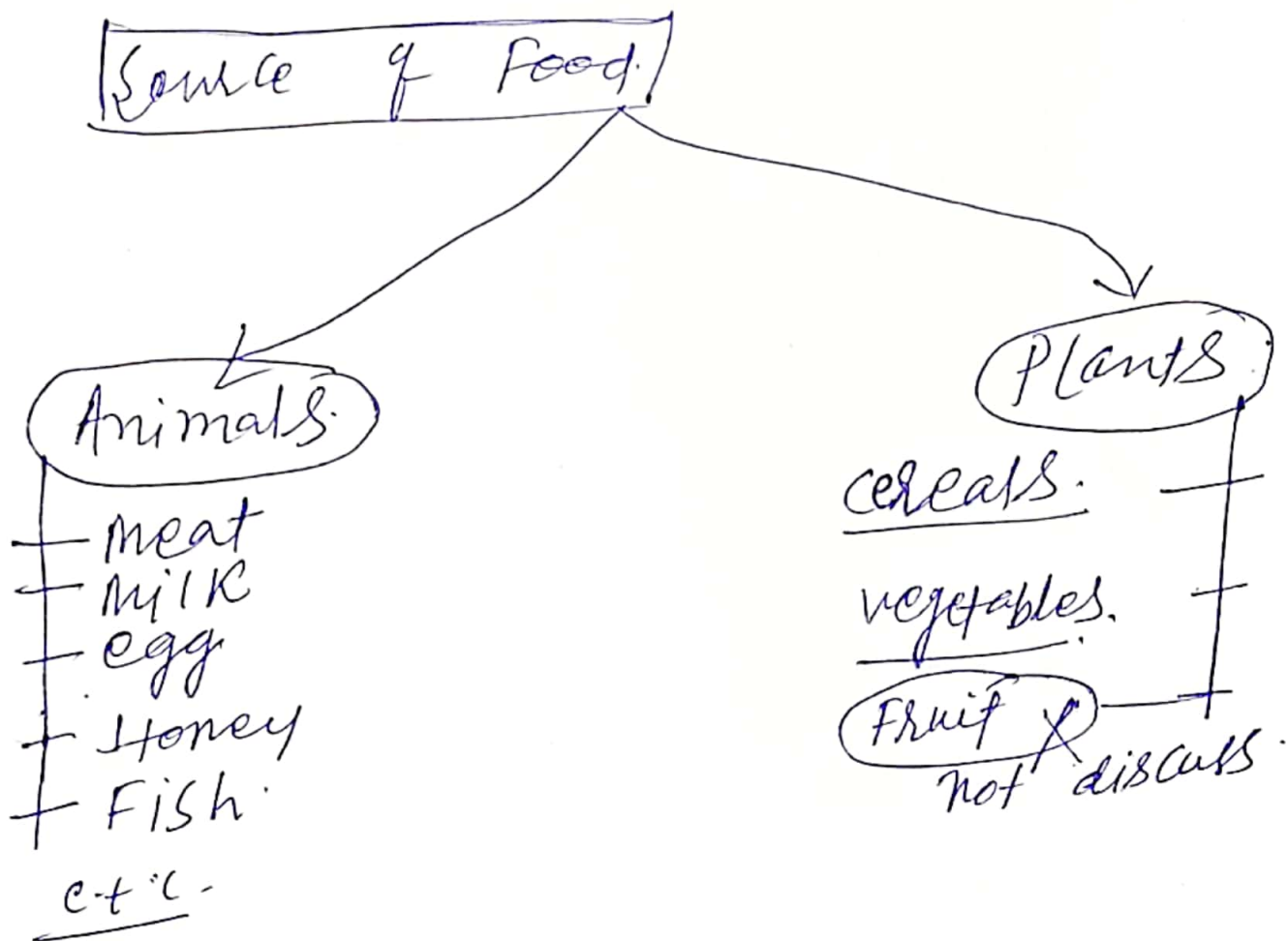


Enhancement of Food Production



Animal husbandry - Breeding & raising of livestock.

