

| Agriculture - II  |                                 |                                       |  |
|-------------------|---------------------------------|---------------------------------------|--|
|                   | KHARIF                          | RABI                                  | ZAID   |
| SOWING SEASON     | June-July                       | Oct. - Nov.                           | Aug - Sept (Kharif)<br>Feb - Mar (Rabi)                                |
| HARVESTING SEASON | Sept. - Oct                     | March - April                         | Dec - Jan (Kharif)<br>April - May (Rabi)                               |
| CROPS             | Rice, Jowar, Pigeon, Jute, R2J2 | Wheat, Gram, Barley, Mustard, NBG, GM | Oilseeds (Kharif), Summer veggs & fruits (Rabi), cucumber, water melon |

No categorisation in S. India - ?? temp are sufficiently high to grow tropical crops during any period in the year where soil moisture there.

### FACTS

- India → dominated by food crops → 65% of total crop
- 50% of total value of agri. production
- throughout year ← sole combination
- India - self-sufficient in foodgrains
- India → 3<sup>rd</sup> production of cereals
- 54% of total cropped area → cereals
- 11% of total production of cereals in world } cereals

**CEREALS** -

- \* grass-like plants
- \* starchy, edible seeds
- \* simple form of cultivation
- \* high nutrition value
- \* formed basic diet of mankind

| BASIS                   | SUBSISTENCE  | COMMERCIAL                          | SHIFTING              | INTENSIVE                     | EXTENSIVE                    | PLANTATION                    | MIXED                        |
|-------------------------|--|-------------------------------------|-----------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|
| <u>Typical Places</u>   | -  | Punjab, Haryana                     | Kerala, A.P           | Irrigated-N coastal-S         | Terai-sub Himalaya N.W India | hills of S. India + N.E India | -                            |
| <u>Farm size</u>        | small  | Large                               | -                     | small                         | huge                         | large                         | -                            |
| <u>crops cultivated</u> | food crops   | cash crops sugarcane tobacco        | maize millet          | rice wheat                    | rice wheat                   | tea coffee rubber             | fruits vegetables            |
| <u>Labour</u>           | only labour  | -                                   | only labour           | labour intensive              | capital intensive            | -                             | -                            |
| <u>Technology</u>       | traditional methods  | Mechanised                          | X                     | irrigation manure fertilisers | machines                     | modern technology             | -                            |
| <u>Yield</u>            | Low  | High                                | Low                   | more                          | high                         | high                          | steady income                |
| <u>Conditions</u>       | > monsoon<br>> natural fertility<br>> environmental conditions | market economy where well-developed | -                     | -                             | -                            | -                             | just two/more crops together |
| <u>Extra</u>            | consumed within family   | -                                   | menace to environment | more than 1 crop              | crop specialisation          | -                             | Rotation of crops            |

**RICE** - warm & humid

FACT: - INDIA - 2<sup>nd</sup> largest important staple

| TEMPERATURE  | ANNUAL RAINFALL             | SOIL                      | PLACES                      | BEST IN:-                                    |
|--|-----------------------------|---------------------------|-----------------------------|--|
| 24°C<br>ample sunshine & H <sub>2</sub> O<br>diff. altitudes | 150-300cm<br>standing water | clayey & Alluvial & loamy | UP, Punjab, N<br>TN, AP } S | delta, flood plains, valleys, coastal plains |

\* MONSOON LAND  
- heavy & standing

**UPLAND RICE**

- mountainous region
- SOWN → MAR-APR
- HARV → SEP-OCT
- rainfall only
- used locally

**LOWLAND RICE**

- low-lying region
- SOWN → JUNE
- HARV → OCT
- plenty of water during periods used locally + supplied to other regions

### METHODS OF CULTIVATION

**DRY SYSTEM**  
only rains

**PODDLED METHOD**  
assured & adequate water

**1 SOWING**

- BROADCASTING** - scattering of seeds by hand  
→ soil - infertile + labour - scarce
- DRILLING** - dropping of seed furrows through shaft of bamboos attached to plough  
→ germination not waste of seeds  
→ consumes time & lab.
- DIBBLING** - dropping of seeds at regular intervals in ploughed furrow

