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BUZZ BUTTONS

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Primary inquiry: Buzz buttons were seen on the menu for a special event at which food was served. An environmental health officer inquired about the following:

1. What are buzz buttons and how are they consumed and used?
2. What are the known risks associated with exposure to buzz buttons?
3. What are the current regulations regarding the use of buzz buttons?

Background

The term buzz button refers to the flower of the *Acmella oleracea (A. oleracea)* plant, an herb that grows throughout the tropics and in many temperate zones and is used in cooking and traditional medicine and as an ornamental plant.[1-4] *A. Oleracea* has many common names. Some names such as buzz buttons and Sichuan buttons are descriptive terms for the effervescent and numbing sensations produced when the plant's flower enters the mouth. Other common names relate to the appearance of the flower (e.g., eyeball plant, spot plant) or to the plant's use in traditional medicine (e.g., the toothache plant), while others relate to its uses in food (e.g., salad cress, paracress) and others are traditional names used in countries where the plant is native (e.g., agriao do para, jampu, jambu oleoresin). Various parts of *A. oleracea* are used to flavour foods and within traditional medicine.[1-4] The plant grows to a height of 60-90 cm and has flat, tear-shaped leaves that range in length from 2 to 6 cm. The flowers (i.e., buzz buttons) are round and yellow with a dark red spot at the top.[5]

The flowers and leaves of A. Oleracea are known for their strong, pungent and often astringent taste. The main active compound, known as spilanthol or affinin (molecular formula, $C_{14}H_{23}NO$ [6]), is most highly concentrated in the flowers, leaves and roots and is responsible for the distinctive taste and therapeutic properties attributed to the plant. The more well-known properties include analgesic, local anesthetic, anti-inflammatory, diuretic, and gastroprotective.[7-9] Extracts of spilanthol and N-alkylamides from the plant have also been shown to be effective in controlling certain species of mosquitoes and moths.[4,10]

Methods

This inquiry was answered using three approaches:

- Expert consultation with specialists in food safety and toxicology from a local health agency,
- A rapid search and review of the scientific literature, and
- A review of regulations and guidelines pertaining to *A. oleracea,* spilanthol and affinin.

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Information from the food safety and toxicology specialists provided preliminary guidance toward setting the scientific background. This consultation also provided background on the extent to which different groups within the environmental public health sector (e.g., environmental health officers, poison control centres) have dealt with buzz buttons and related products. The rapid literature search of peer-reviewed and grey literature was conducted by the NCCEH's information specialist through UBC's EbscoHost (which provided access to Medline, CINAHL, and Biomedical Reference Collection), Ovid (Embase), Web of Science, Google Scholar, and Google. The search included the following keywords:

Acmella oleracea
and
common variants of this name in combination with the terms: toxic, potent, food, beverage, drink, natural product, sensorial effects and properties, and edible flower.

A separate search of government documents and professional organizations was conducted to determine official regulations, authorizations and classifications in force for the use of *A. oleracea* and spilanthol in foods, flavourings and therapeutic agents. Sources consulted included Health Canada, the Food and Agricultural Organization of the United Nations (FAO), the World Health Organization (WHO), the European Food Safety Authority (EFSA), the US Food and Drug Administration (FDA), the US National Center for Biotechnology Information (NCBI), the US Toxicology Data Network (TOXNET) and the Flavor and Extract Manufacturers Association of the United States (FEMA).

Results

WHAT ARE BUZZ BUTTONS AND HOW ARE THEY CONSUMED AND USED?

Although the term buzz button refers to the flowering part of the *A. oleracea* plant, many of the properties of the flower are shared by other parts of the plant. Therefore, uses of the leaves and roots are also reviewed here.

In food preparation, raw and cooked leaves are used in much the same way as spinach and other leafy greens in salads and cooked dishes. Cooking tends to reduce the strong flavour. The leaves and flowers of the plant are also used in dry and powdered forms as a spice and for flavouring chewing tobacco and beverages. The flower bud has a grassy taste followed by tingling or numbing and often increased salivation coupled with a cooling sensation in the throat.[11] A concentrated extract of spilanthol, known as jambu oleoresin is used throughout South America as a flavouring and therapeutic agent.[3]

In traditional medicine, the leaves and flowers are the basis of analgesic and anti-inflammatory preparations, especially for the treatment of dental pain.[4] The leaves are also used in stimulants and dermal antifungal preparations.[12] The roots are used exclusively for therapeutic purposes to treat fever, rheumatism, flu, coughs, malaria, obesity, and snake-bites and as purgatives and laxatives.[7] Spilanthol has also been investigated for its potential effectiveness as a topical treatment for pigmentation disorders and as an anti-aging agent.[3,13]

WHAT ARE THE KNOWN RISKS ASSOCIATED WITH CONSUMPTION OF BUZZ BUTTONS?

