

SPECIAL Naturally occurring, plant-based toxins



Imprint

BfR Consumer Monitor 2024 | Naturally occurring, plant-based toxins

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Foreword

Dear readers,
naturally occurring toxins in plants are a complex topic that illustrates the duality of nature. Plants produce a wide range of chemicals as protective mechanisms against predators and diseases, some of which can be toxic to us humans. A well-known example is solanine in potatoes – green or sprouting parts contain increased concentrations of this toxin.

The presence of these natural toxins in everyday foods leads to a fascinating dynamic in our risk perception towards chemicals. While we often accept natural toxins in food without question, we usually have a higher perception of risk when it comes to synthetic chemicals, even if these are considered harmless in the quantities present. This discrepancy reflects how strongly our perception is influenced by familiarity and the type of risk source.

In order to develop a better understanding of how individual natural, plant-based toxins are perceived and what role the related topic of mold infestation plays in this, the Federal Institute for Risk Assessment (BfR) conducted a survey representative of the population. The results can be found in this special edition of the BfR Consumer Monitor.

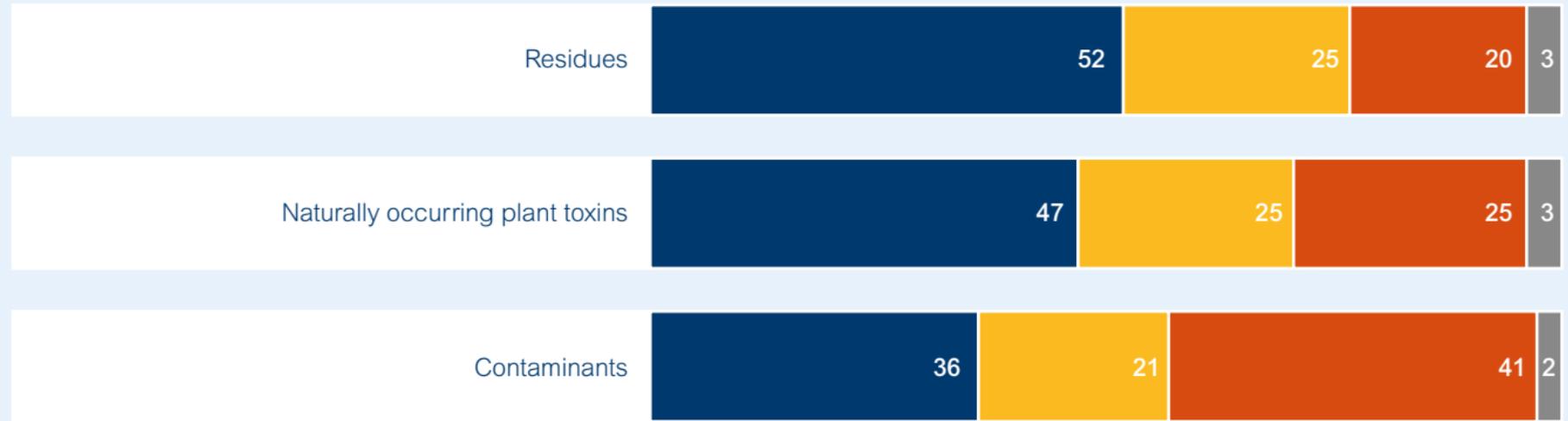


Prof. Dr. Dr. Dr. Andreas Hensel
President, German Federal Institute for Risk Assessment (BfR)



Have you ever heard of ...
in food before this survey?

Awareness – naturally occurring plant toxins



■ yes, heard of it and knew what it meant

■ yes, heard of it, but didn't know what it meant

■ no, not heard of it yet

■ no answer

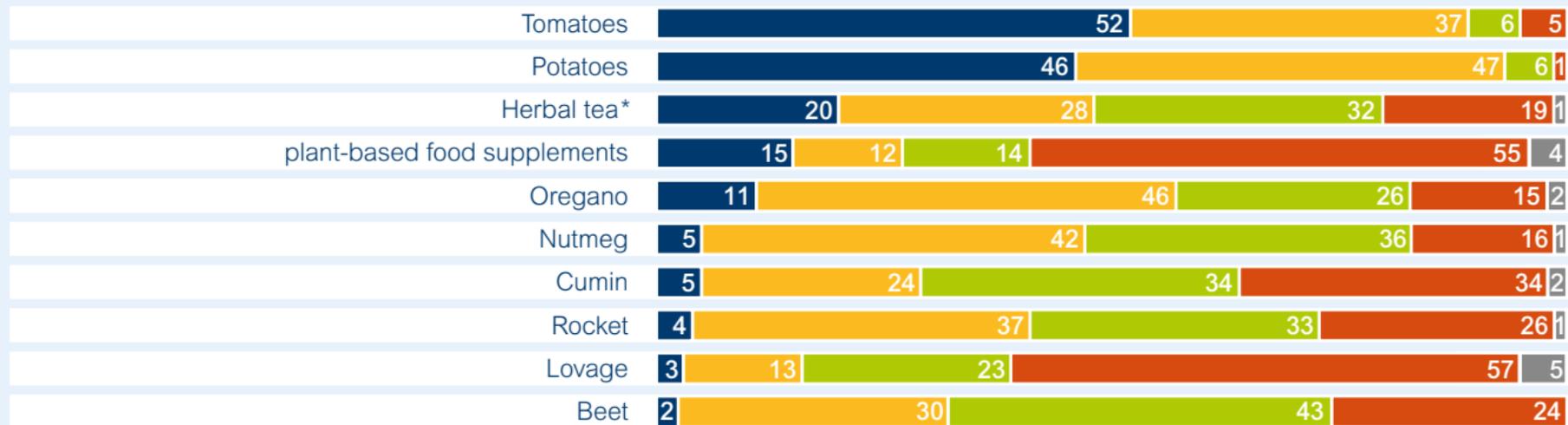
Answer scale: 1 "yes, I have heard of ... in food before and knew what it meant",
 2 "yes, I have heard of it before but did not know what it meant",
 3 "no, I have not heard of ... in food before"

