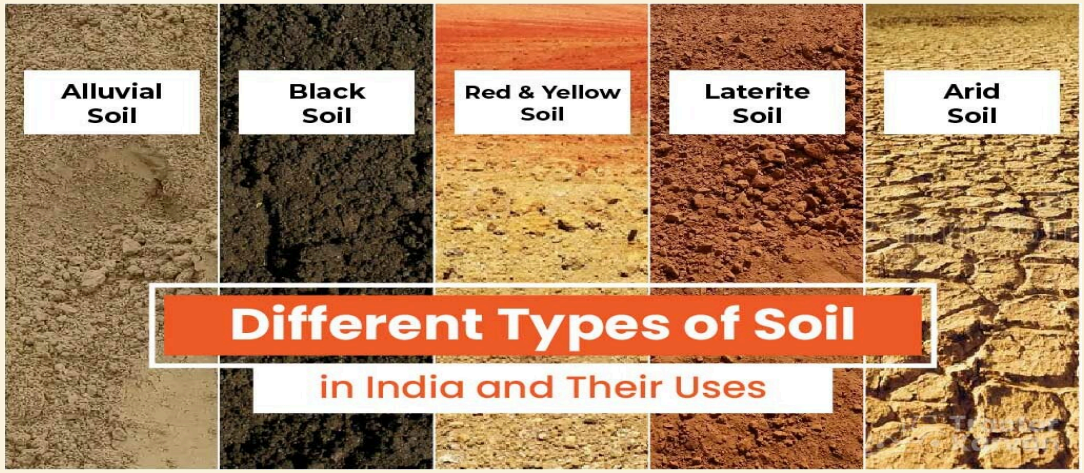
Chapter-6: Soils of India
भारत की मिट्टियाँ

1. Introduction / परिचय

- Soil = upper layer of earth formed by **weathering of rocks** + **organic matter**.
- मिट्टी = शैल अपक्षय + जैविक पदार्थ से बनी ऊपरी परत।

- **India's soils are very diverse** due to varied relief, climate, vegetation, and geology.
- भारत में भौगोलिक विविधता, जलवायु, वनस्पति और शैलों के कारण मिट्टियों का अत्यधिक वैविध्य है।

ICAR (Indian Council of Agricultural Research) classification: 8 main types of soils in India.
भारतीय कृषि अनुसंधान परिषद **(ICAR)** के अनुसार भारत में 8 प्रमुख प्रकार की मिट्टियाँ हैं।



2. Major Soil Types in India / भारत की प्रमुख मिट्टियाँ

(i) Alluvial Soil (जलोढ़ मिट्टी)

- Formed by **deposition of alluvium** by rivers (Indus–Ganga–Brahmaputra).
  नदी-घाटियों द्वारा लाई गई जलोढ़ से बनी।
- Covers ~40% of India's area (largest share).
  भारत के ~40% क्षेत्र में फैली।
- Fertile; ideal for agriculture.
  उपजाऊ; कृषि हेतु उपयुक्त।

Crops: Wheat, Rice, Sugarcane, Maize. फसलें: गेहूँ, धान, गन्ना, मक्का।

Regions: Northern plains, river valleys, deltas (Ganga, Brahmaputra, Indus, Krishna, Godavari).
क्षेत्र: उत्तर भारत के मैदान, नदी घाटियाँ, डेल्टा क्षेत्र।

(ii) Black Soil (काली मिट्टी / रेगुर)

- Formed from **Deccan basalt rocks** (lava).
  ज्वालामुखीय शैलों (डेक्कन ट्रैप) से बनी।
- High clay content, moisture-retentive, cracks in summer.

चिकनी, नमी धारण क्षमता अधिक, ग्रीष्म में दरारें।

- Known as **Regur soil** or “Cotton soil”.
  रेगुर या कपास मिट्टी।

Crops: Cotton (main), also Soybean, Jowar, Bajra.
फसलें: कपास, सोयाबीन, ज्वार, बाजरा।

Regions: Maharashtra, MP, Gujarat, Andhra, TN, Karnataka.
क्षेत्र: महाराष्ट्र, मध्य प्रदेश, गुजरात, आंध्र, तमिलनाडु, कर्नाटक।

(iii) Red (and Yellow) Soil (लाल मिट्टी)

- Formed by weathering of **ancient crystalline rocks** (granite, gneiss).
  प्राचीन क्रिस्टलीय शैलों से बनी।

