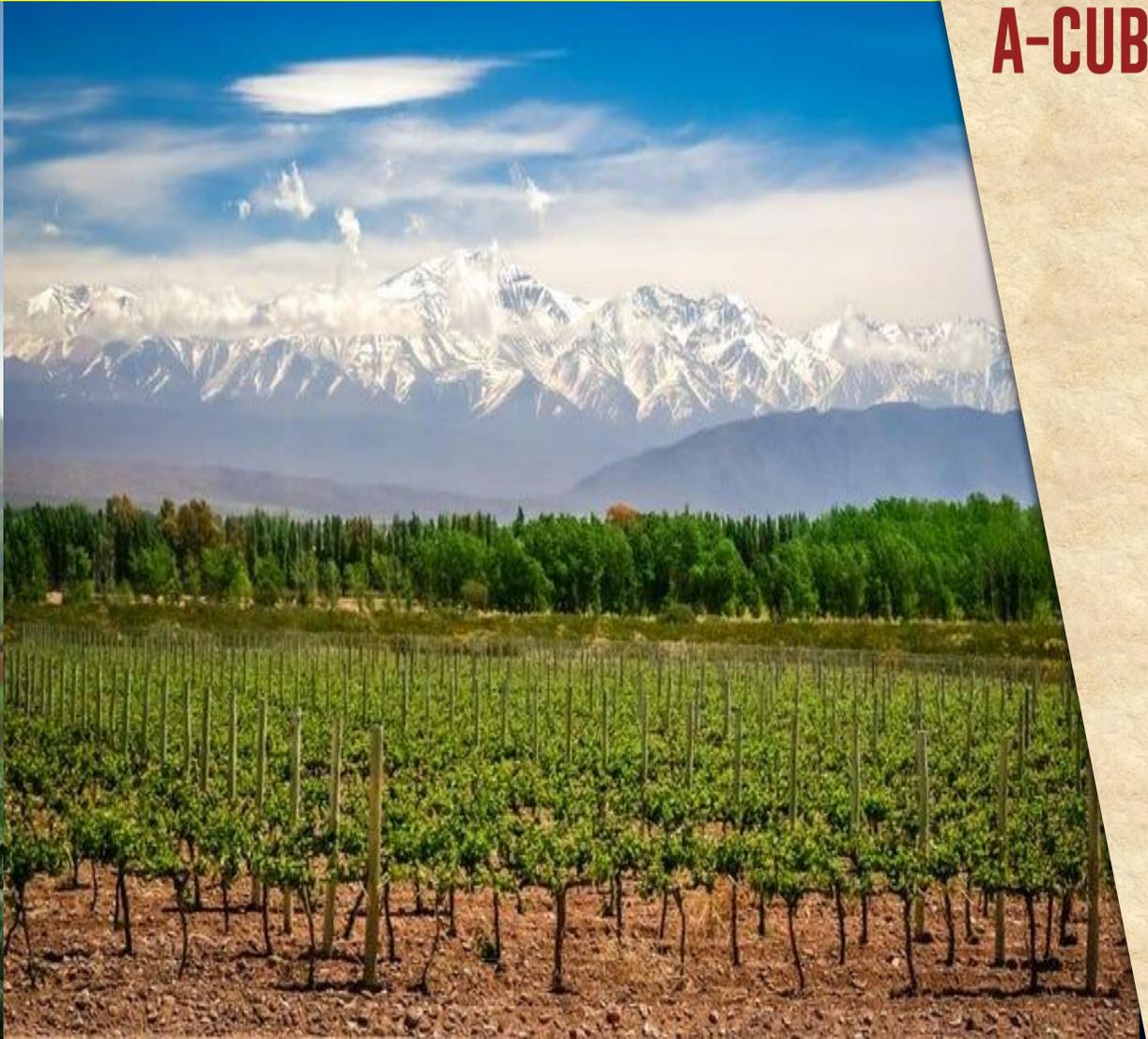


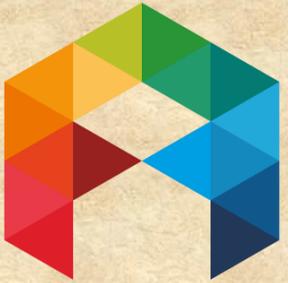
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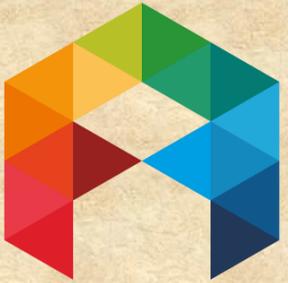


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SUSTAINABLE AGRICULTURE PRACTICES AND SYSTEMS (SAPSS)

- ❖ Sustainable agriculture: The term started gaining prominence in the US in the 1980s, with a formal mention in US legislation for the first time in 1985. This led to a programme on Low Input Sustainable Agriculture (LISA).
- ❖ In India, the national government initiated the **National Mission for Sustainable Agriculture (NMSA) in 2014- 15**, which formally defines sustainable agriculture in the Indian context and has identified ten underlying dimensions.
- ❖ From the year 2018-19, NMSA is being implemented as a sub-mission/sub-umbrella scheme under the Umbrella Scheme of 'Green Revolution Krishonnati Yojana'.