- Breeding: - Controlled Mating (i.e. mating b/w two superior variety)

- Livestock: - Domesticated animal including Poultry & fishery

Ex: - Cows (cattle)
- Buffalo
- Goat
- Sheep & horse e.t.c

World Livestock population.

- India & China contain 70% Livestock population of total population.
- only 25% production from this ~~to~~ livestock come; it is ~~to~~ ~~en~~ very less.
- So to Enhance it we need to do some strategic management.

Dairy farm management.

↓
milk & milk produces.

- 1) Selection of good Breed: — High Yield & Disease Resistance.
- 2) Housing — Ventilation, Water.
- 3) Feed — Roughage; concentrates (Mineral, Nutrition & oil cakes)
- 4) Cleanliness —
- 5) Regular visit to VET —

Mainly — we Pet Cow & Buffalo under dairy management.

Buffalo

— Scientific name: Bubalus bubalus

— Disease Resistance compare to Cow

— More Milk

— More FAT in Milk

Famous breed: —

i) Murrah

ii) Mehsana

iii) Surti

iv) Jathrabadi

Cow

→ Bos indicus

Indian Cow variety

i) Gih

ii) Red Sindhi

iii) Sahiwal

Foreign

i) Jersey

ii) Brown Swiss

iii) Holstein

iv) Friesian

⇒ Diseases of cattle

Viral

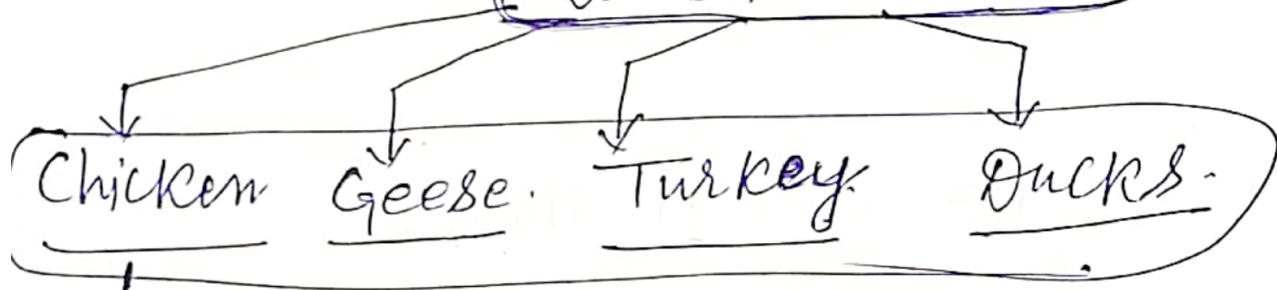
i) Rinderpest (cattle plague)

Bacterial

i) Anthrax
(Bacillus Anthracis)

Poultry Farm Management

— In poultry farm mainly we get
80. Domesticated fowl.



→ we get → Eggs.
→ Meat.

⇒ variety of Hen & Cock.

→ Indian variety

→ Foreign variety 1) → Aseel (cock fighting)
2) → Leghorn.

Some important term in Poultry

i) Broiler — variety for meat production

ii) Layers — variety for Egg production.

iii) Culling: — Killing of fowl (mass) due to disease.

Poultry Disease:

Viral

① Bird-flu $\xrightarrow{\text{Due to}}$ H5N1 virus.

② Ranikhet Disease (New Cast's Disease).

Animal Breeding
2 type

Inbreeding

- closely related individuals, mating for 4 to 6 generation is called inbreeding (i.e. within one breed).

Pros Pure Lines/homozygous for superior character.

Cons - Inbreeding depression (i.e. reduce fertility)

Outbreeding

i) Out cross -

ii) Cross breeding

iii) Inter specific Breeding

to ~~Remove~~ ^{Come out} from Inbreeding depression

① Outcross

Within a breed but unrelated variety of 4 to 6 generation.
if we cross then it called outcross.

ii) Cross breed:- B/w two ~~breeding~~ different variety.