- Red colour due to **iron oxides**.
  लौह ऑक्साइड के कारण लाल।

- Low humus, less fertile but can be improved with fertilizers.
  ह्यूमस कम, उपजाऊता कम, पर खाद डालने पर उपयुक्त।

Crops: Millets, Groundnut, Pulses.
फसलें: मोटे अनाज, मूँगफली, दलहन।

Regions: Southern & Eastern India – TN, Karnataka, Andhra, Odisha, Chhattisgarh.
क्षेत्र: दक्षिण व पूर्व भारत – तमिलनाडु, कर्नाटक, आंध्र, ओडिशा, छत्तीसगढ़।

(iv) Laterite Soil (लेटराइट मिट्टी)

- Formed by **intense leaching** under heavy rainfall & high temperature.
  अधिक वर्षा व उच्च ताप में अपक्षालन से बनी।

- Rich in iron & aluminium, poor in humus & nitrogen.
  लौह व एल्युमिनियम अधिक, ह्यूमस व नाइट्रोजन कम।

- Hard when dry, porous when wet.
  सूखी अवस्था में कठोर, गीली में छिद्रयुक्त।

Crops: Tea, Coffee, Cashew, Coconut.
फसलें: चाय, कॉफी, काजू, नारियल।

Regions: Western Ghats, parts of Kerala, Karnataka, Odisha, Assam, Meghalaya.
क्षेत्र: पश्चिमी घाट, केरल, कर्नाटक, ओडिशा, असम, मेघालय।

(v) Arid & Desert Soil (शुष्क/मरुस्थलीय मिट्टी)

- Found in Rajasthan, Gujarat (Thar desert).
  राजस्थान, गुजरात (थार मरुस्थल)।
- Sandy, saline, poor fertility.
  रेतीली, क्षारीय, उपजाऊता कम।
- Suitable for drought-resistant crops with irrigation.
  सिंचाई से शुष्क फसलें उपयुक्त।

Crops: Bajra, Jowar, Pulses, Guar.
फसलें: बाजरा, ज्वार, दलहन, ग्वार।

(vi) Mountain/Forest Soil (पर्वतीय/वन मिट्टी)

- Found in Himalayan & hill regions.
  हिमालयी व पर्वतीय क्षेत्रों में।
- Highly varied → loamy in valleys, sandy on slopes.
  विविधता → घाटियों में दोमट, ढलानों पर बलुई।
- Prone to erosion due to steep slopes.
  तीव्र ढालों के कारण अपरदनशील।

Crops: Tea, Coffee, Spices, Fruits.
फसलें: चाय, कॉफी, मसाले, फल।

(vii) Peaty & Marshy Soils (पीट/दलदली मिट्टी**)**

- Found in waterlogged, humid areas (Kerala, Bengal, coastal Odisha).
  दलदली/आर्द्र क्षेत्रों में – केरल, बंगाल, ओडिशा तट।

- High in organic matter but acidic & poor in nutrients.
  ह्यूमस अधिक, पर अम्लीय व पोषण कम।

Crops: Rice, Jute. फसलें: धान, जूट।

(viii) Saline & Alkaline Soils (लवणीय/क्षारीय मिट्टी**)**

- Contain excess salts & sodium.
  अधिक लवण व सोडियम।

- Infertile; found in drier areas (Punjab, Haryana, Rajasthan, UP, Gujarat).
  बंजर; पंजाब, हरियाणा, राजस्थान, उप्र, गुजरात।

Can be reclaimed by **gypsum & proper irrigation**.
जिप्सम व सिंचाई से सुधारी जा सकती है।

