Agro-biotechnology or bioprocess

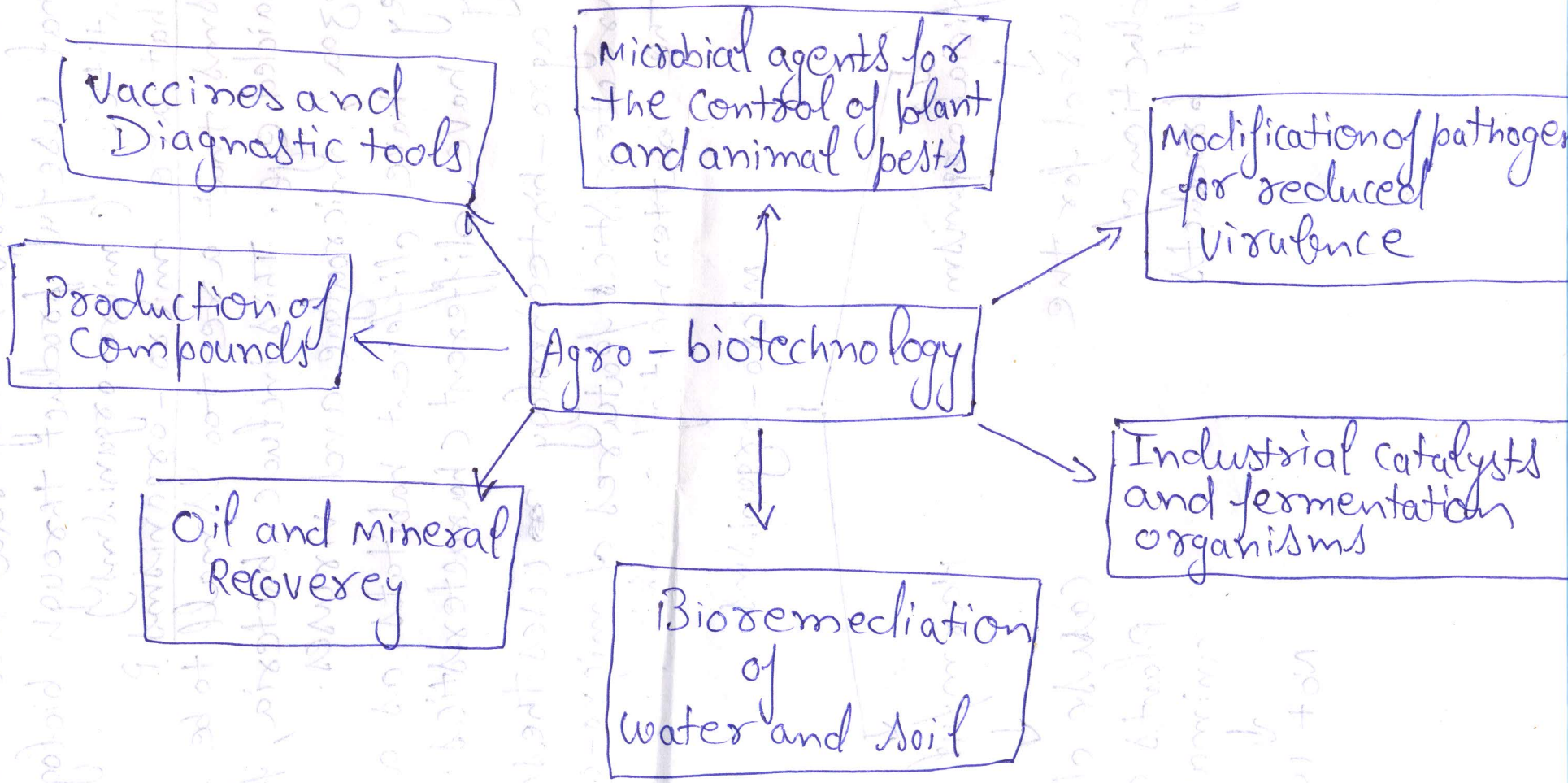
→ an industry-based-process biotechnology.
→ involves conversion of raw materials to final useful product through biological entities. (micro-organisms)
→ what are micro-organisms?
organisms that are too small to be seen by an unaided eye. This include bacteria, fungi, protozoa, microalgae and viruses.
→ They have different habitats as a result they have different characteristics.
→ So agro-biotechnology uses these different characteristics features of micro-organisms for the betterment of mankind.

