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Bitter makes poisonous

Lupin seeds are a popular ingredient, especially in vegetarian and vegan cuisine, and everyone is referring to them these days as a “protein bomb”. However, they can also trigger allergic reactions and severe poisoning.

Once it becomes apparent that a tentative dietary trend is becoming a lasting change, the food industry also starts to move on a large scale. The number of people who are eliminating meat or even all foods of animal origin from their menus is growing steadily. This is opening up new market niches that are looking to be filled with plant-based products. Alongside established imported alternatives such as soy, rice or coconut, lupin is enjoying increasing popularity. As the legume becomes better known and more widely accepted, its use in food products is also increasing: Well-stocked market shelves now offer a large and constantly growing range of products, from lupin drink (as a milk substitute) to lupin patties (as a meat substitute) to lupin flour and coffee. Besides a wealth of protein, the bean is also rich in fibre and

minerals, while at the same time containing few calories and low cholesterol. Since it can be grown and harvested in Germany, the plant also enjoys a better reputation ecologically than soy products, for example. Other properties of this plant, however, urge caution.

Allergen on the rise

For people who have to avoid classic wheat products because of a gluten intolerance, the gluten-free legume with its light yellow, corn-like beans is a good substitute. Yet while some praise lupin seeds as a valuable “superfood” because of their high protein content, others fear them for that very reason. These are people with an allergy to lupin protein. Lupin protein is one of the 14 allergens that currently have to be listed



A bitter taste indicates lupin alkaloids that have adverse health effects

on food packaging if they are contained in the food. Lupin seeds are used, among other things, in milk and soy substitutes, dietary foods and sauces. Since lupin flour extends the shelf life of baked products, small amounts of it are sometimes added to a wide variety of these products. However, consumers don't always expect to find it in pizza or gingerbread. The increased use of lupin flour could thus lead to an increase in allergic reactions. So it's important for lupin protein allergy sufferers to keep a watchful eye, because the allergy can cause skin reactions, breathing difficulties, abdominal cramps or even a life-threatening allergic reaction (anaphylactic shock).

Defensive wolf

Depending on the botanical species and the geographical origin of the lupin (or "wolf's bean" in English), the seeds can also contain varying concentrations of bitter quinolizidine alkaloids. There are over 170 different types of these defensive substances in lupins, which the plant produces to protect itself from predators. The substances also cause symptoms of poisoning in humans, affecting the nervous, circulatory and digestive systems. Typical reactions to lupin alkaloids include dizziness, confusion, palpitations, nausea, dry mouth, loss of motor control, and in high doses even cardiac arrest and respiratory paralysis. There is no current information on how often people in Germany experience complaints after eating lupins in food. A rough extrapolation of the reports of poisonings and suspected cases at the seven German poison information centres in 2016 yields an annual number of about 80 to 100 cases involving parts of the lupin plant. Mainly children are affected. However, most cases do not lead to symptoms or trigger only mild discomfort.

Debitting poses risks

The concentration of quinolizidine alkaloids in the seeds varies depending on the lupin variety from which they originate. "Bitter lupins produce seeds that have

high concentrations of quinolizidine alkaloids and are therefore not suitable for human consumption without suitable pre-treatment," says Professor Dr Bernd Schäfer, Food Toxicologist at the German Federal Institute for Risk Assessment (BfR). To ensure that the beans can be consumed safely, the amount of alkaloids contained in most lupin species must first be sharply reduced. Apart from the "sweet lupin", which has been specially bred to be almost free of them and whose seeds can be eaten without hesitation, the unwanted passengers in other lupin species must first be professionally removed in a "debitting process". Such processes are well established in industrial production. When buying unprocessed lupin seeds, however, it's usually not really obvious to consumers whether they're sweet or bitter. However, if lupin seeds or products made from them have a bitter taste, this can be a clear indication of the presence of lupin alkaloids, which are undesirable for health.

Consumers need considerable expertise to debitter unprocessed lupin seeds correctly and adequately. The BfR therefore advises them to refrain from doing so. "Instead, they should only buy products that are clearly labelled as sweet lupin seeds or as bitter lupin seeds that have already been debittered," says Bernd Schäfer. Otherwise, poisoning can occur if the concentration of quinolizidine alkaloids is too high and the debittering process has not been carried out properly in one's own kitchen. Incidentally, the soaking water used in this process tastes bitter because the alkaloids pass into it. For this reason, it should not be consumed or used in any way, just like the water used to boil potatoes. ■

More information:
www.bfr.bund.de/en > A-Z Index: Lupin protein