Basis: All respondents (n = 1,012); figures given in percentages



How often do you eat the following foods?

Food consumption



■ daily / several times a week
 ■ about once a week / about one to three times a month
 ■ less than once a month
 ■ not at all
 ■ no answer

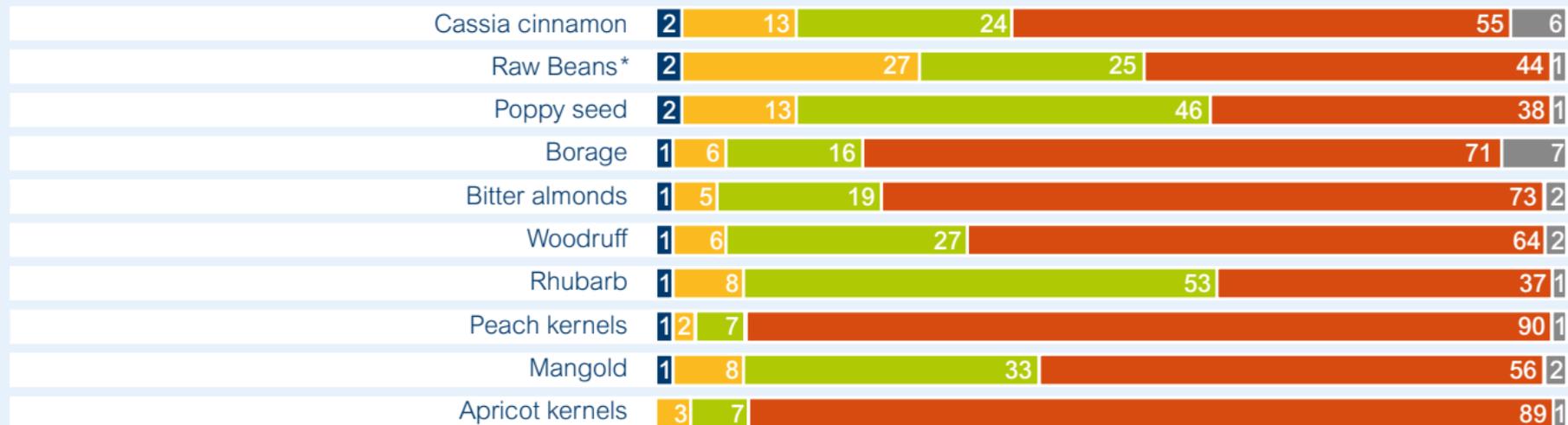
Answer scale: 1 "daily", 2 "several times a week",
 3 "about once a week", 4 "about one to three times a month",
 5 "less than once a month", 6 "not at all"

*Basis: All respondents (n = 1,012); figures given in percentages;
 * Herbal tea (fennel tea, lemon balm tea and camomile tea)*



How often do you eat the following foods?

Food consumption



■ daily / several times a week
 ■ about once a week / about one to three times a month
 ■ less than once a month
 ■ not at all
 ■ no answer

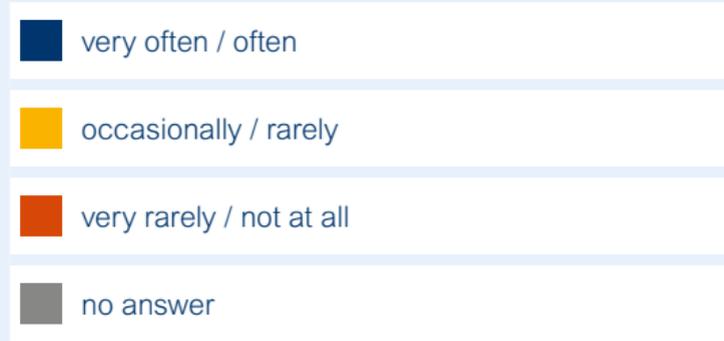
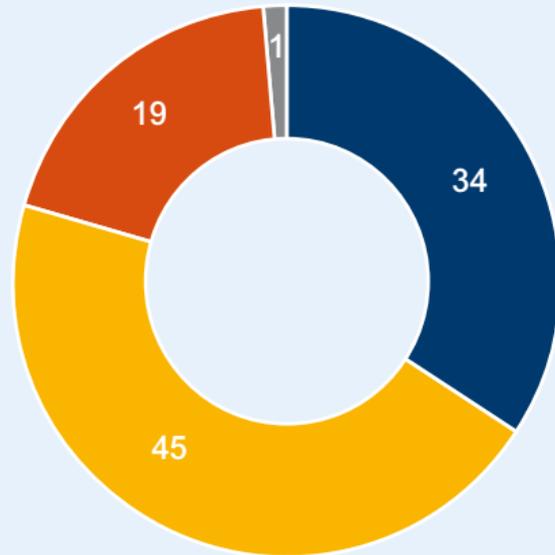
Answer scale: 1 "daily", 2 "several times a week",
 3 "about once a week", 4 "about one to three times a month",
 5 "less than once a month", 6 "not at all"

*Basis: All respondents (n = 1,012); figures given in percentages;
 Raw beans (green beans, bush beans, fire beans and kidney beans)



How often do you eat raw plant foods?