Micro-organisms

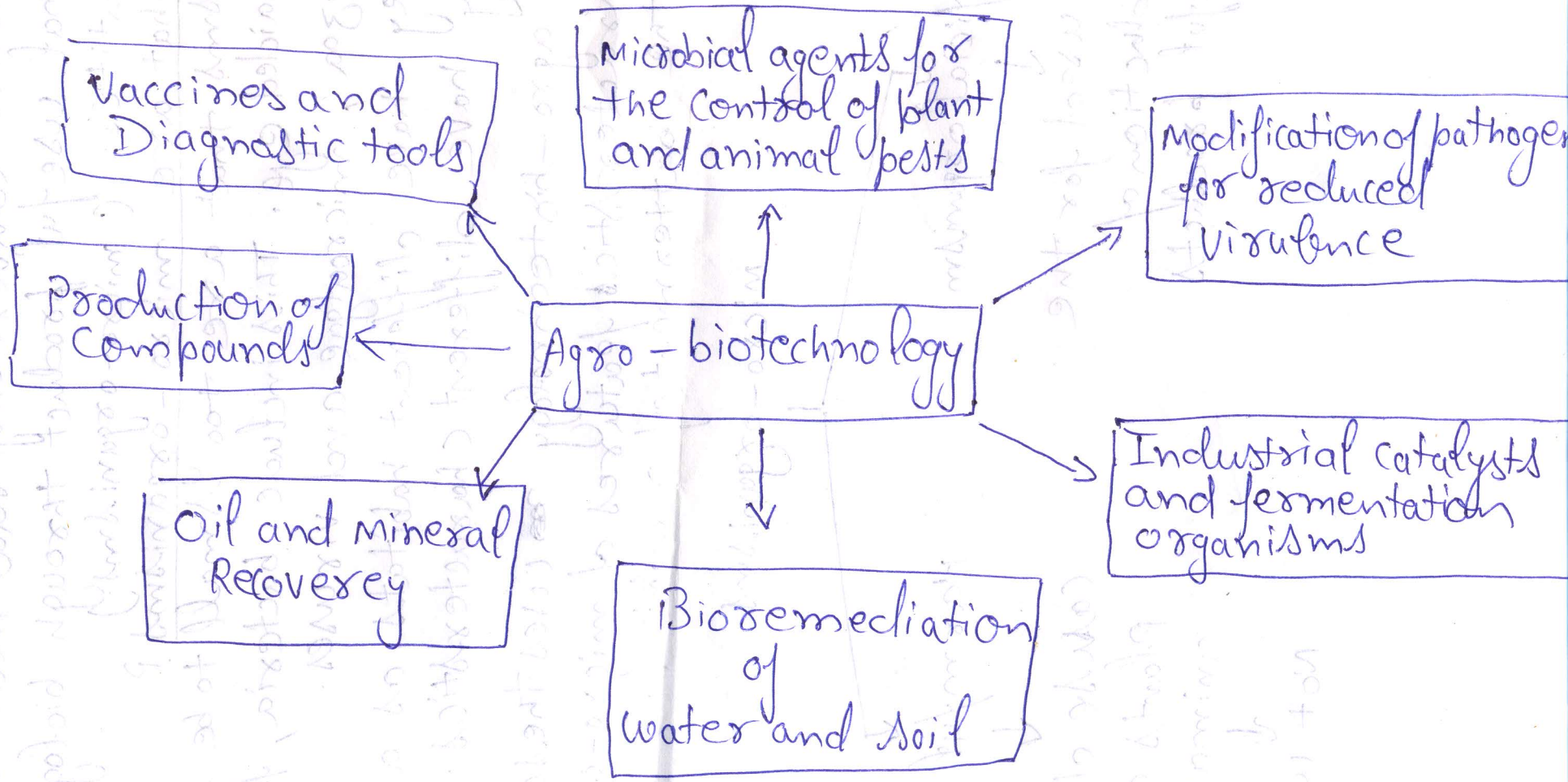
Beneficial organism
↓
are used for the production of useful products

Harmful organism
↓
cause diseases in plants and animals
↓
Not used.

Objectives of agro-biotechnology



Objectives of agro-biotechnology



(k) Others → Glycerol, fats etc.

(l) Vitamins → B_{12} and riboflavin

(m) Recombinent Proteins → Insulin, Interferon

(2) cells/Biomass

(a) Biomass → Food yeast and Single cell protens.

(b) cells → Biofertilizers, biocontrol agents and bioinsecticides.

(c) Vaccines → Viral and bacterial vaccines.

(3) activity :-

(a) Biotransformation or bioconversion → Steroid, antibiotics etc.

(b) Degradation → Disposal of biological and industrial waste, detoxification of toxic compounds.

(c) Solubalization or accumulation → Improved recovery of oils and metals, Discovery of new oil reserves, Recovery of toxic metals.

Characteristics of microbes for industries

(1) Ability to grow on easily available and cheap raw materials.
(2) ability to maintain a physiological constancy (quality unchanged)
(3) ability to undergo biochemical transformation. (i.e. microbial cell can convert raw secondary metabolics or compound into an useful product through variety of Reactions)
(4) high surface to volume ratio i.e. it facilitates the rapid uptake of nutrients to support rates of metabolism and biosynthesis.

importance of micro-organism :→

Products/activity	Examples
(1) Products :→	
(a) amino acids	→ L-glutamic acid, L-lysine
(b) Antibiotics	→ streptomycine, penicillin
(c) Beverages	→ wine and beer
(d) Biodegradable plastic	→ Polyhydroxybutyrate.
(e) enzymes	→ amylase and protease
(f) Flavouring agent	→ MSG, nucleotide etc.
(g) Foods	→ Cheese and bread etc.
(h) Gases	→ CH_3, H_2 and CO_2.
(i) organic acids	→ Lactic acid and acetic acid
(j) organic solvents	→ Acetone etc.

Year	Work
Late Eighties	→ Raw materials for plastic industry obtained from microbes → Industrial chemicals produced by microbes.
Nineties	→ Biofertilizes, Biopesticides and microbes for extraction of metals from industry waste developed. → Small scale production of hydrogen from bacteria → Single cell protein.

History of agro-biotechnology

① ~~Before 6000 BC :- yeast employed as~~

Year	Work
Before 6000 BC	Yeast employed to make wine and beer.
Approx 4000 BC	Bread produced with the help of yeast.
Before AD 1521	→ algae from lakes used as a food.
Before 1670-1680	→ Copper mined with the help of microbes.
1876	→ L. Pasteur indentifies microbes as a cause of failed beer fermentation.
Approx 1890	→ Alcohol first used to fuel motors.
1912-1914	→ Three important industrial chemicals (acetone, butanol and glycerol) were obtained from bacteria.
1928	→ A. Flaming discovered pencillin
1944	→ ~~bag~~ Large scale production of penicillin.
1962	→ Mining of uranium with the aid of microbes begins in Canada
1973	→ Brazilian govt. replace oil with alcohol.
Mid Eighties	→ New antibiotics produced by cell fusion.