

**Chemicals of therapeutic value and Low
priority aquaculture drugs**

Chemical

- **Chemical** is a distinct compound or substance, especially one which has been artificially prepared or purified or extracted from natural sources.
- **Compound:** Thing consisting of several parts or elements.
- **Elements** are chemically the simplest pure substances (made up of one types of atom) which cannot be broken down into another substances.

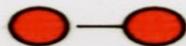
Mostly, however substances contain **more than one type of atom**. These are called **compounds**.

Water is made up of **hydrogen atoms** and **oxygen atoms**. Its formula is **H₂O**.

Carbon Dioxide is made up of carbon and oxygen atoms.
CO₂



Atoms



2 atoms joined
molecule



Molecules in a
Compound

Definitions

Element - A substance which cannot be broken down into something simpler.

e.g. O, N, H.

Compound - Two or more elements combined.

e.g. Water, H₂O Carbon Dioxide CO₂

Mixtures - Contain different substances but not combined.

e.g. Air

Therapeutic

- Therapeutic is a branch of medicine that is concerned specifically with the treatment of disease.

Sources of Therapeutic chemical compound

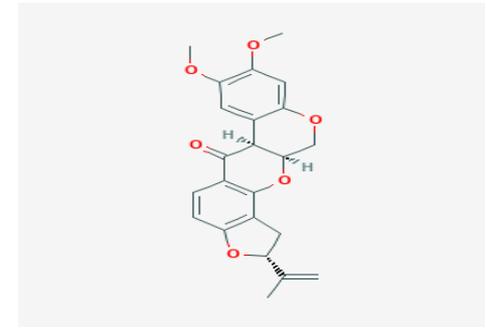
Therapeutic agents are obtained from 6 major sources-

1. Plants sources
2. Animals sources
3. Minerals or Earth sources
4. Microbiological sources
5. Synthetic sources
6. Recombinant DNA technology

Plant sources

- All most all parts of the plant are used- stem, leaves, bark, fruit and root.
- Leaves:
- The leaves of *Digitalis purpurea* are the source of Digitoxin and Digoxin, which are cardiac glycosides.
- Leaves of Eucalyptus gives oil of Eucalyptus, which is important component of cough syrup.
- Tobacco leaves give nicotine.

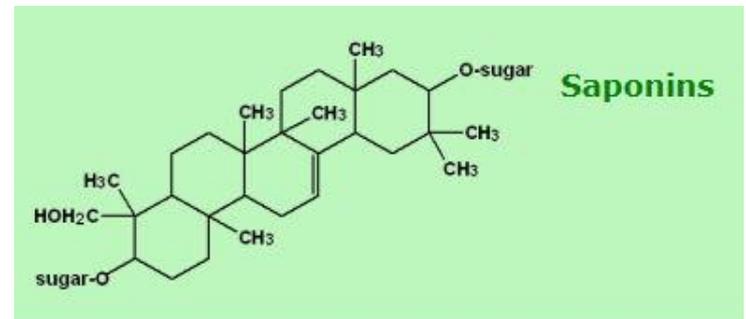
Rotenone



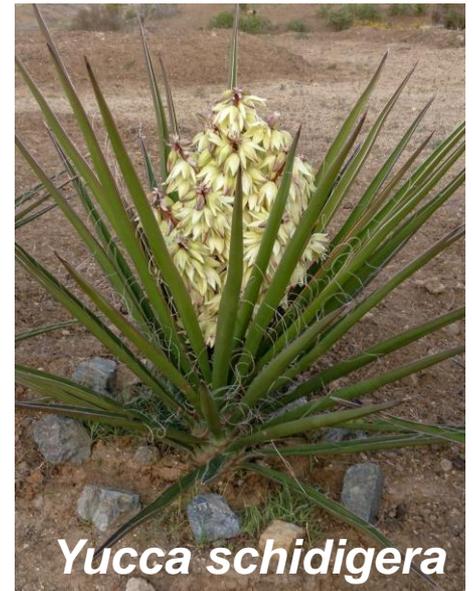
- Insecticide, piscicide, and pesticide.
- It occurs naturally in the seeds and stems of several plants, such as the **jicama vine plant**, and the roots of several members of **Fabaceae plant**.
- Rotenone is produced by extraction from the roots and stem
- Rotenone works by interfering with the electron transport chain in mitochondria.
- Rotenone also inhibits microtubule assembly.