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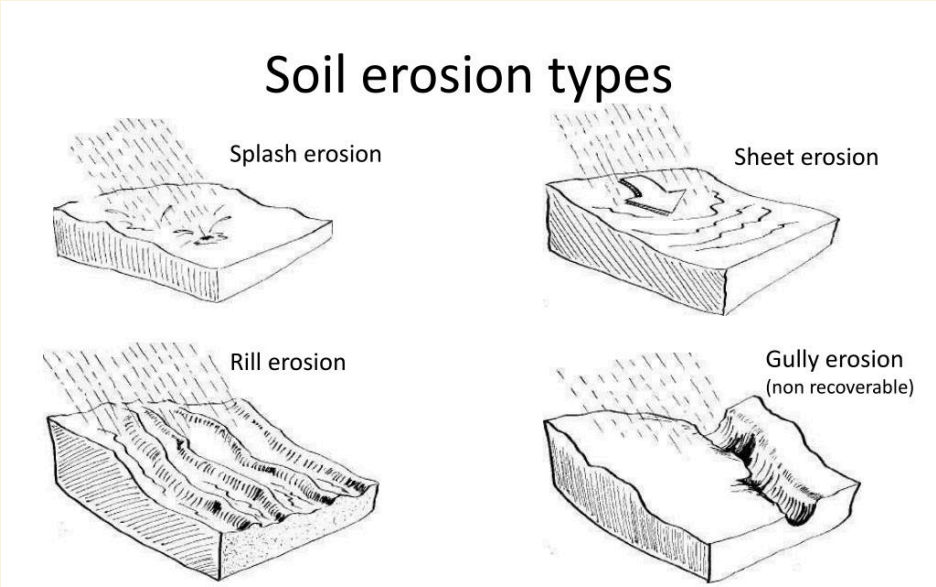
3. Soil Erosion / मृदा अपरदन

- **Definition:** Removal of top fertile soil layer by natural or human activities.
- परिभाषा: मिट्टी की उपजाऊ सतही परत का प्राकृतिक/मानव कारणों से हटना।



Causes / कारण

1. **Water erosion (**जल अपरदन**):**
   - Sheet erosion (thin layer removal).
   - Rill & gully erosion (channels cut by running water).
   - Ravines (deep gullies; e.g., Chambal ravines).
2. **Wind erosion (**पवन अपरदन**):**
   - Blowing away of loose, sandy soil in arid regions (Rajasthan desert).
3. **Deforestation & overgrazing (**वनों की कटाई व अत्यधिक चराई**).**
4. **Unscientific farming & mining (**अवैज्ञानिक खेती व खनन**).**

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4. Soil Conservation Methods / मृदा संरक्षण उपाय

Mechanical / यांत्रिक उपाय

- Contour ploughing (कॉन्टूर हल चलाना).
- Terracing (पर्वतीय ढालों पर सीढ़ीनुमा खेत).
- Bunding (मेढ़बंदी).
- Check dams (छोटे बाँध).

Biological / जैविक उपाय

- Afforestation (वनरोपण).
- Crop rotation (फसल चक्र).
- Strip cropping (फसल पट्टी पद्धति).
- Grassed waterways.

These reduce **run-off, erosion, and improve soil fertility**.

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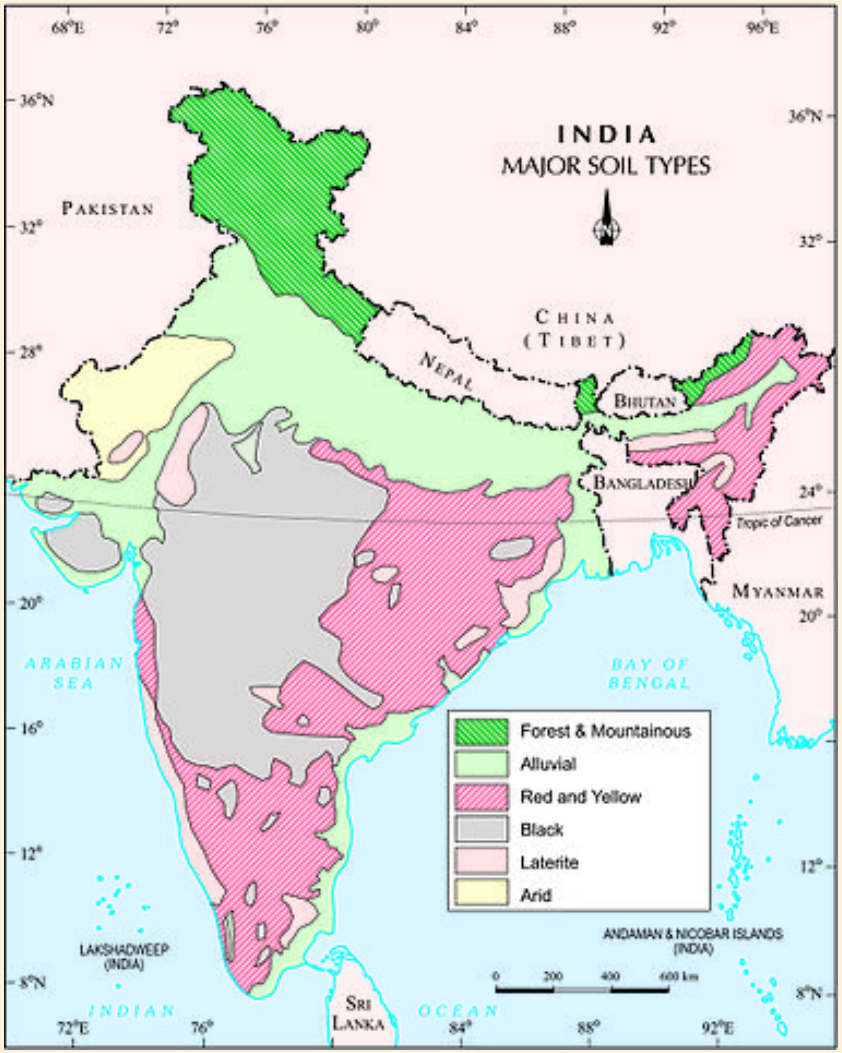
5. Soil Distribution in India / भारत में मृदा वितरण