**2 TRANSPLANTATION**

- seeds are sown in nurseries
- after 4-5 weeks, saplings of 25-30cm h are prepared in groups at a distance
- field - flooded
- date, depth of water level ↑ 4-cm till crop mature

**ADV.**

- healthy plants - only picked
- waste removed
- less wastage of seeds
- higher yield

**JAPANESE METHOD**

- better quality seeds - Japonica
- sowing - sowed in nursery beds
- transplantation - rows
- application of fertilizers + better manure

**3 HARVESTING + PROCESSING**

→ field dried before  
→ threshing help  
→ labour intensive

**THRESHING** - by beating the paddy heads against wooden bars.

**WINNOWING** - process of removing unwanted husk from grain.  
peeing on a height on windy day

**MILLING** - to remove yellowish husk from grains  
villagers → dit → wooden mortar + heavy pestle → broken rice  
∴ modern milling vitamin lost & excessive rubbing

**STATES**

- WB - largest area 3/4
- UP - ex: - 1/4
- AP - 1/3 of state
- Punjab → jowar
- Potato
- TN
- Madhya

| WHEAT - RABI  |  |          |                                       | Wheat ka unit rate per ha                  |
|---|--|----------|---------------------------------------|--|
| CLIMATE   | TEMPERATURE  | RAINFALL | SOIL                                  | AREAS                                      |
| Cool winters<br>Grows:- cool, moist<br>Ripens:- warm, dry | 10-15°C<br>Sown Oct<br>-----<br>20-25°C<br>harvest Nov | 80cm     | Loam or clayey<br>alluvial black soil | UP<br>Punjab<br>Haryana<br>Rajasthan<br>MP |

- > S growing period shorter than N
- > winter rain in N - beneficial
- > shortage of rain → irrigation      excess of H<sub>2</sub>O → retard plant growth
- > India accounts 12% of total wheat production
- > 14% of total cropped area in the country

**METHODS OF CULTIVATION**

**SOWING**  
BROADCASTING or DRILLING

- > well-pulverised } for good germination
- > compact soil bed }
- > well-ploughed + pulverised → before sowing
- > seeds germinate 3-4 days

Not cultivated in west Bengal and extreme south

- > as excessive rain
- > high heat

↓  
 when plant 15-20cm tall ⇒ good irrigation if no rain  
 ↓  
 temp shud be ↓  
 ↓  
 a gradual increase in temp. needed

**HARVESTING**

starts ripening in March

↓  
 harvest - April

↓  
 sickle / machines

↓  
 threshing / threshers (older method)  
 time-consuming



**MILLETS**

inferior crops → poorer sections  
→ straw-fodder

**JOWAR** - Kharif + vabi  
→ dry farming areas - best  
→ on plains generally  
METHODS → broadcasting  
dibbling

| TEMP    | RAIN  | SOIL  | DISTRIBUTION       |
|---------|---|---|--------------------|
| 27-32°C | can<br>arid &<br>semi-arid<br>under 45cm<br>under 100cm<br>→ best | alluvium<br>loamy<br>red<br>grey<br>light<br>sandy<br>(black clayey)<br>loams<br>best | Maha, MP, K, AP, T |
|         |   |   | DURATION           |
|         |   |   | 4-5 months         |

**BAJRA** - Kharif / mixed crop  
→ sown crop  
→ plant stalks - cattle  
thatching purpose

Maha  
**Maharaj** **Kharwali**  
**Gujarat** **ko pencha**

| TEMP    | RAIN   | SOIL                                | DIST.  |
|---------|--|-------------------------------------|--|
| 25-30°C | 50cm-100cm<br>light monsoon<br>+<br>bright sunshine<br>early stages - best | Red<br>Sandy<br>loams<br>black soil | Rajasthan<br>Gujarat<br>Maharashtra<br>UP<br>Haryana |

**RAGI** - Kharif crop  
> S.I → throughout  
Methods → broadcast  
drilling  
→ transplanting on well prepared friable beds

| TEMP    | RAIN   | DIST.                               | SOIL  | CROP MATURE |
|---------|--|-------------------------------------|---|-------------|
| 20-30°C | 50-100cm<br>hardest crops<br>↳ low rain<br>↳ severe drought<br>withstand | Karnataka<br>TN<br>UK<br>Maha<br>AP | red<br>black<br>sandy<br>loams<br>low yield<br>↳ low inputs<br>↳ less attention | 3-5 months  |