Consumption of “green”/ “fresh” foods



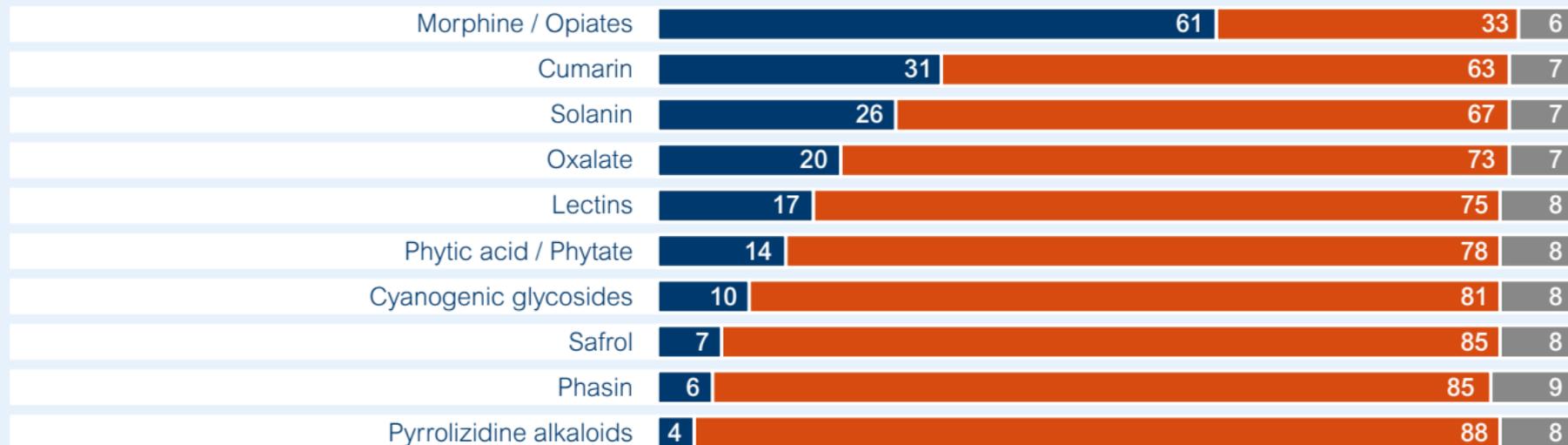
Answer scale: 1 “very often (daily or several times a day)”, 2 “often (five to six times a week)”, 3 “occasionally (three to four times a week)”, 4 “rarely (once or twice a week)”, 5 “very rarely (less than once a week)”, 6 “not at all”

Basis: All respondents (n = 1,012); figures given in percentages



Have you heard of the following
plant toxins that occur naturally
in food?

Known naturally occurring plant toxins

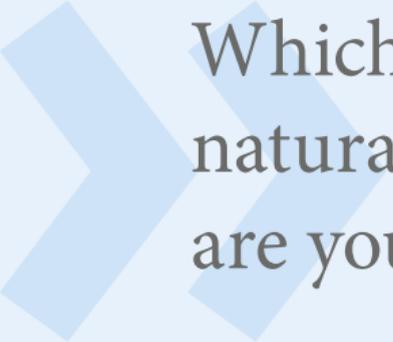


■ yes, I've already heard about it

■ no, I haven't heard of it yet

■ no answer

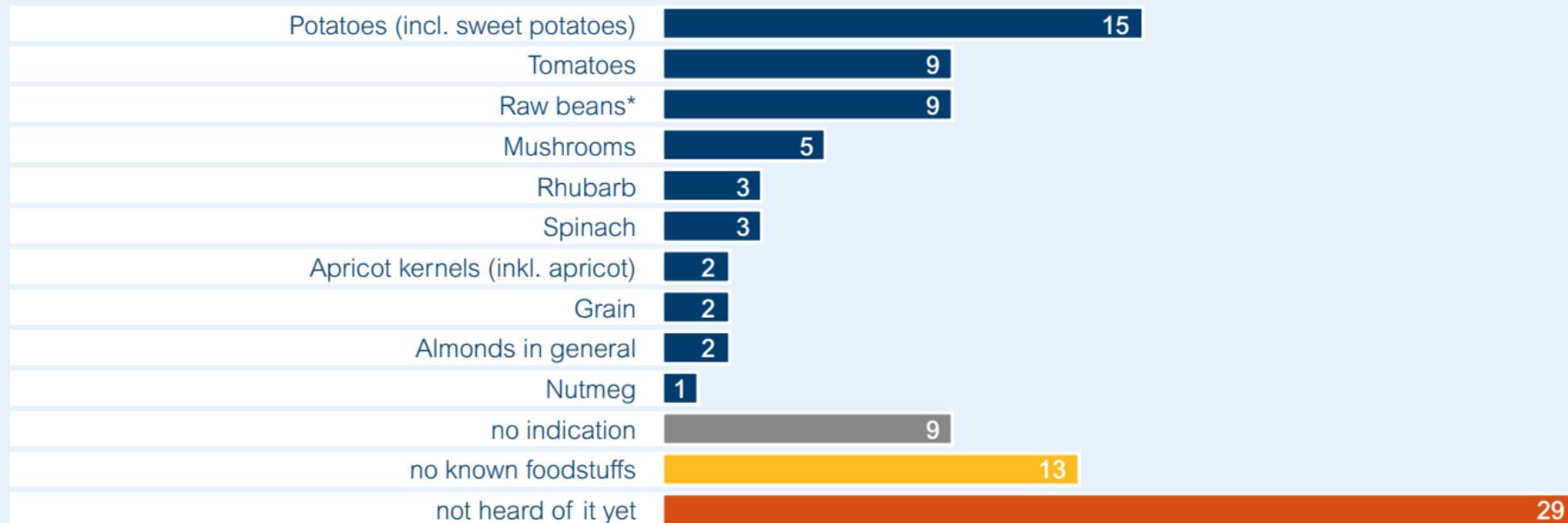
Basis: All respondents (n = 1,012); figures given in percentages