EX:- $\left[\begin{array}{l} \text{Merino Rams } (07) \times \text{Bikaneri Ewes } (9) \\ = \text{HISARDALE} \end{array} \right]$

iii) Interspecific breeding

mule = $\left(\frac{\text{Female Horse}}{\text{(mare)}} \right) \times \left(\frac{\text{Male Donkey}}{\text{Jack.}} \right)$

⇒ Hinny = Male Horse × Female donkey

⇒ Liger = Male lion × female tiger

⇒ Tigon = Male Tiger × Female lion

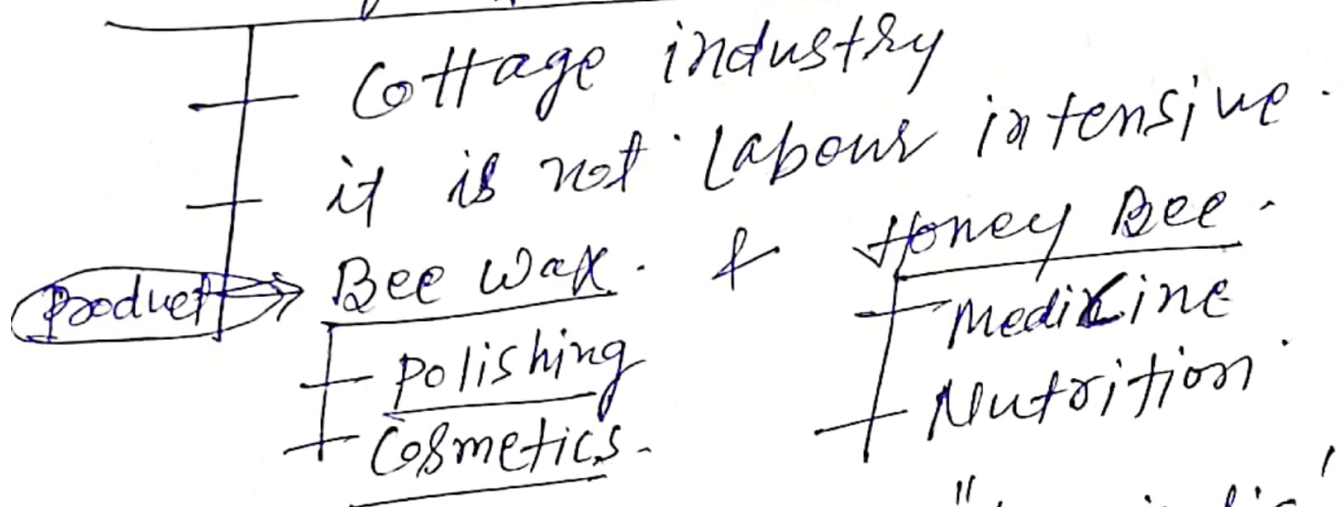
Multiple Ovulation Embryo Transfer Technique (MOET) ^{Balch}

In the Response of FSH (inject through man)
a Superior female produce 6-8 ova/egg
& then it ~~is~~ artificially inseminated
So 6-8 zygotes will form
& at the 8-32 cell stage
non surgically remove & implanted
into 6-8 different cow's uterus
& after embryo development
we can get 6-8 Superior
variety of cow.

Bee Keeping.

→ Api-culture - Arrangement of
bee-hive in a artificially
arranged Area.

use of Api-culture.