The evaluation by the FAO/WHO Expert Committee on Food Additives concluded that when used as a flavouring agent, intake levels of spilanthol do not pose a risk for human health.[14] Similar results were obtained by the EFSA's evaluation of the substance for the general population as well as for habitual and heavy consumers.[15] The assessment of habitual and heavy users provides the more relevant indication of safety because outside of regions where it is a traditional food, spilanthol is regularly consumed by a very small proportion of the population. Intake ranges among habitual consumers is from 0.25–25 mg/kg of food eaten. The EFSA's intake threshold of concern

is 90 µg/person/day, and most habitual consumers' intake is below this level. The heaviest users had intake levels as high as 670 µg/person/day. This is above the threshold level of concern, but still below the no-observed-level-of-effect (NOAEL) of 1,404 mg/person/day.[14-17] While it appears that dietary intake of spilanthol is generally at safe levels, there is evidence that the substance slows the rate at which alcohol is metabolized and may prolong intoxication.[18] In addition, *A. oleracea* is a member of the Asteraceae plant family and people with sensitivities to the Asteraceae/Compositae/Daisy family may experience adverse reactions to spilanthol exposure.[19]

WHAT ARE THE CURRENT REGULATIONS REGARDING THE USE OF BUZZ BUTTONS?

The NCBI and the EFSA classify spilanthol as a flavouring agent. Both agencies consider the levels of habitual dietary intake as safe.[6,15] The TOXNET classifies spilanthol as a natural product and as a drug/therapeutic agent.[20] FEMA recognizes jambu oleoresin as a Generally Recognized as Safe (GRAS) flavouring ingredient.[21] Health Canada's Licensed Natural Health Products Database (LNHPD) lists four products containing spilanthol.[22] Two of these are topical creams, a homeopathic remedy and a sunscreen. Two are liquid preparations designed to be taken orally for the relief of gastric distress and to improve digestion. There are no other records of applications related to spilanthol as a natural product or as novel food (See note on Health Canada's natural product and novel food regulations).[22,23]

Knowledge gaps

The main gaps in knowledge about the safety of *A. oleracea* appear to relate to its use in treating certain medical conditions and to risks associated with very high levels of consumption. Although this work addresses an inquiry about the dietary uses of the plant's flower, we mention this gap because many papers discuss both the potential risks and benefits of dietary and therapeutic uses of *A. oleracea*. Our literature search revealed that spilanthol has been investigated for treating a number of conditions, but there are very few studies. No studies were found on acute toxicity risks. Data on subacute and chronic toxicity come from a small number of rodent studies that found decreases in the weights of adrenal glands and livers but no adverse clinical findings.[17]

There may also be uncertainty as to the risks associated with spilanthol when it is used in compounded products. The LNHPD contains detailed warnings and contraindications for each of the four licensed products containing spilanthol; however, because these products contain a number of other ingredients, it is not possible to ascertain whether these warnings are relevant for spilanthol alone. All four products warn against use by pregnant and breast-feeding women. Two of the four also warn against use by people with blood-clotting disorders, acute stomach irritation, inflammation or ulcers, heart disease, high or low blood pressure, kidney or liver disorders, diabetes, edema, and kidney stones. Contraindications include combining the compound with diuretics, blood-thinning and antiandrogen agents, and allergies to the Asteraceae/Compositae/Daily family of plants.[22] Side effects listed include headaches, dizziness, confusion, muscle weakness or pain, and abnormal heart beat.

Summary

Buzz buttons, the flowers of the *A. oleracea* plant, buzz buttons are one of several forms in which parts of this plant can be consumed. Both the flowers and the leaves may be eaten raw, cooked, dried, and powdered. Extracts from the flowers, leaves and roots are used in traditional medicine and in natural products. Spilanthol, the main active ingredient in the plant, is widely considered safe when consumed as a flavouring or food. It is commonly used in parts of Asia and South America but is relatively new in North America and Europe, except among small sub-populations for whom it is part of the traditional diet.

Consumers should be advised about potential adverse reactions to buzz buttons or other parts of the *A. oleracea* plant among people who are sensitive to the Asteraceae/Compositae/Daisy family of plants and warned about the combined effects of alcohol and *A. oleracea.* As *A. oleracea* is known to have a strong and astringent taste, patrons may appreciate seeing appropriate notation on menus.

Note on the regulation of natural health products and novel foods

NATURAL HEALTH PRODUCTS

Health Canada's Natural and Non-prescription Health Products (NNHP) Directorate assesses and licenses NHPs with health claims prior to allowing them to be sold in Canada. The NNHP Directorate is also responsible for ensuring that NHPs are properly manufactured and conducts post-market monitoring. NHPs include: Vitamins and mineral supplements, herbal and other plant-based remedies, homeopathic and traditional medicines, probiotics and other products such as amino and essential fatty acids.

The NNHP Directorate reviews applications submitted by manufacturers. Products are approved for specific intended uses with full disclosure of risks and contraindications. The product label must include a health claim and appropriate warnings. Full details of the approval process and listing of licensed products can be found at: https://www.canada.ca/en/health-canada/services/drugs-health-products/natural-non-prescription.html. Approved substances are listed in Schedule 1 of the NHP Regulations at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2003-196/page-13.html#docCont.

NOVEL FOODS

Natural products sold without health claims may be classified as novel foods under Health Canada's, Food Directorate. The approval process is conducted for manufactured products following the submission of an application by the producer prior to marketing. Novel foods are those that are new or unfamiliar, that are produced using a process that was not previously evaluated or that supplements ingredients already in regulation or is a genetically modified food. The approval process has two main stages, one determining novelty and the second to determine safety. Details of Health Canada's approach to novel foods are available at: https://www.canada.ca/en/health-canada/services/food-nutrition/legislation-guidelines/guidance-documents/guidelines-safety-assessment-novel-foods-derived-plants-microorganisms/guidelines-safety-assessment-novel-foods-2006.html.

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