Which foods that contain
naturally occurring plant toxins
are you already familiar with?

Open question

Known foods with naturally occurring plant toxins



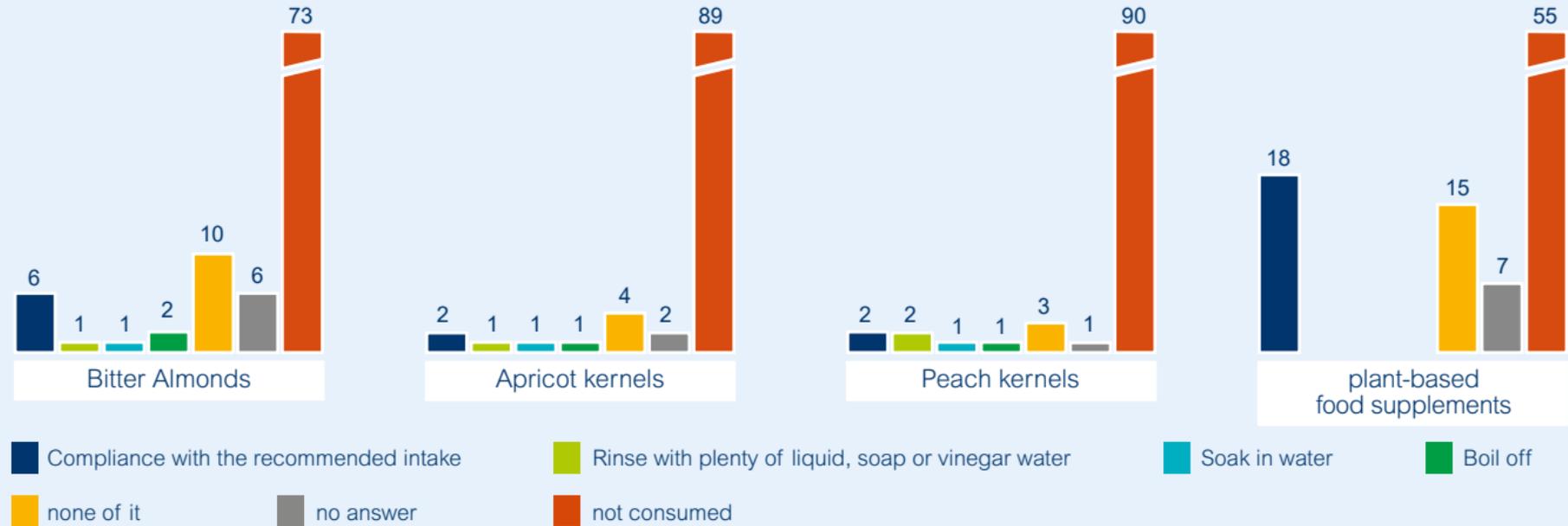
Multiple answers (open-ended responses without specified answers)
Shown: the top 10 foods most frequently mentioned spontaneously

Basis: All respondents (n = 1,012); figures given in percentages;
*Raw beans (green beans, bush beans, fire beans and kidney beans)



Do you avoid possible negative health effects from naturally occurring plant toxins in the following foods?
If yes, how?

