

# **Anti-nutritional Compounds in Legumes and Oilseeds**

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## Anti-nutritional Compounds in Legumes and Oilseeds

Compounds that interfere with the absorption of nutrients.

- They function as the immune system of the plant, offering protection from the radiation of the sun, foraging by animals and from invasion by micro-organisms.
- Raw soybeans would inhibit the growth in rats and will result in enlarged pancreas unless the seeds are cooked.
- Proteinase inhibitors were capable of inhibiting the growth of insect larvae.
- Therefore, the presence of those proteins and chemicals are part of the survival mechanism of the species. □ Factors such as protease inhibitors can interfere with protein utilization if ingested, lectins adversely affect carbohydrate utilization, and gossypol in cottonseed can tie up iron.

# ANTI NUTRIENT COMPOUND IN PLANT FOOD

## Antinutrients



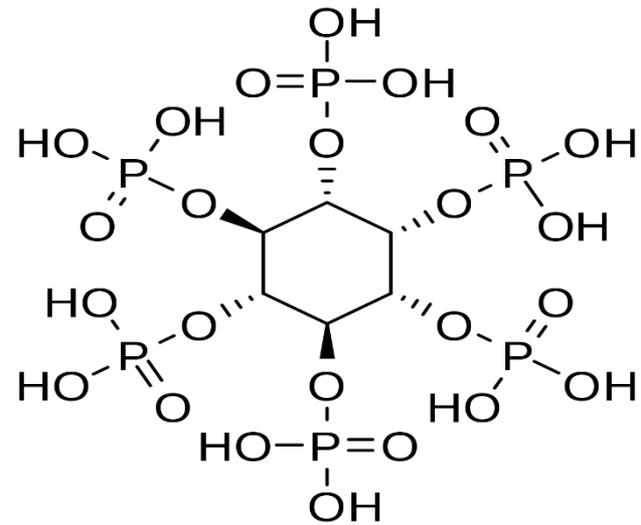
## Major dietary sources



- |    |   |   |   |
|----|---|---|---|
| 1. | Phytic acid or phytin   | → | Whole legume seeds and cereal grains  |
| 2. | Fibre (for example, cellulose, hemicellulose, lignin, cutin, suberin) | → | Whole cereal grain products (for example, wheat, rice, maize, oats, barley) |
| 3. | Tannins and polyphenols   | → | Tea, coffee, beans, sorghum   |
| 4. | Oxalic acid   | → | Spinach leaves, rhubarb, Kale, Chard and other heartily leafy greens        |
| 5. | Hemagglutinins (for example, lectins)                                 | → | Most legumes and wheat, beans   |

## Phytic acid/ phytin

- It is the principal storage form of phosphorus in plant tissue, especially bran and seeds. Catabolites of phytic acid are called lower inositol polyphosphates.
- Due to its molecular structure, phytic acid has affinity to polyvalent cations, such as minerals and trace elements, and could in this way interfere with their intestinal absorption in man and animal.
- During the germination of seeds, phytate is hydrolyzed, and phosphorous along with minerals such as calcium, magnesium and iron are liberated, becoming available for germination and development of the seedlings.



There are some beneficial aspects of phytates, despite it has received status of anti nutrients.

Antioxidative effect

Preventing pathological calcification e.g. Kidney stones

Cholesterol lowering effects

Anticancer activity



## Lentils

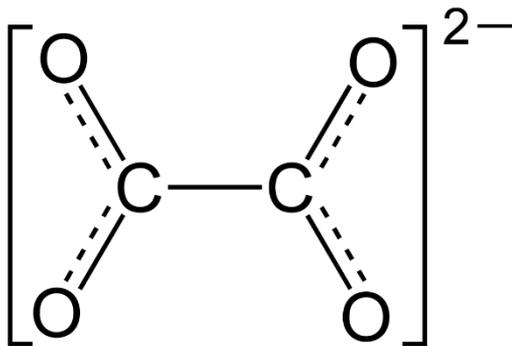
Lectins are carbohydrate binding proteins macromolecules that are highly specific for sugar moieties of other molecules.

- They perform recognition on cellular and molecular level.
- They mediate attachment and binding of bacteria and virus to their intended target

# Functions of Lectins in Plants

- Rhizoba binding ( lectin knockout transgene studies)
- Plant germination and seed survival growth.
- Recognition of non carbohydrate ligands.

## Oxalates

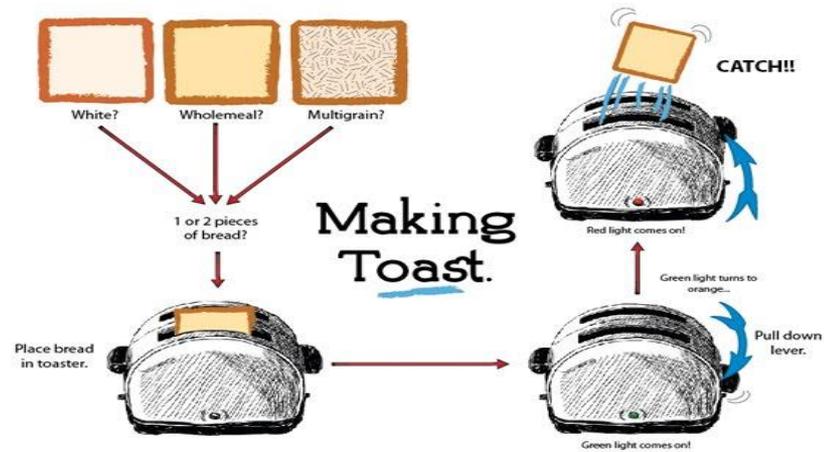


- Oxalates interfere with calcium absorption. Oxalates will also crystalize in tissues if consumed regularly, creating arthritis-like symptoms and even kidney stones.
- Calcium and magnesium bind to the oxalates in your stomach and prevent them from being absorbed.
- Oxalates present in plants bind with calcium are practically insoluble