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The Centrally Sponsored and Central Sector Schemes of NMSA are as under:

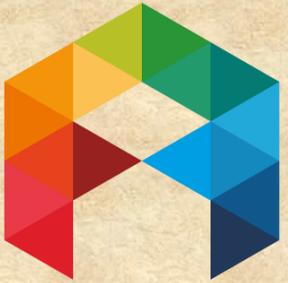
A) Centrally Sponsored Schemes:

- ❖ Rainfed Area Development (RAD)
- ❖ Sub Mission on Agro Forestry (SMAF)
- ❖ National Bamboo Mission (NBM)
- ❖ Soil Health Management (SHM)
- ❖ Paramparagat Krishi Vikas Yojana (PKVY)

B) Central Sector Schemes:

- ❖ Soil and Land Use Survey of India (SLUSI)
- ❖ National Rainfed Area Authority (NRAA)
- ❖ Mission Organic Value Chain Development in North Eastern Region (MOVCDNER)
- ❖ National Centre of Organic Farming (NCOF)
- ❖ Central Fertilizer Quality Control and Training Institute (CFQC&TI)

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- ❖ In the face of increasing extreme climate events—acute and frequent droughts, floods, desert locust attacks—examples of resilience are emerging from the ground, highlighting sustainable agriculture’s potential.
- ❖ We have identified **some sustainable agriculture practices and systems (SAPSs) prevalent in India.**
- ❖ Some are focused only on one aspect of agriculture (we call them practices).
- ❖ In contrast, others are more holistic concerning the overall agriculture or most aspects of it (we call them systems).

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SUSTAINABLE AGRICULTURE PRACTICES AND SYSTEMS (SAPSS)

System

- ❖ Permaculture
- ❖ Organic farming
- ❖ Natural farming
- ❖ System of rice intensification (SRI)
- ❖ Biodynamic agriculture
- ❖ Conservation agriculture
- ❖ Integrated farming system (IFS)
- ❖ Agroforestry
- ❖ Integrated pest management (IPM)
- ❖ Precision farming
- ❖ Silvipastoral systems
- ❖ Vertical farming
- ❖ Hydroponics
- ❖ Crop-livestock-fisheries farming system

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SUSTAINABLE AGRICULTURE PRACTICES AND SYSTEMS (SAPSS)

Practices

- ❖ Vermicomposting
- ❖ Drip irrigation/sprinkler
- ❖ Crop rotation and Intercropping
- ❖ Cover crops
- ❖ Mulching and Contour farming
- ❖ Rainwater harvesting-artificial recharge of groundwater
- ❖ Floating farming
- ❖ Plastic mulching
- ❖ Shade net house
- ❖ Alternate wetting and drying technique (for rice)
- ❖ Saguna rice technique
- ❖ Farm pond lined with plastic film
- ❖ Direct seeding of rice
- ❖ Canopy management
- ❖ Mangrove and non-mangrove bio-shields

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Permaculture

- ❖ Permaculture emphasises **traditional and new practices** in which all the input is produced by the farm itself, resulting in food self-sufficiency.
- ❖ It originated as a design science for small-scale farmers to create quantity produce, ease their work and also to address environmental degradation.
- ❖ The principles of permaculture work on earth care, people care and fair share.
- ❖ Example: **A banana circle.**
- ❖ A banana circle has multiple functions: food production, compost pile, biomass production, habitat for wildlife, etc.

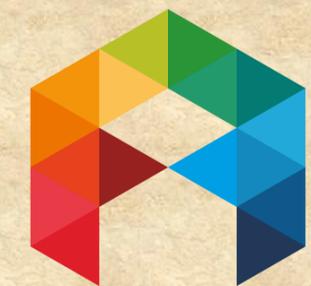
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ORGANIC FARMING

- ❖ Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, genetically modified organisms and livestock food additives.
- ❖ To the maximum extent possible organic farming system rely upon crop rotations, **use of crop residues, animal manures, legumes, green manures, off farm organic wastes, bio fertilizers**, mechanical cultivation, mineral bearing rocks and aspects of biological control to maintain soil productivity and tilt to supply plant nutrients and to control insect, weeds and other pests.

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NUTRIENT MANAGEMENT IN ORGANIC FARMING

Different available organic inputs are:

1. Organic manures: Green manuring with Sesbania, cowpea, green gram etc are quiet effective to improve the organic matter content of soil.