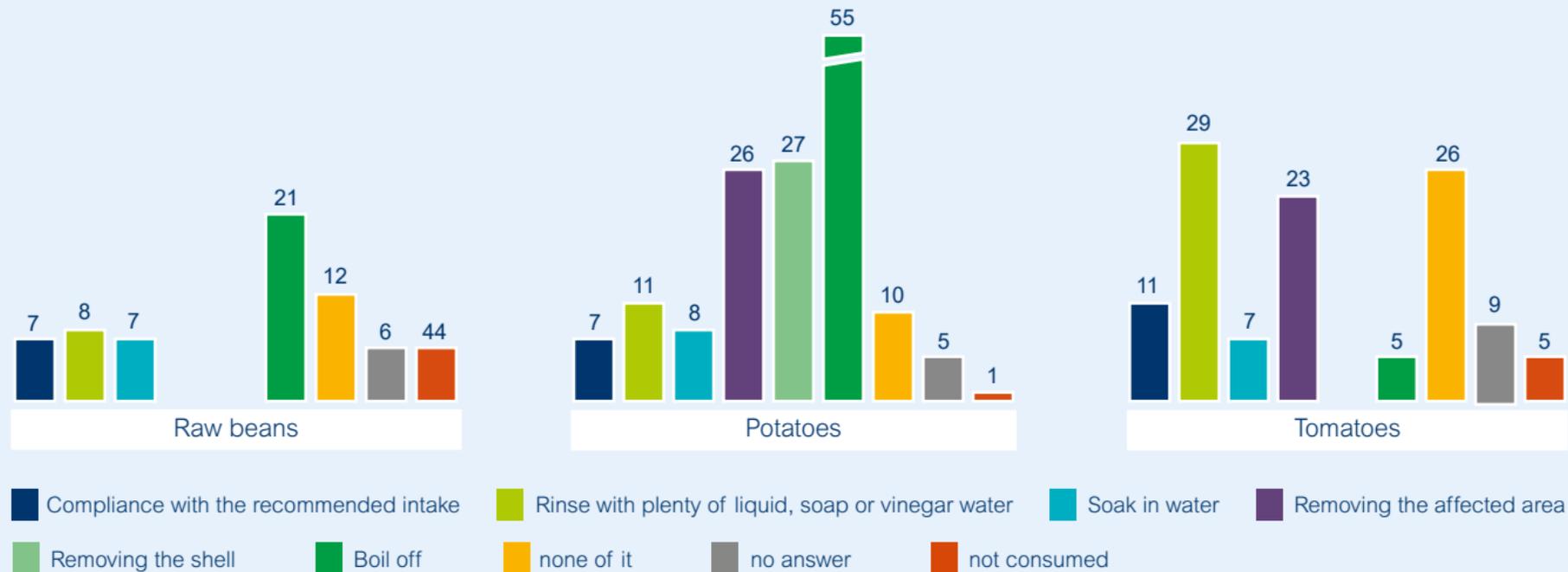
Avoidance behavior towards naturally occurring plant based toxins in fruits and plant based dietary supplements¹



¹) Bars above 40 % are shortened for a clear presentation.

Basis: All respondents (n = 1,012); figures given in percentages

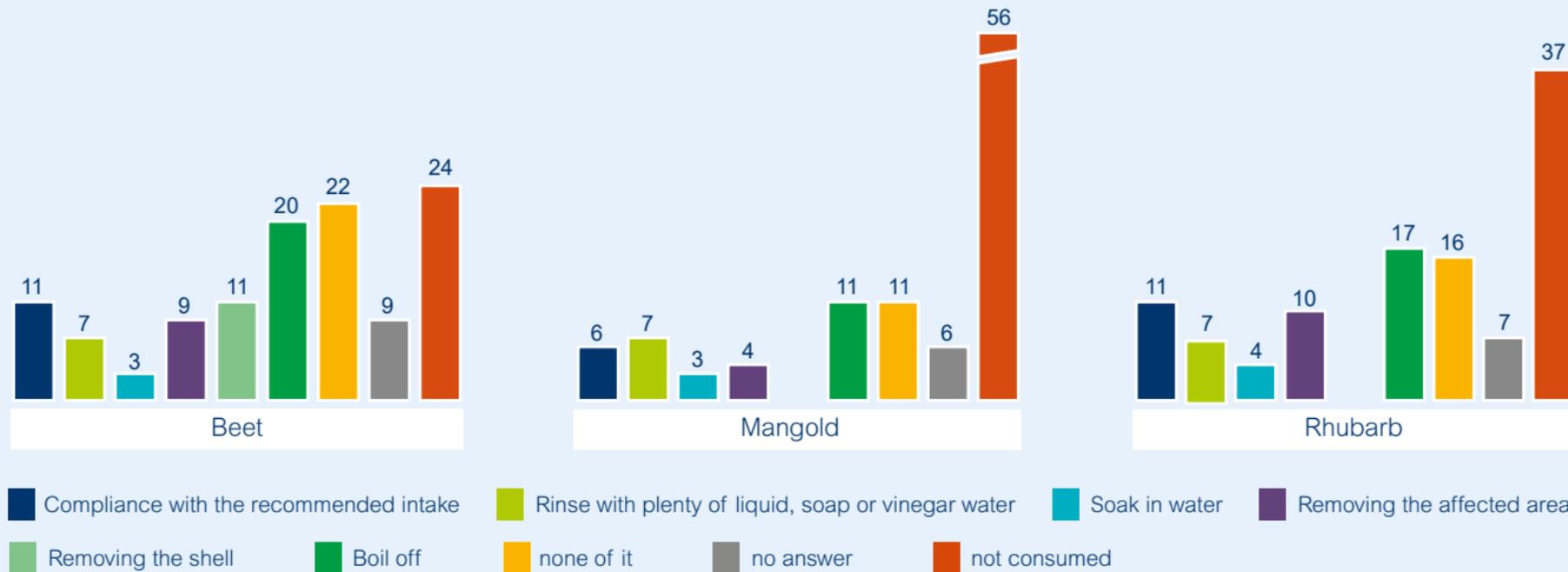
Avoidance behavior towards naturally occurring plant toxins in vegetables¹