- **Alluvial soil:** Indo-Gangetic plain (Punjab, UP, Bihar, WB, Assam, delta regions).
- **Black soil:** Maharashtra, MP, Gujarat, Telangana, Andhra, TN.
- **Red soil:** TN, Karnataka, Andhra, Odisha, Chhattisgarh.
- **Laterite soil:** Kerala, Karnataka, Maharashtra, Odisha, Assam, Meghalaya.
- **Arid soil:** Rajasthan, Gujarat.
- **Mountain soil:** Himalayan states (JK, HP, Uttarakhand, NE).
- **Saline/Alkaline:** Arid tracts of Punjab, Haryana, Rajasthan, Gujarat, UP.
- **Peaty/Marshy:** Kerala, coastal Bengal, Odisha.



Chapter-7: Agriculture in India / भारत में कृषि

1. Importance of Agriculture / कृषि का महत्व

- Agriculture = backbone of Indian economy.
- **~46% workforce** engaged in agriculture (Census/PLFS data).
- Contributes **~16–18% of GDP**.
- Provides food, raw material, employment.
  कृषि भारत की रीढ़ है – रोजगार, भोजन, उद्योग हेतु कच्चा माल देती है।

2. Cropping Seasons in India / भारत में फसल चक्र

(Defined by Indian Council of Agricultural Research – ICAR)

(a) Kharif Crops / खरीफ फसलें

- **Sown:** With onset of SW Monsoon (June–July).
- **Harvested:** Sep–Oct.

- Need **warm, wet climate**.
- प्रमुख खरीफ फसलें: धान, मक्का, ज्वार, बाजरा, कपास, गन्ना, मूँगफली, सोयाबीन।

Examples:

- Rice (धान) → WB, UP, Bihar, TN, AP.
- Maize (मक्का) → Bihar, UP, Karnataka.
- Cotton (कपास) → Maharashtra, Gujarat, Telangana.
- Sugarcane (गन्ना) → UP, Maharashtra, Karnataka.

(b) Rabi Crops / रबी फसलें

- **Sown:** After monsoon retreat (Oct–Nov).
- **Harvested:** Mar–Apr.
- Need **cool, dry climate** for growth; **bright sunshine** at ripening.
- प्रमुख रबी फसलें: गेहूँ, जौ, चना, मसूर, सरसों, आलू।

Examples:

- Wheat (गेहूँ) → Punjab, Haryana, UP, MP, Rajasthan.
- Mustard (सरसों) → Rajasthan, Haryana, UP.
- Gram (चना) → MP, Rajasthan, Maharashtra.

KHARIF	RABI	ZAID
Monsoon crop (High water requirement)	Winter crop	Summer crop
July - October	October - February	March - June
Rice, Maize, Jowar, Bajra, Soyabean, Cotton, Groundnut, Jute, Urad Dal, Moong Dal, Tur Dal	Wheat, Barley, Gram, Peas, Mustard	Watermelon, Muskmelon, Cucumber, Vegetables and Fodder crops

(c) Zaid Crops / ज़ायद फसलें

- Short season between Rabi & Kharif (Mar–Jun).
- Need **warm, dry weather** + irrigation.
- प्रमुख ज़ायद फसलें: तरबूज, खरबूज, खीरा, ककड़ी, मूँग, सब्जियाँ।

Examples:

- Watermelon, cucumber, vegetables.
- Fodder crops for livestock.

