

Pyrrolizidine Alkaloids and Borage Oil

What are pyrrolizidine alkaloids?

Pyrrolizidine Alkaloids (PAs) are a group of more than 200 alkaloid compounds¹ commonly found in flowering plant families such as *fabaceae*, *boraginaceae* and *asteraceae*². PAs share a common chemical structure that consists of a nitrogen-containing double ring. They differ from one another in the number and type of attached chemical groups, as well as the degree of saturation in the double ring system. PAs are believed to function in the plant as a form of defence³. Every plant organism produces a significant number of chemicals that are critical for their survival. Without the production of these specific chemicals, which include toxins, the plant would be destroyed by elements of nature, such as insects and grazing animals.

Are pyrrolizidine alkaloids harmful?

Of the more than 200 PAs, approximately 100 are believed to display potentially harmful effects. These effects are attributed to the chemical structure of the PA. In general, saturated PAs (absence of double bonds in the double-ringed structure) are harmless; however, unsaturated PAs are suspected to cause certain liver conditions⁴. PA-induced conditions are most likely to occur if plants containing low levels of PAs are consumed over an extended period¹. Although potentially harmful, PA-containing plants may have many beneficial properties if properly used under the care of a health professional.

Are pyrrolizidine alkaloids found in the borage plant?

PAs have in fact been identified in the leaf, flower, and seed of the borage plant (*boraginaceae*). However, it is important to note that PAs have NEVER been found in borage seed oil. Due to the presence of nitrogen in the double ring system, PAs are soluble in both water and alcohol, but are NOT soluble in the oil. PAs identified in the plant parts are predominantly a harmless saturated PA known as thesinine; however, small amounts of the potentially harmful, unsaturated PA amabiline have been detected in leaves and seed⁴. Studies have shown that the total alkaloid amount in the plant, relative to dry weight, is less than 0.001%². Further studies have substantiated the absence of PAs in borage oil⁴.

Is borage oil safe to consume?

Absolutely. Borage oil is one of the richest sources of the essential fatty acid GLA, an essential nutrient with many health benefits. PAs are not present in the oil, therefore, it is perfectly safe for consumption. As a matter of fact, the German legislation has indicated that the ingestion of 10g of borage oil per day does not present any health risk⁵.

References

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Bioriginal Food & Science Corp.

102 Melville Street, Saskatoon, Saskatchewan, Canada S7J 0R1
Ph (306) 975-1166 Fx (306) 242-3829 www.bioriginal.com
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