Saponin

- Saponins are glucosides with foaming characteristics.
- Saponins consist of a polycyclic aglycones attached to one or more sugar side chains.
- The foaming ability of saponins is caused by the combination of a hydrophobic (fat-soluble) sapogenin and a hydrophilic (water-soluble) sugar part.
- Saponins have a bitter taste.
- Saponins toxin are known as **sapotoxin**.



- The best known sources of saponins are peas, soybeans, and some herbs with names indicating foaming properties such as soapwort, saoproot, soapbark and soapberry.
- Commercial saponins are extracted mainly from *Yucca schidigera* and *Quillaja saponaria*.



Animal sources

- Pancreas is a source of **Insulin**, used in treatment of Diabetes.
- Urine of pregnant women gives **human chorionic gonadotropin (hCG)** used for treatment of infertility.
- Sheep thyroid is a source of **thyroxin**, used in hypertension.
- Cod liver oil is used as a source of **Vitamin A** and **D**.
- Blood is used in preparation of **vaccine**.

Mineral sources

- Iron is used in treatment of iron deficiency anaemia.
- Zinc is used as zinc supplement. Zinc oxide paste is used in wounds.
- Iodine is antiseptic. Iodine supplement are also used in diet.
- Fluorine has a antiseptic properties.
- Selenium sulphide is used in anti dandruff shampoos.

Synthetic sources

- Synthetic drugs are manufactured to pharmacologically resemble naturally occurring drugs.
- Example- Emetine bismuth Iodide, Apomorphine, Ampicillin, Methyl testosterone etc.

Microbial sources

- *Penicillium notatum* is a fungus which release penicillin.
- Actinobacteria give Streptomycin.
- Aminoglycosides such as gentamicin obtained from Streptomyces.

- **Antimycin A**

- **Antimycin A** is a secondary metabolites produced by *Streptomyces* bacteria.
- Antimycin A is the active ingredient in Fintrol, a chemical **piscicide** (fish poison) used in Aquaculture.
- Antimycin A is an inhibitor of cellular respiration, specifically oxidative phosphorylation.

Recombinant DNA technology

- Recombinant DNA technology involves cleavage of DNA by enzyme restriction endonucleases.
- The desired gene is coupled to rapidly replicating DNA (Viral, Bacterial or Plasmid).
- The new genetic combination is inserted into the bacterial cultures which allow production of vast amount of genetic material.
- **Advantage:**
- Huge amount of drugs can be produced.
- Drug can be obtained in pure form.

Low Regulatory Priority (LRP) Drugs

- LRP drugs are harmless compounds that have historically been used in aquaculture but will likely never be approved by FDA.
- List of LRP are:

SL NO	Drug name	Application / Action
1	Acetic acid	Parasiticide
2	Calcium Chloride	Egg hardening
3	Calcium Oxide	Protozoacide
4	Carbon dioxide gas	Anaesthetic
5	Fuller's earth	Reduce egg adhesion
6	Garlic	Parasiticide
7	Ice	Reduce metabolic rate

SL NO	Drugs Name	Application / Action
1	Magnesium Sulfate	Parasiticide
2	Onion	Parasiticide
3	Papain	Remove egg mass gelatinous material
4	Potassium Chloride	Osmoregulation
5	Povidone iodine	Egg surface disinfectant
6	Sodium bicarbonate	anaesthetic
7	Thiamine hydrochloride	Thiamine deficiency in Salmonids
8	Sodium Chloride	Osmoregulation
9	Sodium Sulfite	Improve egg hatchability
10	Urea and Tannic acid	Denature egg adhesion
11	Clove Oil	Anaesthetic

Assignment for Group-1 (FSP)

Dated....

Case study report

Topic: Case study of village fish farmer

• Point to be write:

1. Name of Farmer, Information about pond/farm/ area etc.
2. Mannuring/fertilizer/liming schedule
3. Feeding
4. Treatment of weed fish and aquatic weeds

Submitted by: your name, registration number

Send it to me, Email: tasok.leya@cutm.ac.in

Assignment for Group-2 (FSP)

Dated....

Case study report

Topic: Case study report on fish epidemiology

• Point to be write:

1. Farmer name, pond detail
2. Details of Fish seed source
3. Prophylaxis schedule
4. Details of Epidemiology

Submitted by: your name, registration number

Send it to me, Email: tasok.leya@cutm.ac.in