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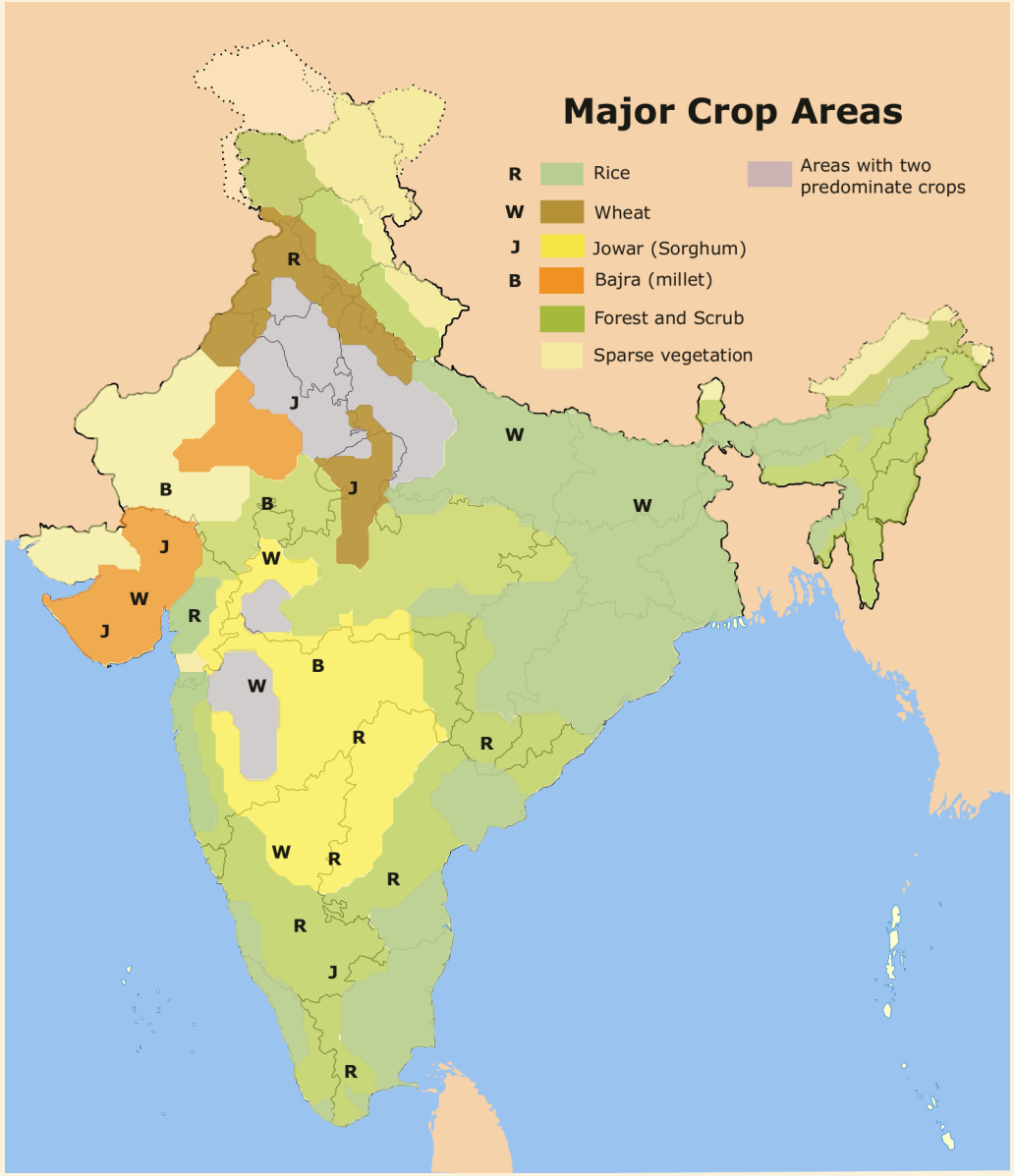
3. Major Crops of India / भारत की प्रमुख फसलें:


Major Crop Areas
R Rice
W Wheat
J Jowar (Sorghum)
B Bajra (millet)
Forest and Scrub
Sparse vegetation
Areas with two predominate crops

(a) Food Crops / खाद्यान्न फसलें

1. **Rice (धान):** Staple food, >22% of world production.
    - Needs high temp (25–35°C), 100–200 cm rainfall.
    - Major states: Telangana, WB, UP, Punjab, TN, AP.
2. **Wheat (गेहूँ):** Second staple food.
    - Needs cool climate (10–15°C), 75–100 cm rainfall.
    - Major states: Punjab, Haryana, UP, MP, Rajasthan.
3. **Millets (ज्वार, बाजरा, रागी):** Coarse grains, hardy crops.
    - Jowar → Maharashtra, Karnataka.
    - Bajra → Rajasthan, Gujarat, Haryana.
    - Ragi → Karnataka, Tamil Nadu.
4. **Maize (मक्का):** Food + fodder + industrial crop.
    - States: Bihar, UP, Karnataka, AP.
5. **Pulses (दलहन):** Gram, Tur, Moong, Urad, Masoor.