2. Bacterial and fungal bio fertilizers: Following bacterial and fungal bio fertilizers can be used as a component of organic farming in different crops:

- ❖ Rhizobium
- ❖ Azotobacter
- ❖ Azospirillum:
- ❖ Plant growth promoting rhizobacteria e.g. Actinoplanes, Azotobacter, Bacillus, Pseudomonas, Rhizobium, Bradyrhizobium, Streptomyces, Xanthomonas etc.
- ❖ Phosphorus-solubilizing bacteria (PSB)- **Most predominant phosphorus-solubilizing bacteria (PSB) belong to the genera Bacillus and Pseudomonas.** At present PSB is most widely used bio fertilizer in India. PSB can reduce the P requirement of crop up to 25%.
- ❖ Mycorrhiza fungi
- ❖ Blue green algae (BGA)
- ❖ Azolla

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ORGANIC FARMING

Weed management in organic farming

- ❖ In organic farming, chemical herbicides cannot be used. So weeding can be done only manually.
- ❖ Different cultural practices like tillage, flooding, mulching can be used to manage the weeds. Besides, biological (pathogen) method can be used to manage the loss due to weeds.
- ❖ When the ground is fallow, a cover crop can be planted to suppress weeds and build soil quality.
- ❖ Weeds growth can also be limited by using drip irrigation whenever possible, which restricts the distribution of water to the plant line.

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INSECT PEST MANAGEMENT

- ❖ The main strategy to combat harmful pests is to **build up a population of beneficial insects**, whose larvae feed off the eggs of pests.
- ❖ The key to building a population of beneficial insects is to establish borders (host crops) around fields planted with blends of flowering plants that the beneficial insects particularly like.
- ❖ Then periodically beneficial insects are released into the fields, where the host crops serve as their home base and attract more beneficial insects over time.
- ❖ When faced with a pest outbreak that cannot be handled by beneficial insects, the use of natural or other organically approved insecticides **like neem pesticides is done**.
- ❖ The two most important criteria for allowed organic pesticides are low toxicity to people and other animals and low persistence in the environment. These criteria are determined by the National Organic Standards.

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NATURAL FARMING

- ❖ It includes Zero Budget Natural Farming (ZBNF) and community managed natural farming in India which is a set of farming methods, and also a grassroots peasant movement, has spread to various states in India.
- ❖ It has attained wide success in southern India, especially the southern Indian state of Karnataka where it first evolved.
- ❖ Instead of commercially produced chemical inputs, the ZBNF promotes the **application of *jeevamrutha* — a mixture of fresh desi cow dung and aged desi cow urine, jaggery, pulse flour, water and soil — on farmland.**
- ❖ This is a fermented microbial culture that adds nutrients to the soil, and acts as a catalytic agent to promote the activity of microorganisms and earthworms in the soil.

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SYSTEM OF RICE INTENSIFICATION (SRI)

- ❖ The System of Rice Intensification involves cultivating rice with as much organic manure as possible, starting with young seedlings planted singly at wider spacing in a square pattern; and with intermittent irrigation that keeps the soil moist but not inundated, and frequent inter cultivation with weeder that actively aerates the soil.
- ❖ SRI is not a standardised, fixed technological method. It is rather a set of ideas, a methodology for comprehensively managing and conserving resources by changing the way that land, seeds, water, nutrients, and human labour are used to increase productivity from a small but well-tended number of seeds. SRI is an amalgamation of multiple beneficial practices.
- ❖ The Kadiramangalam System of Rice Intensification- has been developed using SRI ideas and practices, such that it is suited to local conditions in the Cauvery Delta region.

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BIODYNAMIC AGRICULTURE

- ❖ Biodynamic agriculture is a form of alternative agriculture **very similar to organic farming**, but it includes various esoteric concepts drawn from the ideas of Rudolf Steiner.
- ❖ Initially developed in 1924, it was the first of the organic agriculture movements. It treats soil fertility, plant growth, and livestock care as **ecologically interrelated tasks, emphasizing spiritual and mystical perspectives**.
- ❖ Biodynamic farming practices and farming methods include avoiding chemical soil fertilizers to enhance soil fertility, consideration of biological organisms (from living organisms in the soil to animal health), diverse crop rotation, cover crops, green animal manures, as well as meeting certain guidelines for perennial and annual planting.

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ADVANTAGES OF BIODYNAMIC AGRICULTURE

- ❖ Production of top quality fruits and vegetables, with **strong flavours and high levels of nutrients (protein and vitamin content)**.
- ❖ Yields always above the average level, higher on average than those produced by organic farming.
- ❖ Little trouble with **livestock and plant diseases**
- ❖ No spreading of insect pests, and no great economic damage due to their presence.

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