¹) Bars above 40 % are shortened for a clear presentation

Basis: All respondents (n = 1,012); figures given in percentages

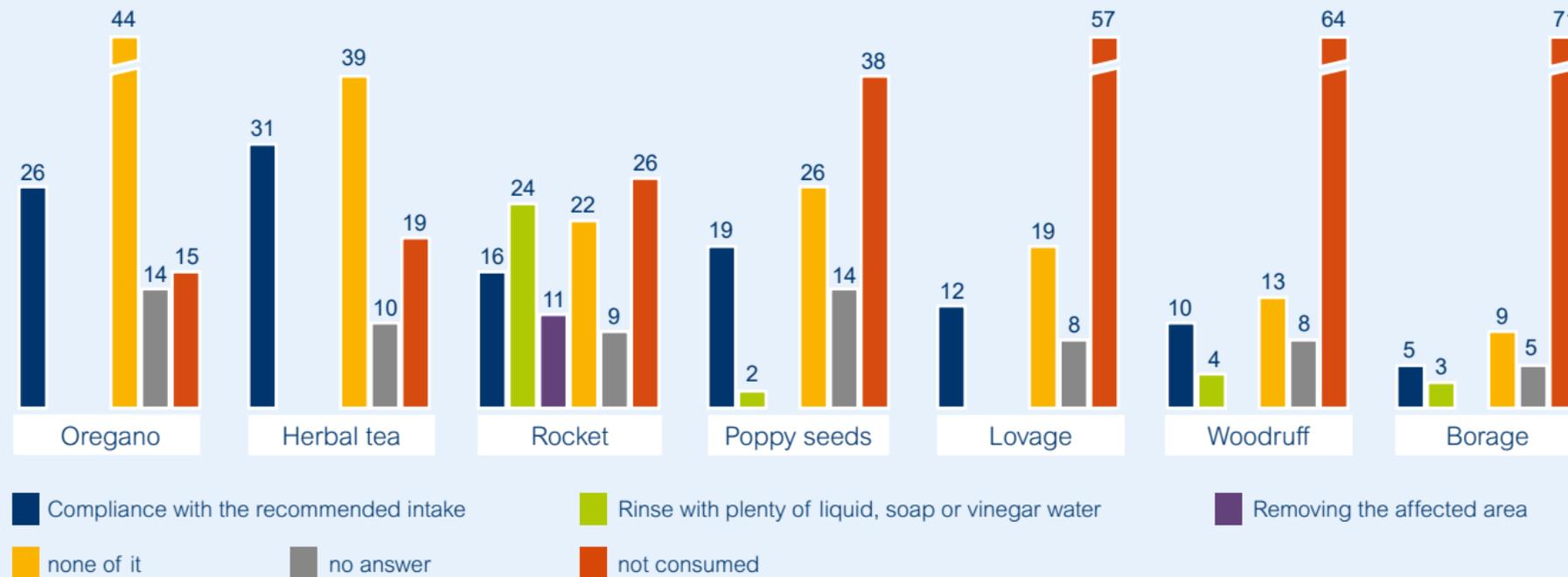
Avoidance behavior towards naturally occurring plant toxins in vegetables¹



¹⁾ Bars above 40 % are shortened for a clear presentation

Basis: All respondents (n = 1,012); figures given in percentages

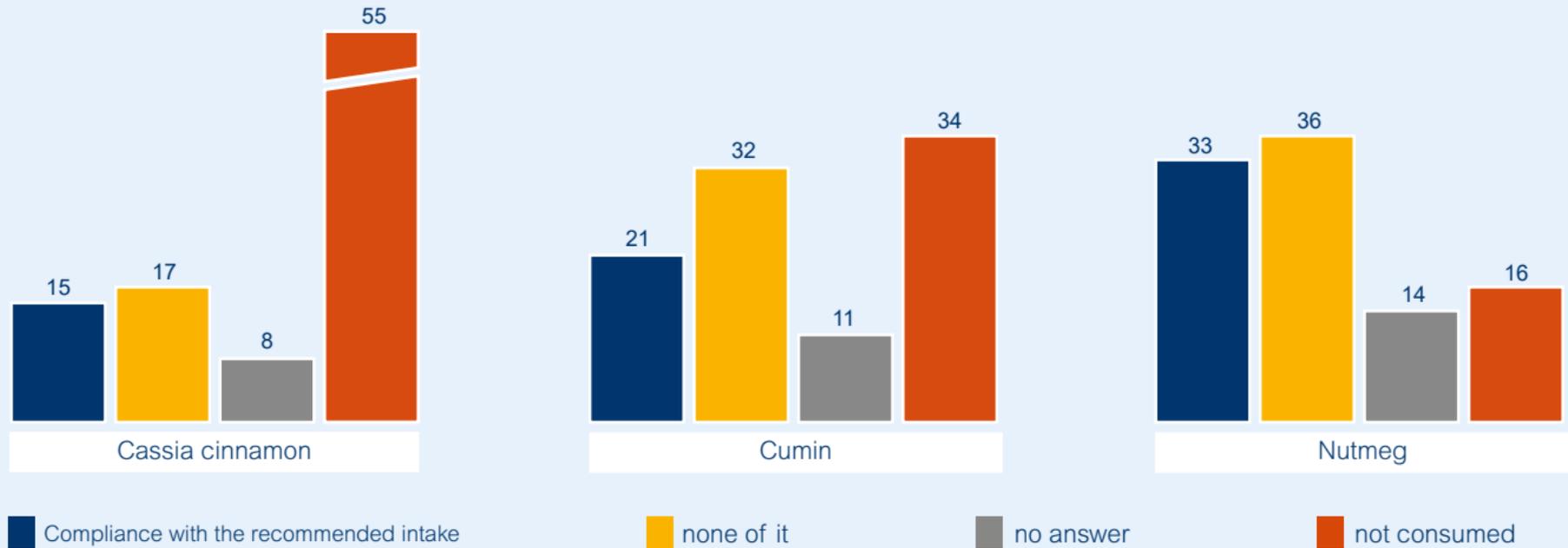
Avoidance behavior towards naturally occurring plant toxins in herbs¹



¹) Bars above 40 % are shortened for a clear presentation.