**TRICKS -**

hardest crops  
> v. low rain also  
> drought also  
yield ↓  
→ need less  
→ low

**Karo matale findo**  
**in Raji film nodwaga.**  
A.P.P. I love you.

**PULSES**

> vegetable protein  
 > leguminous  
 ↓  
 fix atm. N<sub>2</sub> in soil  
 ↓  
 ↑ soil fertility

rotated to restore fertility

Urad, Tur, Moong } **KHARIF**  
 Khesari, Masur } **RABI**

Gram → leading pulse crop

India → largest producer + consumer,  $\frac{2}{5}$  × pulses in world

| TEMP    | RAIN                           | SOIL           | DISTRIBUTION              |
|---------|--------------------------------|----------------|---------------------------|
| 20-25°C | 50-75cm<br><small>25cm</small> | Dry light soil | MP, Maha, UP, Raja-<br>AP |

- > excellent forage
- > grain concentrates in feed of cattle

**India - largest area production → 2<sup>nd</sup> in world!**

**CASH CROPS** - those that are primarily grown for sale & not used by the grower & his family.

**Sugarcane**

| TEMPERATURE   | RAINFALL   | SOIL   | DISTRIBUTION   |
|---|--|--|--|
| 20-36°C<br>Frost - fatal<br>Short cool dry winter season. | 100-150cm<br>slightly dry sunny season during ripening | alluvial loam<br>lava loam clayey black, brown, red, light brown | universal → UP<br>Teleging → TN<br>machine → MH<br>1 <sup>st</sup> sugarcane |

**METHODS**

1. **SOWING** - labour intensive

a) **SETT METHOD**  
 ↳ new canes are planted by cuttings from old plants  
 ↳ quickly establishes  
 ↳ buds sprout to new stalks

b) **Ratooning**  
 ↳ after the cane has been cut close to the ground leaving a bit of stalk in soil with roots.  
 ↳ new shoots  
 ↳ second crop obtained roots of 1<sup>st</sup> crop → RATOON  
 ↳ **DISADV.**  
 i) yield thinner canes & sucrose content  
 ii) unfile sick of pests & diseases

c) **BY BUDS**  
 • obsolete method  
 some states → where yield x  
 • suc planted in furrows & covered with soil

**HARVESTING**  
 Sugarcane harvested before cane flowers.  
**GIR:-N** before winter → protect from frost.

**GRPs:-**  
 Stalks must be cut as near as possible  
 ↳ greater accumulation of sucrose in base of stem.

**PROCESSING**  
 Harvesting within 48 hrs → to preserve sugarcane content.  
 Scheduling between rollers + boiled with lime →  
 Raw brown sugar ← Sugarcane juice  
 Crystallized sugar

**ROLE OF GOVT IN SOLVING PROB**

- Cooperative societies
- Rural credit banks  
↳ loans at low interest rate
- Better irrigation means

**PROBLEMS:**

- Sugarcane - soil exhausting crop & of fertilizers → ↑ production
- mills if far → ↓ sugarcane cost
- ↑ % of production cost of transport
- annual crop - x other crop ↓ income
- high input
- % fixed by govt. not profit → farmers

**REGIONS:**  
 PUNJAB - HARYANA → SATLU - GANDHA PLAIN  
 BLACK SOIL AREA → Maharashtra to TN  
 COASTAL A.P + Krishna Valley.  
 S.S - ↑ moisture yield better quality  
 ↳ favourable monsoon climates  
 ↳ free from too + winter frost  
 ↳ sufficient irrigation

**NEW FARMING**

**Groundnuts in Bajar and Tomato Sabji**

**GROUND NUT** (peanut / monkey nut) INDIA - 2<sup>nd</sup> largest

|                     | SOIL.                                 | MATURE     | DISTA.            |
|---------------------|---------------------------------------|------------|-------------------|
| 20-25°C<br>50-100cm | Sandy loams<br>black<br>yellow<br>sod | 4-5 months | Gujarat, AP<br>TN |

SOWING - Sandy soil plough → seeds sown → plants mature → self pollination  
 harvested ← fruit inside earth. ← flowers stalk elongates

Rabi - Odisha  
Rharif - rest

**MUSTARD**

| TEMP.   | RAIN.     | SOIL.       | MATURE     | DIS.                         |
|---------|-----------|-------------|------------|------------------------------|
| 13-24°C | 25cm-40cm | heavy loams | 4-5 months | UP<br>Rajasthan<br>Karnataka |

Mustard is an ultimate perfect remedy for good health.