- India = largest producer & consumer.
- States: MP (largest), UP, Rajasthan, Maharashtra.

(b) Commercial Crops / वाणिज्यिक फसलें

1. **Cotton (कपास):** Black soil areas.
   - States: Maharashtra, Gujarat, Telangana.
2. **Jute (जूट):** “Golden fibre”, used in gunny bags.
   - States: WB, Bihar, Assam.
3. **Sugarcane (गन्ना):** Tropical crop.
   - States: UP (largest), Maharashtra, Karnataka.
4. **Oilseeds (तिलहन):** Groundnut, Mustard, Soybean, Sunflower.
   - States: Gujarat (groundnut), MP (soybean), Rajasthan (mustard).

(c) Beverage & Plantation Crops / पेय व बागान फसलें

1. **Tea (चाय):** Assam, WB (Darjeeling), Nilgiris.

2. **Coffee (कॉफी):** Karnataka (largest), Kerala, TN.
3. **Tobacco (तम्बाकू):** Andhra, Gujarat.
4. **Spices (मसाले):** Kerala, Karnataka.

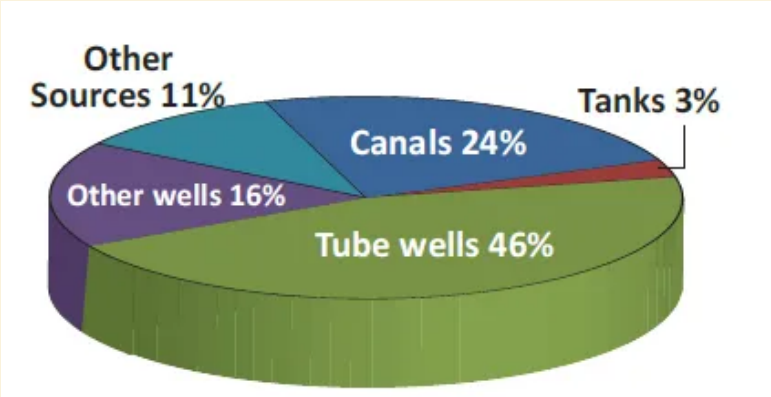
Largest crop-producing states in India as per the Economic Survey 2024-25 (Table 1.18):

Crop/Group	1st State	2nd State	3rd State
Rice	Telangana	Uttar Pradesh	West Bengal
Wheat	Uttar Pradesh	Madhya Pradesh	Punjab
Maize	Karnataka	Bihar	Madhya Pradesh
Coarse Cereals	Rajasthan	Karnataka	Madhya Pradesh
Tur (Arhar)	Karnataka	Maharashtra	Uttar Pradesh
Gram (Chana)	Madhya Pradesh	Maharashtra	Rajasthan

Pulses (Total)	Madhya Pradesh	Maharashtra	Rajasthan
Groundnut	Gujarat	Rajasthan	Madhya Pradesh
Rapeseed/Mustard	Rajasthan	Uttar Pradesh	Madhya Pradesh
Soybean	Madhya Pradesh	Maharashtra	Rajasthan
Sunflower	Karnataka	Haryana	Odisha
Oilseeds (Total)	Rajasthan	Madhya Pradesh	Gujarat
Sugarcane	Uttar Pradesh	Maharashtra	Karnataka
Cotton	Gujarat	Maharashtra	Telangana
Jute & Mesta	West Bengal	Bihar	Assam