Basis: All respondents (n = 1,012); figures given in percentages

Avoidance behavior towards naturally occurring plant toxins in spices¹



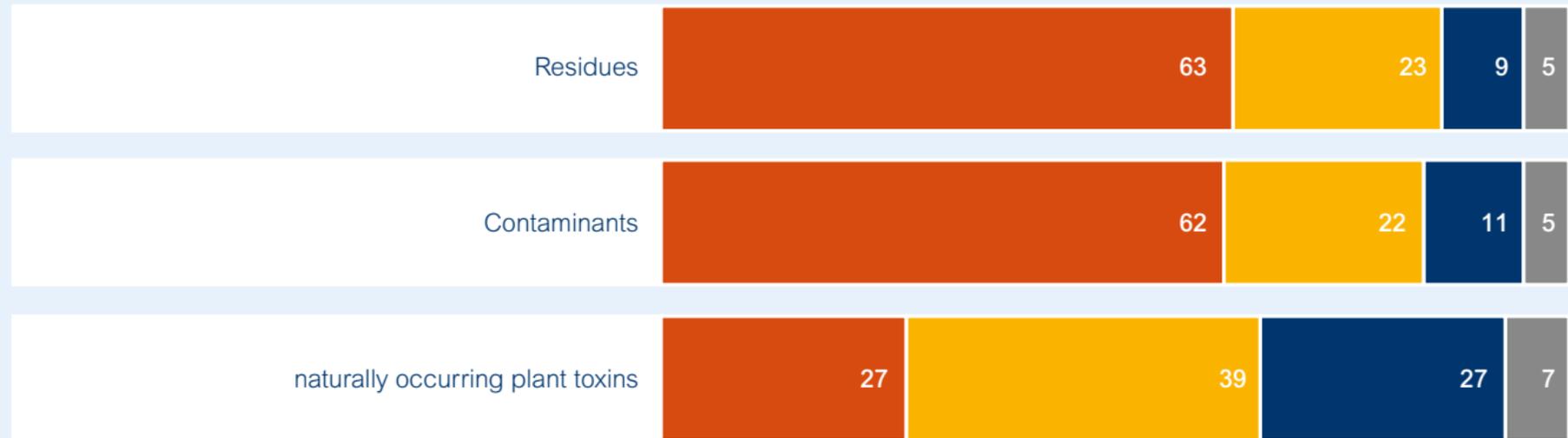
¹⁾ Bars above 40 % are shortened for a clear presentation

Basis: All respondents (n = 1,012); figures given in percentages



How concerned are you about ...?

Naturally occurring plant toxins, contaminants, residues



■ (very) worried
 ■ medium
 ■ not worried (at all)
 ■ no answer

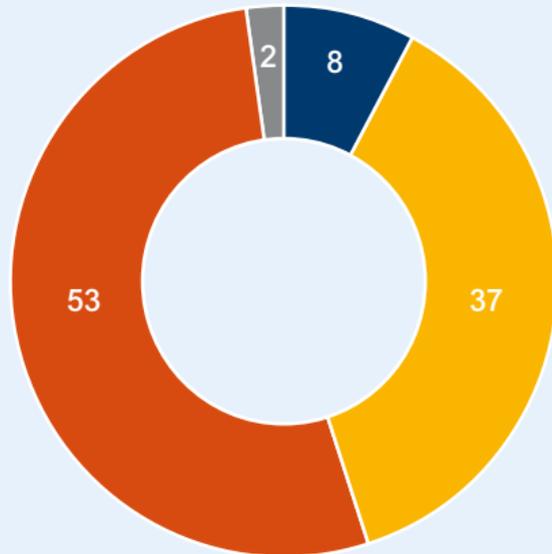
Answer scale: 1 "not worried at all", 2 "not worried", 3 "medium", 4 "worried", 5 "very worried"

Basis: All respondents (n = 1,012); figures given in percentages



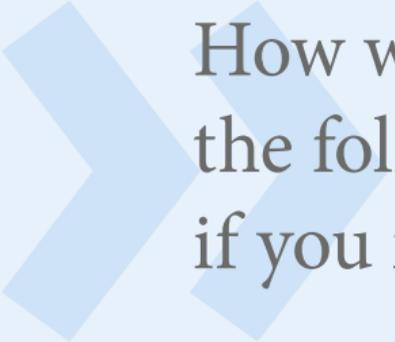
How well informed do you feel
about naturally occurring,
plant-based toxins in foods?

