ANTINUTRIENTS: CHEMICAL STRUCTURE, FUNCTIONALITY AND FOOD PRACTICES TO REDUCE ITS EFFECT

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OBJECTIVES

- In which foods can we find antinutrients in greater quantity
- What biochemical nature do they have
- How they interact with the other components present in food.
- Which techniques can be used to reduce their effect
- Investigate if they bring any technological or health benefits.

WHAT ARE ANTINUTRIENTS

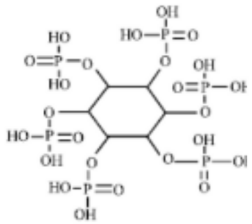
Antinutrients are natural compounds present in vegetables, which interfere with the absorption and function of other compounds and nutrients, reducing their bioavailability.

EXAMPLES OF VEGETABLES: legumes, seeds, green tea, spinach, broccoli, cereals, nuts, grapes

TYPES OF ANTINUTRIENTS

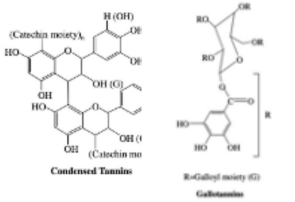
CHELATION MECHANISM: They bound by covalent bonds to a mineral or protein, preventing them from being absorbed properly.

PHYTIC ACID



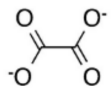
- Chelate minerals, proteins and enzymes
- Phytases degrade phytic acid and reduce the chelating effect

TANNINS



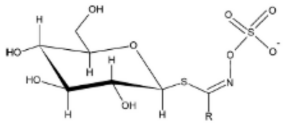
- Chelate metals and protein.
- Tannin-protein complexes can form aggregates and precipitate

OXALATES



- Chelate minerals
- Absorbed oxalates could contribute to the formation of calcium oxalate kidney stones

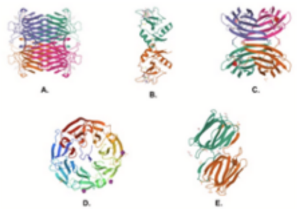
GLUCOSINOLATES



- Chelate minerals, mainly iodine
- Glucosinolates are modified to form isothiocyanates, nitriles, and other products

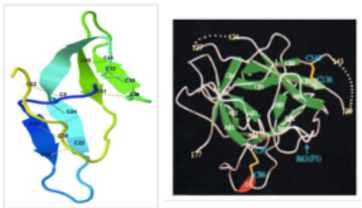
ENZIME INHIBITION MECHANISM: they act by binding to enzymes or their substrates and forming inactive complexes, as a consequence, the activity of these enzymes is blocked.

LECTINS



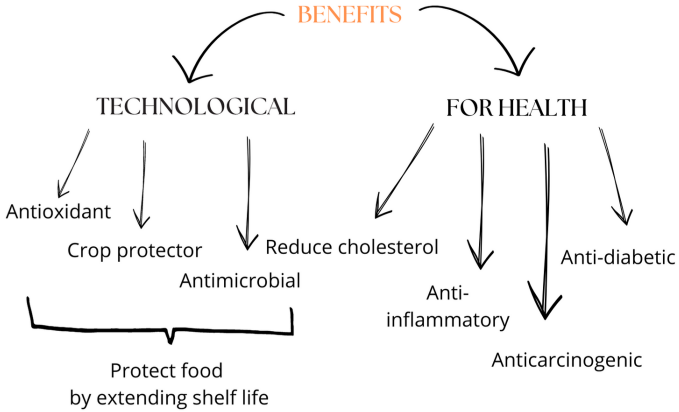
- Chelate carbohydrates
- They are resistant to digestive enzymes

TRYPSIN INHIBITORS



- Chelate trypsin and chymotrypsin
- Causes hypertrophy of the pancreas

BENEFITS



PRACTICES TO REDUCE THE EFFECT OF ANTINUTRIENTS

PHYSICAL PROCESSES

Soak:
Reduction depends on solvent and time

Cooking:
Reduction depends on time and temperature.

Decrease the quality of food

Extrusion:
High temperatures and shear forces
Short residence times

Irradiation:
Results similar to cooking
Faster and more efficient

Differential solubility:
Precipitate by adjusting the pH and centrifuge or filter to remove it

BIOLOGICAL PROCESSES

Germination:
It activates mechanisms that reduce antinutrietns.

Improve the nutritional quality of food. ✓

Enzymatic processes
Inactivate antinutrients by endogenous enzymes and/or the addition of exogenous enzymes

Does not damage the quality of the nutrients ✓

Fermentation:
Bacteria and yeasts do fermentation and lower the pH.Enzymes that degrade antinutrients are activated

Preserves the quality of food ✓

CONCLUSIONS

- Knowing about antinutrients is very important to be able to have a healthy, balanced diet without deficits, especially for vegan or vegetarian people, people who follow raw vegan diets and people who live in regions where there is a lack of availability of varied foods and consumption of edible wild plants is very high.
- With adequate treatment and moderate consumption, along with a varied and balanced diet, they can benefit us.
- The processing method used will depend on each type of food and the purpose for which they want to be used. Industrially, fast and efficient methods are needed. Currently, many alternatives are being studied in the industrial field to try to reduce the action of antinutrients as much as possible while preserving the quality of food.