**SOYABEAN** Kharif crop

| TEMP.   | RAIN.     | SOIL                                | MST.                           |
|---------|-----------|-------------------------------------|--------------------------------|
| 13-24°C | 40cm-60cm | friable<br>loamy<br>acidic<br>soils | MP<br>Maharashtra<br>Rajasthan |

Edible → crushed to make vegetable oil

Oilseeds → Non-edible → crushed & oil obtained used in industries & to produce commercial products

Soya milk powder for making luppe



# COTTON

| TEMP    | RAIN    | SOIL   | DURATION   | DISTRIBUTION             |
|---------|---------|--|------------|--------------------------|
| 21-30°C | 50-75cm | clayey soil<br>black soil<br>alluvial<br>red, laterite | 6-8 months | Gujarat, AP, Maharashtra |

- \* Ranks 2<sup>nd</sup> → production ; 4<sup>th</sup> - world production area
- \* Kharif crop
- \* Oct - day temp ↑ - ripening & bursting of cotton balls
- \* very ↓ - retard plant growth. \* 200 frost free days → needed mature
- \* sunny, dry weather } flowering
- \* Rain during ball opening → bad → vulnerable to pests, diseases

## METHODS OF CULTIVATION

- \* **Sowing** → before onset of rains → long staple. up to Sep - short, medium
- \* seedlings - thinned out, ground - regularly weeded, cleared of weeds

### **HARVESTING**

- \* Oct } cotton balls - ripen + burst into white balls.
- in 3-4 pickings. R% - yields ↓ with successive pickings

### **PROCESSING**

- \* **GINNING** - process to separate fibres/dirt from seeds and short fibres/linters which adhere to them.
- ↓
- seeds - crushed - get oil; residue - fodder
- ↓
- cotton lint - baled → transport → manufacturing centres
- ↓
- fibres - washed + combed → rope-like mass of fibres

sliver  
↓  
fed to spindles  
& spun to make cotton yarn.

### VARIETIES

- ↳ SUPERIOR LONG STAPLE
- ↳ LONG STAPLE
- ↳ SUPERIOR MEDIUM STAPLE
- ↳ MEDIUM STAPLE
- ↳ SHORT STAPLE

## JUTE

| TEMPER.     | RAIN  | SOIL  | TYPES                              | DISTRIBUTION   |
|-------------|---|---|------------------------------------|--|
| 24°C - 35°C | 150cm <br/> occasional showers <br/> untimely rains - x | new alluvium <br/> loamy → Ho <br/> sinks quickly <br/> clayey, sandy | white jute 75% <br/> tosa jute 25% | WB, Assam, Bihar <br/> > hot damp climate <br/> > alluvial, loamy soil <br/> > more water available > cheap labour |

2 \* species - CORCHORUS CAPSULARIS & CORCHORUS OUTORIUS

"GOLDEN FIBRE" → huge revenue to government

\* Mesta is inferior substitute for jute 3 Bags

\* Tosa jute → uplands

### METHODS OF CULTIVATION

#### SOWING

- ↳ feb → lowlands
- ↳ march-June → uplands

#### HARVESTING

Higher yields → during winter season. while kept in H<sub>2</sub>O  
 h of 2-4 m → mature → cut-bundled → RETTING (ponds)  
 After 20-25 days,  
 bark peeled from plant by hand & fibre-removed from pith

#### PROCESSING

Retting is a <sup>micro</sup>biological process which loosens the outer bark and helps in removing fibre from stalk.

→ softens the outer bark & facilitates the early removal of fibre within  
 fleshy part → decomposed. fibres → scraped to pieces of vegetable matter  
 After drying, fibres loosely spongy & woven

↓  
 making sacks, bags, carpet

Gret. has developed Web Browser Application for Jute.

microbiological

process where the outer bark loosens & helps in removing fibre from stalk

while kept in H<sub>2</sub>O

submerged in H<sub>2</sub>O

## TEA

| TEMP.     | RAIN. | SOIL   | DISTRIBUTION               |
|-----------|-------|--|----------------------------|
| 24°C-30°C | 150cm | well drained<br>deep friable loams<br>or forest land<br>rich in organic<br>fertility | 1) ASSAM<br>2) WB<br>3) TN |

- > high humidity, heavy dew, morning fog } rapid abundant rain } development
- > GR - Tea gardens set up on hill slopes.  
→ high altitude → climatic conditions & the slopes protect the crop from annual inundations and waterlogging during rains.