Perceived level of information



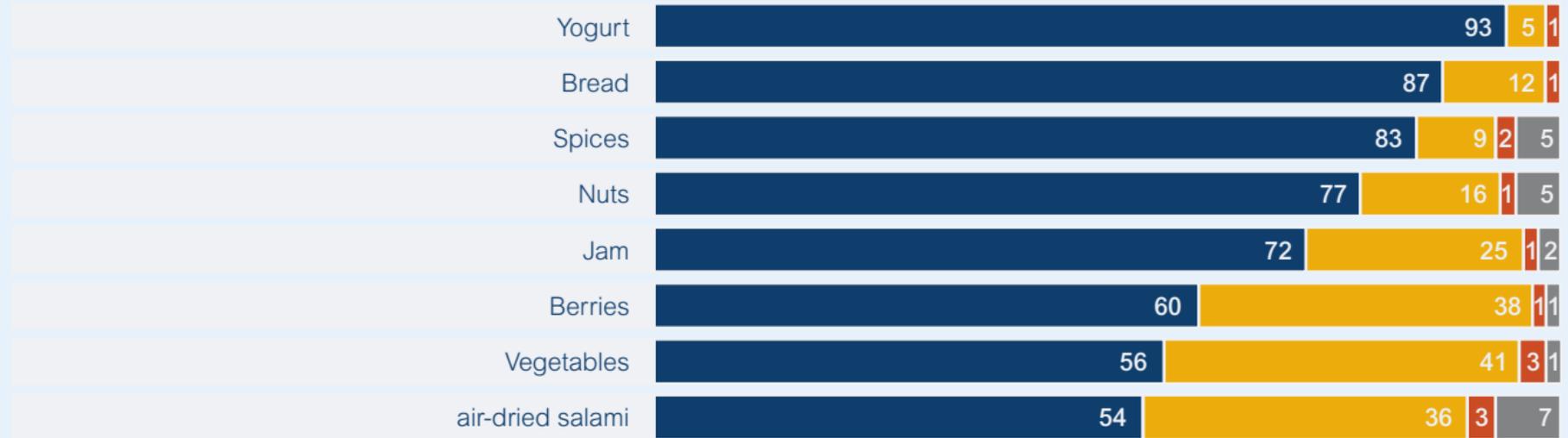
Answer scale: 1 "not well informed at all", 2 "not well informed", 3 "medium", 4 "well informed", 5 "very well informed"

Basis: All respondents (n = 1,012); figures given in percentages



How would you handle
the following foods
if you noticed mold on them?

Moldy food



■ throw away completely

■ remove the moldy part

■ other

■ no answer

Answer scale: 1 "Throw away completely (the whole product/package)",
2 "Remove the moldy part. The rest is edible.", 3 "Other"

Basis: All respondents (n = 1,012); figures given in percentages

How was the data collected?

Survey period:	07 - 11 August 2023
Sample size:	$n = 1.012$
Population:	German-speaking population aged 16 and over in private households in the Federal Republic of Germany
Sample:	Via Online-Access-Panel (<i>after ESOMAR-Guidelines based on ISO 20252</i>)
Representativeness:	The sample was drawn proportionally according to gender × age (cross-quota), education and Nielsen region, and weighted according to gender, education, age, household size and federal state.
Survey Method:	Onlinesurvey (CAWI)
Presentation of results:	All figures in per cent, rounding differences possible
Conducted by:	INFO GmbH

Naturally Occurring Plant Toxins in Foods

Natural toxins in foods are often chemical compounds produced by plants as a defense mechanism against predators. These toxins can be present in varying amounts in different foods and may pose potential health risks. For instance, certain types of beans contain lectins, which, when inadequately prepared, can cause gastrointestinal discomfort. Potatoes can also contain toxins that may even lead to poisoning after consumption.

Although excessive consumption or improper preparation can result in health issues, most people can tolerate these toxins in small quantities without adverse effects. In many cases, simply heating the food is sufficient to render the natural toxins harmless. After just a few minutes of cooking, the risk is so low that the food can be consumed without concern.

The Federal Institute for Risk Assessment (BfR) recommends safe consumption levels, often related to body weight. For most adults, these toxins are safe in moderate amounts. However, it is especially important for children, who are more sensitive, not to exceed these recommendations

About the BfR

Do nanoparticles promote the occurrence of allergies? Does apple juice contain too much aluminium? The German Federal Institute for Risk Assessment, or BfR for short, is responsible for answering questions on all aspects of the health assessment of foods and feeds, consumer products and chemicals. Through its work, it makes a decisive contribution towards ensuring that food, products and the use of chemicals have become safer in Germany.

The Institute's main tasks comprise the assessment of existing health risks and identification of new ones, the development of recommendations to limit risks and the transparent communication of this process. This work results in the scientific advice given to political decision makers. To help with the strategic alignment of its risk communication, the BfR conducts its own research in the field of risk perception. The Institute is independent in its scientific

assessments, research and communication. The BfR belongs to the portfolio of the Federal Ministry of Food and Agriculture (BMEL).

More information at: www.bfr.bund.de/en

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Cumarin:

> **A-Z-Index > C > coumarin**

Contaminants:

> **A-Z-Index > C > contaminants**

Morphine:

> **A-Z-Index > M > morphine**

Plant compounds:

> **A-Z-Index > P > plant compounds**

pyrrolizidine alkaloids:

> **A-Z-Index > P > pyrrolizidine alkaloids**

Residues:

> **A-Z-Index > R > residues**

Solanine:

> **A-Z-Index > S > solanine**

Cyanide:

> **A-Z-Index > C > cyanide**

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