

How to Reduce Anti-nutrients in Foods

Nutrients in plants are not always easily digested because plants may contain “antinutrients”. These are plant compounds that reduce the absorption of nutrients from the digestive system. They are not a major concern for most people, but may become a problem during periods of malnutrition or among people who base their diets almost solely on grains and legumes. However, antinutrients aren't always "bad." Under some circumstances, antinutrients like phytates and tannins, may have some beneficial health effects as well, including lowering risks of developing cancer and even supporting bone health despite their effect on mineral availability.

The most widely studied antinutrients include:

1. *Lectins*. Found in all food plants, especially in seeds, legumes and grains, they may be harmful in high amounts when uncooked by interfering with the absorption of nutrients.
2. *Phytates*. Mainly found in seeds, grains and legumes, phytates are formed when phytic acid binds with minerals, including iron, zinc, magnesium and calcium, in the intestines, reducing their absorption.
3. *Tannins*. Associated mostly with wine, tannins (or tannoids) are a class of astringent, polyphenolic biomolecules that bind to and precipitate proteins and various other organic compounds including amino acids and alkaloids. These compounds are widely distributed in many species of plants, where they play a role in protection from predation (also acting as pesticides) and might help in regulating plant growth.
4. *Protease inhibitors*. Widely distributed among plants, especially in seeds, grains and legumes, they interfere with protein digestion by inhibiting digestive enzymes.
5. *Calcium oxalate*. The primary form of calcium in many vegetables, such as spinach. The calcium bound to oxalate is poorly absorbed.

As mentioned, these are naturally occurring compounds found in many plants and many are beneficial to human health. Their “anti-nutrient” effects can be eliminated when following a few simple cooking techniques.

COOKING. High heat, especially when boiling or pressure-cooking, can degrade antinutrients like lectins, tannins and protease inhibitors. One study showed that boiling pigeon peas for 80 minutes reduced protease inhibitors by 70%, lectins by 79% and tannins by 69%. Additionally, calcium oxalate is reduced by 19-87% in boiled green leafy vegetables. Steaming and baking are not as effective. In contrast, phytate is a little more heat-resistant and not as easily degraded with boiling but pressure-cooking is effective. The cooking time required depends on the type of antinutrient, food plant and the cooking method. Generally, a longer cooking time results in greater reductions of antinutrients.

Combining many methods can reduce antinutrients substantially, sometimes even completely. As an example, soaking, sprouting and lactic acid fermentation decreased the phytate in quinoa by 98%. Similarly, sprouting and lactic acid fermentation of corn and sorghum degraded phytate almost completely. In addition, soaking and boiling pigeon peas led to a 98-100% reduction in lectins, tannins and protease inhibitors.

SOAKING. Most of the antinutrients in these foods are found in the skin. Since many antinutrients are water-soluble, they simply dissolve when foods are soaked. In legumes, soaking has been found to decrease phytate, protease inhibitors, lectins, tannins and calcium oxalate. For example, a 12-hour soak reduced the phytate content of peas by up to 9%. Another study found that soaking pigeon peas for 6-18 hours decreased lectins by 38-50%, tannins by 13-25% and protease inhibitors by 28-30%. The reduction of antinutrients may depend on the type of legume. In kidney beans, soybeans and faba beans, soaking reduces protease inhibitors only very slightly. Leafy vegetables can also be soaked to reduce some of their calcium oxalate.

SPROUTING. Sprouting is a period in the life cycle of plants when they start emerging from the seed. This natural process is also known as germination. This process increases the availability of nutrients in seeds, grains and legumes. Sprouting takes a few days, and may be initiated by a few simple steps:

- Begin by rinsing the seeds to remove all debris, dirt and soil.
- Soak the seeds for 2-12 hours in cool water. The soaking time depends on the type of seed.
- Rinse them thoroughly.
- Drain as much water as possible and place the seeds in a sprouting vessel, also called a sprouter. Make sure to place it out of direct sunlight.
- Repeat rinsing and draining 2-4 times every 8-12 hours.

During sprouting, changes take place within the seed that lead to the degradation of antinutrients such as phytate and protease inhibitors. Sprouting has been shown to reduce phytate by 37-81% in various types of grains and legumes. There also seems to be a slight decrease in lectins and protease inhibitors during sprouting. You can find detailed instructions on other websites. For example, Sprout People has excellent information on how to sprout various types of beans, grains and other plant foods.

FERMENTATION. Fermentation is an ancient method originally used to preserve food. It is a natural process that occurs when microorganisms, such as bacteria or yeasts, start digesting carbohydrates in food. Although food that becomes fermented by accident is most often considered spoiled, controlled fermentation is widely used in food production. Food products that are processed by fermentation include sauerkraut, kimchi, wine, beer, coffee, cocoa and soy sauce. Another good example of fermented food is sourdough bread.

Making of sourdough effectively degrades antinutrients in the grains, leading to increased availability of nutrients. In fact, sourdough fermentation is more effective at reducing antinutrients in grains than yeast fermentation in typical bread.

In various grains and legumes, fermentation effectively degrades phytate and lectins. For example, fermenting pre-soaked brown beans for 48 hours caused an 88% reduction in phytate.

Again, keep in mind that these are naturally occurring compounds, which can cause problems in humans if consumed in too high an amount or when improperly cooked. HOWEVER, they also have all been shown to have healthful benefits in humans. SO, eat a varied, plant-based diet, cook foods properly, eat in moderation but don't be afraid of antinutrients since they'll probably help you. They are certainly healthier than a doughnut or bag of Doritos!