Sl. No.	Crop	Cropping Season	Temperature	Rainfall	Soil	Features	Features	Location
1	**Rice**	Kharif	Above 25°C and high humidity	Above 100 cms	Alluvial clayey soil.	India is the second largest producer of rice in the world after China.	In Assam, West Bengal and Orissa, three crops of paddy are grown in a year known as "Aus, Aman and Boro".	Northern plains, North Eastern States, Coastal and Deltaic Regions.
2	**Wheat**	Rabi	Cool growing season and Bright sunshine	50 - 75 cms of well distributed rainfall	Well drained alluvial soil & Black Soil	Main food crop of the north and north western states of India	Two important wheat-growing zones in India are: The Ganga-Sutlej plains in the northwest and black soil region of Deccan.	Punjab, Haryana, Uttar Pradesh and parts of Madhya Pradesh are major wheat producing states.
3	**Millets (Jawar)**	Kharif	Grown in areas with high temperature	Low rainfall.	Less fertile soil.	Jawar, Bajra and Ragi. They are also known as coarse grains.	Jowar grows in moist areas and hardly needs irrigation. Very high nutritional value.	Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh.
	Millets (Bajra)	Kharif	Grown in areas with high temperature	Low rainfall.	Sandy soil and shallow black soil.		Very high nutritional value.	Rajasthan, Uttar Pradesh, Maharashtra, Gujarat and Haryana.
	Millets (Ragi)	Kharif	Grown in areas with high temperature	Low rainfall.	Dry regions on red, black, sandy loamy & shallow black soils.		Very high nutritional value.	Karnataka, Tamil Nadu, Himachal Pradesh, Uttarakhand, Sikkim, Jharkhand and Arunachal Pradesh.
4	**Maize**	Kharif	21°-27°C	50 cm - 100 cm	-----	Used as both food and fodder crop.	Grows well in old alluvial soil.	Karnataka, Uttar Pradesh, Bihar, Andhra Pradesh, Telangana and Madhya Pradesh.
5	**Pulses**	Rabi	Survive even in dry conditions.	Need less moisture	Pulses are usually grown in rotation with other crops, so that the soil can regain its fertility.	India is the largest producer and consumer of pulses in the world.	Tur (arhar), urad, moong, masur, peas and gram. Pulses are the great source of protein.	Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra and Karnataka.

4. Irrigation in India / भारत में सिंचाई



Importance / महत्व

- Monsoon is **uncertain & uneven**.
- Irrigation ensures **crop security, multiple cropping, high yields**.

  सिंचाई कृषि उत्पादन का आधार है क्योंकि मानसून अनिश्चित व असमान है।

Sources of Irrigation / सिंचाई के साधन

1. **Canals (नहरें):** Major in north India.
   - States: UP, Punjab, Haryana.
   - Example: Indira Gandhi Canal (Rajasthan).
2. **Wells & Tube wells (कुएँ/नलकूप):** Common in UP, Bihar, Punjab.
3. **Tanks (तालाब):** Popular in south India (Tamil Nadu, Karnataka, Telangana).

4. **Modern methods (आधुनिक पद्धतियाँ):** Drip irrigation (Maharashtra, Gujarat), Sprinkler (Rajasthan).

Exam Fact:

- Largest canal irrigation state → **Uttar Pradesh**.
- Largest tank irrigation → **Tamil Nadu**.
- Largest drip irrigation → **Maharashtra**.

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5. Green Revolution / हरित क्रांति

Introduction

- Launched in **1960s**, led by **Dr. M.S. Swaminathan**.
- Based on **HYV (High Yield Variety) seeds**, fertilizers, pesticides, irrigation, mechanisation.

  1960 के दशक में हरित क्रांति; उच्च उपज बीज, रसायन, सिंचाई व मशीनरी पर आधारित।

Achievements / उपलब्धियाँ

- India became **self-sufficient in food grains** (esp. wheat & rice).
- Wheat production soared in Punjab, Haryana, UP.
- Created "**Granary of India**" (Punjab-Haryana).

Limitations / सीमाएँ

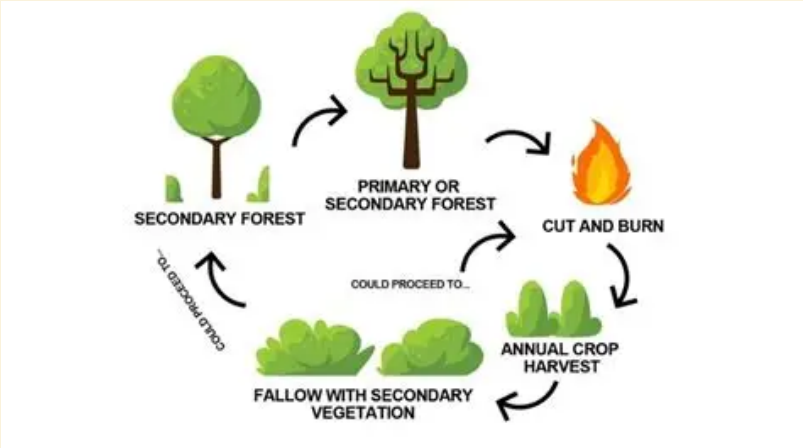
- Regional imbalance: Mostly limited to NW India.
- Environmental issues: Soil degradation, water logging, pesticide pollution.
- Neglect of pulses & coarse grains.

