

## **Botanical Raw Materials**

### **Avoiding inadvertent pyrrolizidine alkaloid contamination**

#### **What are pyrrolizidine alkaloids?**

Pyrrolizidine alkaloids are a group of naturally-occurring compounds that are common in numerous plants. Many of these plants are noxious, invasive weeds that are common in agricultural areas, pastures, and along roadsides, etc. Some pyrrolizidine alkaloids have been shown to be toxic to the liver, may cause genetic damage, and may be able to cause cancer.

#### **Why are pyrrolizidine alkaloids important to the harvest of botanicals?**

Plants that product pyrrolizidine alkaloids may be present in the same areas in which botanical raw materials are cultivated or collected, so harvesters must avoid inadvertently harvesting plants that may contain pyrrolizidine alkaloids along with the target botanical.

#### **What pyrrolizidine alkaloid containing plants may contaminate botanicals?**

These images are two examples of pyrrolizidine alkaloid containing plants that may contaminate botanical raw materials. Many other pyrrolizidine alkaloid containing plants may be present in cultivation areas, depending on the geographic location of the cultivation site.



Common vipersbugloss (*Echium vulgare*)



Alpine ragwort (*Senecio nemorensis*)

#### **Can pyrrolizidine alkaloid containing plants be controlled prior to harvest?**

If pyrrolizidine alkaloid containing plants are identified in the cultivation area, they can be removed by hand-pulling or other mechanical techniques, or by applying herbicides if permitted.

#### **How can pyrrolizidine alkaloids be avoided during the harvest of botanicals?**

##### ***Hand harvesting***

Harvesters should focus on collection of only the target botanical as the best way to avoid inadvertent contamination with pyrrolizidine alkaloids.

##### ***Machine harvesting***

The settings and operation of the harvesting equipment should be optimized to avoid the harvesting of weeds that may contain pyrrolizidine alkaloids. Equipment should be thoroughly cleaned between uses.

**Can post-harvest handling practices reduce pyrrolizidine alkaloid contamination?**

When practical, plant material that may contain pyrrolizidine alkaloids can be removed during post-harvest inspection, cleaning, and drying of harvested crops. Any non-target plant material that is removed should be destroyed and not composted.

**Can plant material that may contain pyrrolizidine alkaloids be composted?**

Plant material that may contain pyrrolizidine alkaloids should not be composted. It should be carefully removed from the cultivation area and destroyed off site to avoid reintroduction into the soil of the cultivation area.

**Resources for further information**

AHPA *Good Agricultural and Collection Practices and Good Manufacturing Practices for Botanical Materials* (GACP-GMP), 2021 can be accessed at:

<https://www.ahpa.org/AHPAResources/GoodAgriculturalandCollectionPractices.aspx>

European Commission “Amending Regulation (EC) No 1881/2006 as regards maximum levels of pyrrolizidine alkaloids in certain foodstuffs” and the Annex of maximum levels for each foodstuff can be accessed at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32020R2040&rid=1>

Food Supplements Europe (FSE) *Guidelines and recommendations to reduce the presence of pyrrolizidine alkaloids in food supplements*, 2021 can be accessed at:

[https://foodsupplementseurope.org/wp-content/themes/fse-theme/documents/publications-and-guidelines/Pyrrrolizidine\\_Guidelines-May2021.pdf](https://foodsupplementseurope.org/wp-content/themes/fse-theme/documents/publications-and-guidelines/Pyrrrolizidine_Guidelines-May2021.pdf)

This detailed guidance contains a useful Annex of common plants that contain pyrrolizidine alkaloids with descriptions and color images of the following species:

*Anchusa arvensis* L.

*Borago officinalis* L.

*Cynoglossum officinale* L.

*Echium vulgare* L.

*Eupatorium cannabinum* L.

*Heliotropium europaeum* L.

*Leucanthemum vulgare* Lam.

*Lithospermum arvense* L.

*Myosotis arvensis* (L.) Hill.

*Myosotis stricta* Link ex Roem. & Schult.

*Petasites hybridus* (L.) G. Gaertn., B. Mey. & Scherb.

*Pulmonaria officinalis* L.

*Senecio erucifolius* L.

*Senecio inaequidens* DC.

*Senecio jacobaea* L.

*Senecio nemorensis* L.

*Senecio viscosus* L.

*Senecio vulgaris* L.

*Symphytum asperum* Lepech.

*Symphytum officinale* L.

*Symphytum × uplandicum* Nyman

*Tussilago farfara* L.