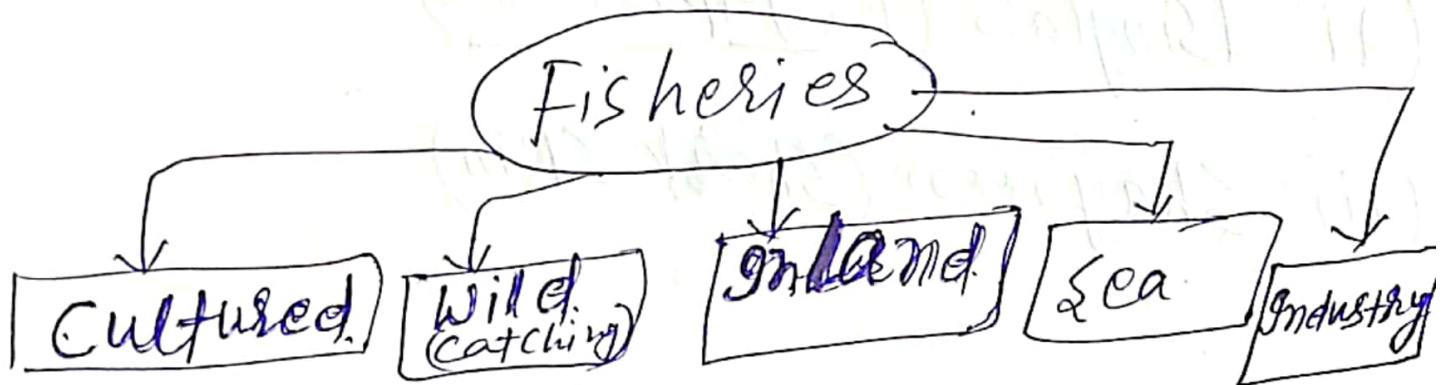
Bee variety in india → "Apis indica"

#> Knowledge for Bee-keeping.

- i) Knowledge of the nature & habits of bee
- ii) Selection of suitable location for keeping beehive
- iii) catching & hiving of swarms (Group of bees)
- iv) Management of beehives during different season.
- v) Handling & collection of honey & of beeswax.

Fisheries

— Catching, processing & selling
of fish, molluscs, crustaceans etc



⇒ Aqua culture — Raising of aquatic plants & animals

⇒ Pisciculture — It is a type of aqua culture in which only farming of fish takes place.

⇒ Blue Revolution — World wide increase in production of Aquatic product (including plant & fish)

<u>Freshwater</u>	<u>Edible fish</u>	<u>Marines</u>
① Catla	① Sardine	
② Rohu	② Hilsa	
③ Mrigal	③ Pomfret	
④ Magur	④ Salmon	

Important product from fisheries

- (i) Cod Liver oil - (Vit-A)
- (ii) Isinglass (for gelatin production)
- (iii) Shagreen (Shark skin)

Plant Breeding.

- ① Collection & variability
- ② Evaluation & Selection of parents
- ③ Cross hybridization among the selected parents.
- ④ Selection & testing of superior recombinants.
- ⑤ Testing, release & commercialization of new cultivars.

— Germ^{plasm} Collecting — Collection of all Gene (Allele) of a plant variety is called Germ plasm collection.

Green Revolution - M.S. Swaminathan.

1960's — 2000

— Planted — Improved Semidwarf Varieties

— Norman Ernest Borlaug.

— Mexico → (International Center for Wheat & Maize improvement)

He develop
2- variety
of wheat

① Sonalika

② Kalyan-Sona

} Wheat

Rice - varieties

Jaya & Ratna

produced through

IR8 ♀

International Rice
Research Institute
(Phillipines)

♂
Taichung Native 1
(Taiwan)