Types of Agriculture in India / भारत में कृषि के प्रकार

1. Shifting Agriculture (स्थानांतरित/झूम खेती)

- Forests cleared, crops grown for few years, then land abandoned.
- Practised in **NE India (Nagaland, Mizoram, Meghalaya, Manipur, Arunachal)**.
- Locally called **Jhum cultivation**.

  मिट्टी की उर्वरता घटने पर भूमि बदल दी जाती है।



2. Subsistence Agriculture (आत्मनिर्वाह कृषि)

- Farming done mainly for family consumption, not for sale.
- Small landholdings, traditional tools, low productivity.
- Practised in Bihar, UP, Odisha, MP, Bengal.

  परिवार के उपभोग हेतु खेती।

3. Intensive Agriculture (गहन कृषि)

- Small farms, high population pressure.
- High labour input, multiple crops annually.
- Common in **densely populated areas of North India**.

  छोटी भूमि पर अधिक श्रम व कई फसलें।

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4. Extensive Agriculture (व्यापक कृषि)

- Large landholdings, low labour input, mechanised farming.
- More common in sparsely populated regions (USA, Russia; in India → limited areas of Punjab, Haryana).

  विशाल भूमि पर मशीन आधारित खेती।

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5. Plantation Agriculture (बागान कृषि)

- Single commercial crop grown on large estates for market/export.
- Requires capital & skilled labour.
- Crops: **Tea, Coffee, Rubber, Sugarcane, Banana**.
- States: Assam, WB, Karnataka, Kerala, TN.

  एक ही नगदी फसल बड़े क्षेत्र पर – जैसे चाय, कॉफी।

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6. Commercial Agriculture (व्यावसायिक कृषि)

- Market-oriented farming → crops grown for sale.
- Use of HYV seeds, fertilizers, irrigation, machinery.
- Crops: Cotton, Sugarcane, Tobacco, Oilseeds.

  बिक्री हेतु फसल उत्पादन।

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7. Mixed Agriculture (मिश्रित कृषि)

- Both **crops + livestock** farming together.
- Provides income security & manure.
- Practised in Punjab, Haryana, Karnataka.

  फसल + पशुपालन दोनों।

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8. Organic Agriculture (जैविक/प्राकृतिक कृषि)

- No chemical fertilizers, pesticides, or HYVs.
- Based on compost, bio-fertilizers, eco-friendly practices.
- Gaining popularity in Sikkim (first 100% organic state), Uttarakhand.

  रसायन मुक्त, पर्यावरण अनुकूल खेती।

REVOLUTION	PRODUCT
BLACK REVOLUTION	PETROL
GREY REVOLUTION	FERTILIZER
BROWN REVOLUTION	LEATHER
BLUE REVOLUTION	FISH
GREEN REVOLUTION	AGRICULTURE
PINK REVOLUTION	ONION
RED REVOLUTION	MEAT
YELLOW REVOLUTION	OIL SEED
GOLDEN REVOLUTION	HONEY
SILVER REVOLUTION	EGG
WHITE REVOLUTION	MILK & DAIRY
ROUND REVOLUTION	POTATO
GOLDEN FIBER REVOLUTION	JUTE
SILVER FIBER REVOLUTION	COTTON

6. Agricultural Challenges / कृषि की चुनौतियाँ

- Small & fragmented land holdings.
- Dependence on monsoon, low irrigation coverage.
- Low productivity in many crops.
- Post-harvest losses, lack of cold storage.
- Rising input costs (fertilizers, diesel, pesticides).
- Climate change → irregular monsoons, droughts, floods.

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7. Agricultural Solutions / कृषि समाधान

1. **Improved Irrigation:** Expand drip & sprinkler.
2. **Diversification:** Move beyond wheat–rice; promote pulses, oilseeds, horticulture.
3. **Technology adoption:** GM crops, bio-fertilizers, AI-based precision farming.
4. **Infrastructure:** Cold storage, food processing, market linkages.
5. **Soil health management:** Soil cards, organic farming.

6. **Government Schemes:** PM Fasal Bima Yojana, PM Krishi Sinchai Yojana, E-NAM.
