

WHAT ARE THE SOLUTIONS?

1. Plant protection products:

Datura can be controlled with herbicides for weeds; however, few chemical solutions are available, and:

- *Datura* must be controlled early in the season when the seeds germinate;
- The later in the season the problem is treated, the bigger the *Datura* plant is and the more difficult it is to control;
- Fighting *Datura* at the end of the season, when the seedpods are already developed, is actually too late*.

2. Physical or mechanical removing:

Physically removing the weed is the only solution if the *Datura* has already developed to an adult plant and seed boxes are growing. In the future robots will be used to control weeds, but at this moment this equipment is still in an experimental stage, with a limited use in practise.

3. Good agricultural practices:

- In the pre-harvest monitoring phase, it is recommended to check the neighbouring areas in the case of adjacent crops which have a potential risk for foreign objects;
- Before sowing, make a field visit during which it is defined, among others, how to control the weeds (weed control treatments);
- During the growing cycle, make periodic field visits (with variable frequency in relation to the phases of the cycle, to the vegetable cultivated, to the climatic conditions, etc.) to define the methods of control of the weeds;
- Near the harvest, control the field very carefully, going through the diagonals from one side to the other and in case of toxic weeds remove them manually using protective gloves and then destroy the plants, do not leave at borders of field and do not use in compost;
- For *Potato berries*, the field needs to be free from potatoes. If the previous crop was potatoes, the chance to have volunteer plants that produce berries becomes bigger.

*Legislation: EU Regulation 2016/239 establishes a maximum regulatory limit of 1µg/kg for atropine and scopolamine for processed cereal-based foods and baby foods for infants and young children, containing millet, sorghum, buckwheat or their derived products.



The European Association of Fruit and Vegetable Processing Industries represents over 500 companies in 11 EU countries that produce:

- Frozen vegetables
- Canned vegetables
- Dehydrated vegetables
- Canned deciduous fruit and compotes
- Jams and fruit spreads
- Frozen fruit

The key feature that all product groups represented by PROFEL have in common is the **preservation of fruit and vegetables.**



Avenue des Nerviens 9/31 – 1040 Brussels

Phone: + 32 2 500 87 59

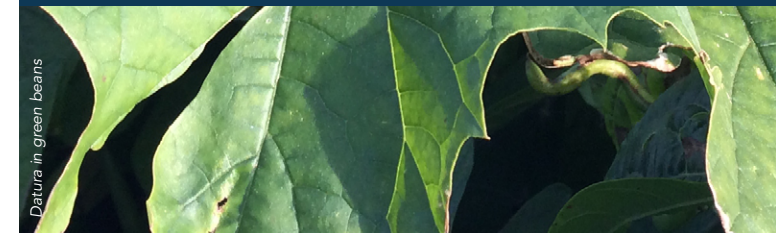
profel@profel-europe.eu • www.profel-europe.eu

PROFEL

The European Association
of Fruit and Vegetable
Processing Industries



MANAGING TOXIC WEEDS IN VEGETABLE CROPS AND BEYOND



Datura in green beans



Datura stramonium

WHY A BROCHURE ON TOXIC WEEDS?

As a consequence of changes to the climate, combined with a reduced availability of herbicides to control weeds, toxic weeds, including *Datura stramonium* and *Black nightshade* have increased in prevalence in the main vegetable growing areas in Europe.

Potato volunteer plants in vegetables crop coming from recently introduced varieties cause a new problem: they produce in contrast to the older varieties a lot of toxic berries. These weeds and berries contain toxins, and if consumed can result in serious symptoms of poisoning. The increased prevalence of toxic weeds in crop land across Western Europe has become a major concern for vegetable growers and vegetable processors.

WHAT ARE THE RISKS OF TOXIC WEEDS?

Datura stramonium, *Black nightshade* and *Potato berries* all contain tropane alkaloids. *Datura stramonium* contains atropine, hyoscyamine and scopolamine which are dangerous for animals and humans and consumption of even very small amounts can affect the central nervous system, resulting in serious symptoms of poisoning. *Potato berries* contain the toxic alkaloid solanine and consumption can lead to gastrointestinal and neurological disorders. *Black nightshade* foliage and berries also contain the tropane alkaloids

atropine and scopolamine which are toxic if consumed. Effective control for these toxic weeds during the growing, harvesting and processing of vegetables is of paramount importance to ensure food safety.

The toxins are secondary metabolites which means that their concentration is variable in relation to external growing conditions. In general toxic plants produce more toxins under stress (e.g. drought). *Datura*, *Black nightshade* and potato volunteers are germinated during spring and produce fruits and seeds from June to September.

ARE OTHER SECTORS CONCERNED?

Yes. Toxic plants are adapted to many growing conditions (e.g. soil characteristics, weather conditions) and different crop rotation systems and so, they can be found in many different crop types. In addition to the concerns related to food safety, these weeds also pose an agronomical threat due to severe crop competition. For example, in some fields the prevalence of *Datura* can be larger than expected since seeds can stay dormant belowground for years and germinate when the conditions are favorable for germination. Toxic weeds should be controlled in every crop in the rotation, to prevent multiplication and the spread of toxic weed seeds across a field.

Sectors with mechanical harvesting and/or mechanical sorting should pay particular attention to the presence of toxic weeds because depending on the crop, the technology might not always identify the toxic weed parts.



Potato storage in spinach

EXAMPLES OF TOXIC WEEDS

1. *Datura stramonium*

Datura species are herbaceous, leafy annuals and short-lived perennials which can reach up to 2 m in height. The flowers are erected or spreading, trumpet-shaped, 5-20 cm long and 4-12 cm broad at the mouth. The fruit is a spiny capsule 4-10 cm long and 2-6 cm broad, splitting open when ripe to release the numerous seeds. The seeds disperse freely over pastures, fields and even wasteland locations. *Datura stramonium* is an annual and overwinters only as seeds. It produces 500 to 5,000 seeds per plant, which can survive up to 30 years. *Datura* prefers rich, calcareous soil. Adding nitrogen fertilizer to the soil increases the concentration of alkaloids present in the plant. All parts of *Datura* plants contain dangerous levels of the tropane alkaloids atropine, hyoscyamine and scopolamine.

2. *Black nightshade* (*Solanum nigrum*)

Black nightshade is a widespread plant, it can be found in diverse crop systems and production regions. It is an annual plant of 10-60 cm. The plant contains many seeds (500 seeds per plant) which allows it to multiply very rapidly. The flowers give rise to spherical berries of 6-7 mm in diameter. The berries are initially green and turn purple/black when they are ripe. The plant occurs on a wide range of soils but prefers soil rich in nitrogen. All parts of the plant are toxic, but it is mainly the berries that pose the greatest risk.

3. *Potato berries*

After flowering, potato plants produce small green fruits that resemble green cherry tomatoes, each containing about 300 seeds. Like all other parts of the plant except the tubers, the fruit contain the toxic alkaloid solanine and are therefore considered toxic. Whilst the tubers contain very low levels, and the leaves relatively low levels, a higher concentration of alkaloids exist in the skin of the tuber, the flowers, fruits and especially the seeds. Potato fruits are produced when the plants experience cool temperatures and sufficient water.



Datura stramonium



Black nightshade



Potato berries