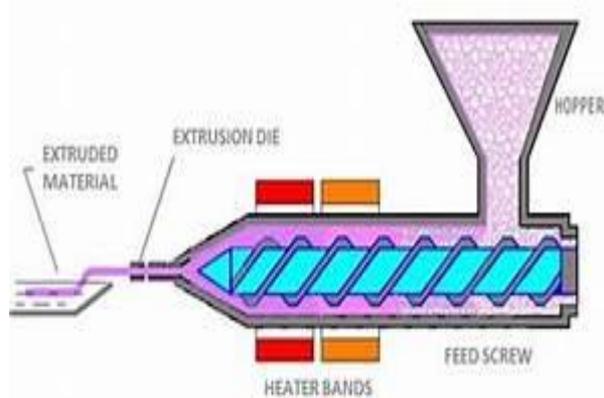
# Different Methods to remove anti-nutritional compounds



1. Boiling



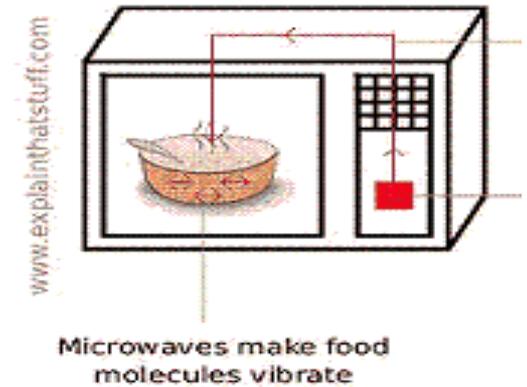
2. Toasting



3. Extrusion



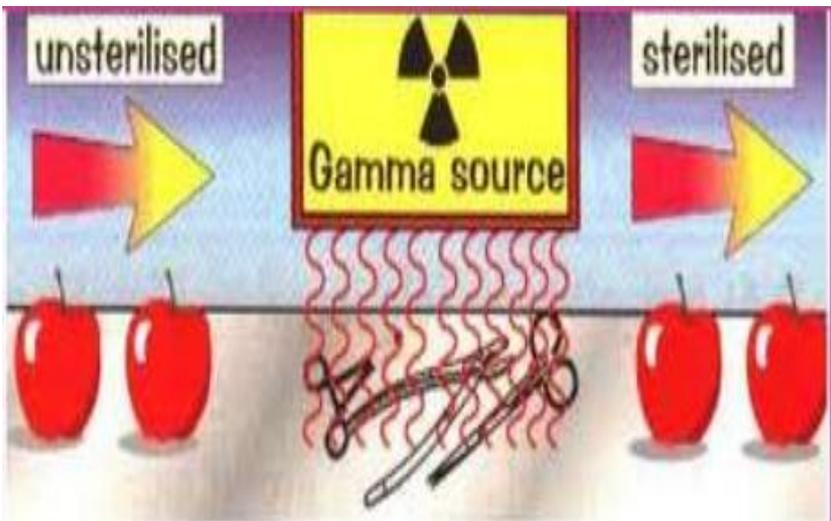
4. Roasting



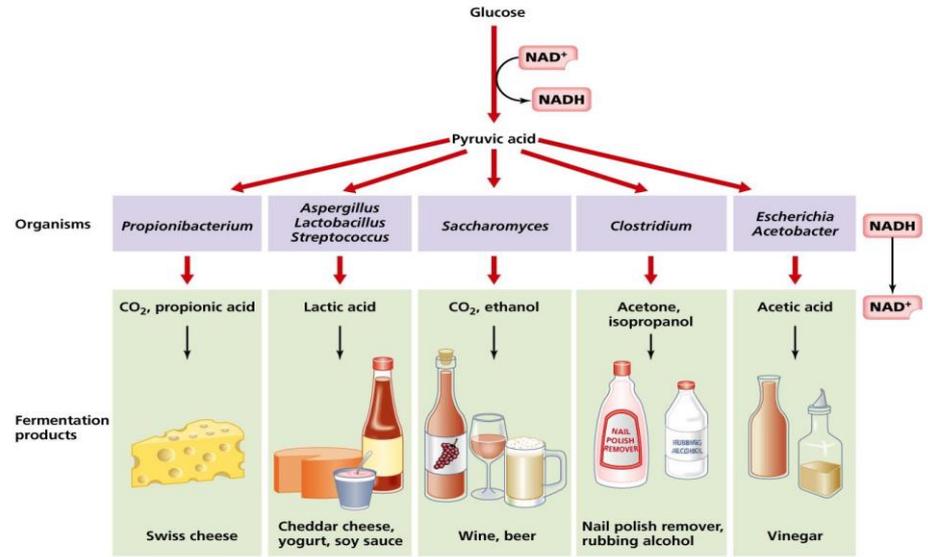
5. Micronization



➔ **6. Cooking**



**7. Irradiation**



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**8. Fermentation**

SL. NO.	TREATMENTS	EXPLANATIONS
1.	Steaming	Heating at ultrahigh temperatures (>100 °C)
2.	Blanching	Mild boiling (75 °C – 95 °C) to inactivate Endogenous enzymes and avoid cooking.
3.	Extrusion	HTST processing involving a combination of high temperature, pressure, and shear processing
4.	Roasting	Dry heating at 120 °C – 250 °C
5.	Soaking	Exposure to water and salt solutions with or without additives to encourage ANF loss
6.	Processing chemical and chemical modification	Treatment with thiosulphite, cu-salts (ascorbic Acid).