Tea and water plants  
' toolkit.

> (I) - largest area under tea.

> 4<sup>th</sup> largest exporter

**METHODS OF CULTIVATION**

**FROM SEEDS** → from tea seeds  
→ High quality seeds - well prepared nurseries  
↓  
transplanted within a yr - tea garden

**FROM CUTTINGS** → tea shrubs - nurseries from cutting HTV. } clonal planting  
rather than seeds, cuttings of H.V.V. also used.

**HARVESTING**

**PLUCKING OF LEAVES** - pruning of bush, after 2 yr  
↓  
lower elevations → 10d to maintain height & diameter of  
higher elevations → 15d plant limited to 1 metre.  
S.W monsoon season

- \* Frequent pruning → ↑ encourages fresh leaves & shoots.
- \* GIR - plucking by women
  - Tea-picking - patience & judgement
  - women - better pickers
  - employed at cheaper rates.

fine plucking : 2 tender leaves + bud / shoot .

**PROCESSING** ∴ 4 types

① **BLACK TEA** What a realistic fellow in Dak Burgolow.

**WITHERING** - gathered leaves → withered / dried in sun  
↓  
to extract moisture

**ROLLING** - rolled mechanically b/w steel rollers to break up fibres.

leaves - dried / baked over charcoal → reddish brown colour .

**FERMENTATION** - leaves - fermented } allow tannic acid  
by half

**DRYING** - Further fermentation checked by roasting  
for drying the leaves in oven / fire } BLACK IN  
COLOUR

**BLENDING** - expert blender } further blend  
tea tasters } special aroma, brands.

### B) GREEN TEA

- not dried in sun but in ovens.
  - pick → heated → roasting → rolling
- GR are highly flavoured & strong stimulants.  
A:- higher tannic acid content.

### C) OOLONG TEA

- greenish brown
- drying & fermenting

### D) BRICK TEA

- inferior & coarsest leaves, stems & tea-dust  
compressed - rectangular  
blocks of brick tea.

Bababudan hills  
in  
Karnataka

# COFFEE ☕

on slope  
↓  
So H<sub>2</sub>O -x stagnant

| TEMP.   | RAIN.                             | SOIL   | DISTRI.                   |
|---|-----------------------------------|--|---------------------------|
| 15-28°C<br>moderate moisture<br>fairly long dry weather<br>beans to ripen | 150-200cm<br>prolonged drought -x | well drained<br>friable loamy<br>soil + vegetable<br>mould | Karnataka<br>Kerala<br>TN |

\* strong sunshine, snowfall -x

## METHODS

**SOWING:-** seeds } → nursery → transplanted in fields  
cuttings }

pruned annually → ? ⇒ ease picking  
ensure heavy bearing of coffee berries

**COVERCROPS:-** coffee plant is susceptible to direct sunlight  
planted under shade trees (silver oak, jackfruit)

**HARVESTING:-** begin in 3rd year, also 4th-5th  
by hand - removing ripe berries from stalk.

## PROCESSING :- WET PARCHMENT

### DRY PARCHMENT

cherries - sorted + cleaned

coffee cherries - spread out  
in sun to dry.

beans - fermented by  
drying

after drying, - machines  
peel off **layer of inner  
husk**

sorted - in size &  
quality

beans - separated,  
grounded brown colour +  
aroma + taste

fruit covering removed  
pulping  
↓  
fermented  
↓  
washing  
↓  
drying

|   | TYPES instant coffee |                  |                          |
|---|----------------------|------------------|--------------------------|
|   | ROBUSTA              | LIBERKA          | ARABKA                   |
| > lower elevation                             | lowland              | highland         |                          |
| > poor quality                                | moderate quality     | superior quality |                          |
| > acid conditions like<br>> disease resistant | disease resistant    |                  | susceptible to diseases. |