Sugar-Cane

North Indian
Sugar Cane

Thin Stem

Less Sugar

Saccharum
Barberi

Thick Stem

more sugar
produce

South India
Sugar Cane

Saccharum
officinarium

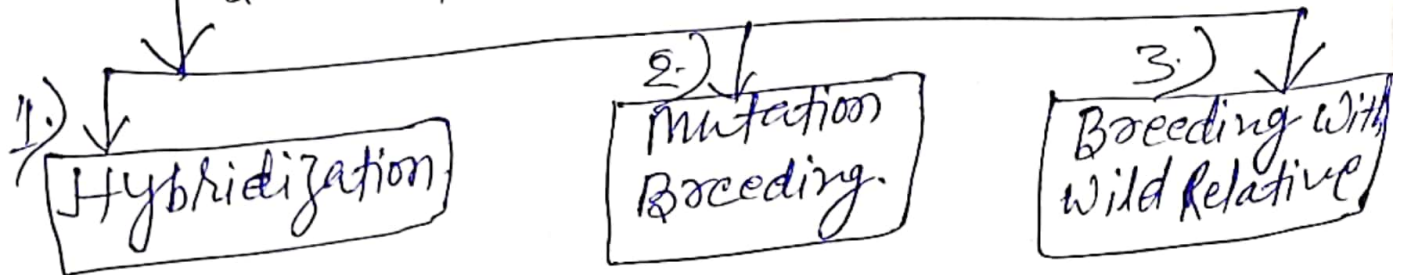


Mating
b/w both variety
to make disease
resistance.

Superior variety
formed.

Plant Breeding for Disease Resistance

3-way.



1) Hybridization.

Crop	Variety	Resistance to Disease
Wheat	Himgiri	Leaf & Stripe Rust, Mill bunt
Brassica	Pusa Swarnim (Karan Rai)	White Rust
Cauliflower	Pusa Subhaga Pusa Snowball K-1	Black Rot & Chl. 1 Blight Black Rot
Cow Pea	Pusa Komal	Bacterial blight
Chilli	Pusa Sadabahar	Chilli Mosaic Virus Tobacco Mosaic Virus & Leaf Curl

2) Mutation Breeding - In Mung bean (Mungdaa) powdery mildews & Yellow mosaic virus was treated using the help of UV-Ray mutation (heat & Trail method).

3) Hybridisation/Breeding with Wild Relatives -
A variety of Ladyfinger (*Abelmoschus Esculentus*) cross with its wild variety to Resistance from Yellow mosaic virus.

Plant Breeding for insect Pest Resistance

Crop-	variety	Insect Pests
Brassica (RapeSeed Mustard)	Pusa Gaurav	Aphids
Flat bean	Pusa Sem 2 Pusa Sem 3	Jassids, Aphids & Fruit borer
Okra (Bhindi)	Pusa Sawani Pusa A-4	Shoot & Fruit borer

Biofortification - Adding Extra nutrients ~~to~~ in existing varieties by hybridization.

- 1.) protein content & Quality.
- 2.) oil content & Quality.
- 3.) vitamin content.
- 4.) Micro nutrient & Mineral content.

Bio-fortification	Crop
1.) Vit-A Enriched	Carrot, Spinach, Pumpkin
2.) Vit-C Enriched	Bitter Guard, Bathua, Mustard, Tomato
3.) Iron & calcium Rich	Spinach, Bathua
4.) Protein enrich	Beans, Broad-Label, French, Golden Rais

(Note: - Atlas 66 is a wheat variety with High protein content)

Single cell protein.

- Protein Rich microbes are considered under Single cell protein.
- These microbes can produce very fast (protein) nutrient content.

1) Methylophilus → protein
(Bacteria)

2) Spirulina → protein
(BGA)

3.) Chlorella (space algae) → protein.
(single cell algae)

Tissue culture

- From a plant took a piece of Tissue/Cell except (seed). & put them into culture medium having nutrient solution then callus (undifferentiated mass of cell) grow & then put them into another medium having Auxin (Responsible for Root-development) & Cytokinin (Responsible for shoot-development) then new plant-let ~~(Seedling)~~ i.e Soma-clone will grow.

- Micro propagation - Technique Through Tissue-culture produce thousands of plants is called micro propagation.

- Totipotency - property of a cell/tissue to form a ~~complete~~ complete individual.

- Meristem culture - Using Meristem of plant perform tissue culture is called Meristem culture.

→ It is used to grow virus free plant.

- Somatic hybridization -

