

Last updated: 27th September 2002

VIPER'S BUGLOSS & PURPLE VIPER'S BUGLOSS (ECHIUM)

Family: *Cruciferae*

Genus: *Echium*

Species: *vulgare* (*Viper's Bugloss*), *lycopsis* (*Purple Viper's Bugloss*)



Source: CSL Files

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General Background

Usually stout bristly biennial herbs, sometimes shrubby (see individual descriptions below), *Echium* spp are found throughout Europe. There are about 30 species in Europe in the Mediterranean region, Madeira, the Canaries and the Azores.

Two of the more common species are *E. vulgare* (Viper's Bugloss or Blueweed) and *E. lycopsis* (Purple Viper's Bugloss). *Echium* is a member of the borage family and like borage it grows quickly, competing well with weeds.

E. vulgare is an erect, very rough bristly biennial, growing to between 30 and 90 cm. During the year of germination leaves form large rosettes with long narrow leaves. In the second year an erect hispid stem grows out of the rosette, up to 1m tall. Leaves are linear-lanceolate, entire, bristly hairy up to 100mm long. Flowering occurs between June and October. The numerous flowers are arranged in a spike and are violet-blue, funnel-shaped, approximately 2cm long, 10 - 12mm broad spreading horizontally. Stamens are red and conspicuous. Seed nutlets are three-cornered, 2.5 - 3mm long, rough and grainy.

E. lycopsis is an erect biennial 20-60 cm. It is similar in general appearance to *E. vulgare* but leaves are much larger and softer. Found on cliffs and sandy ground near the sea. The flowers are initially purple, becoming violet-blue.

Echium spp. like warmth and prefer light, dry stony soils on open sites. Found mainly on rubble and wasteland, more rarely found in arable fields and vineyards.

Details of Quality Characteristics

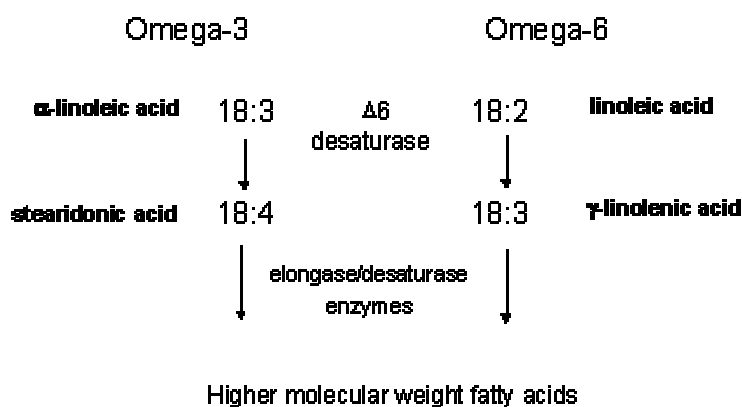
There has been an increase in interest in echium, especially *Echium plantagineum*, because of the fatty acid composition of the seed oil. Like borage and evening primrose oil, it contains significant amounts of gamma linolenic acid (GLA), but it also contains the rarer stearidonic acid (SdA), which is also an important intermediate in the production of a number of important compounds in the body. Both acids are made by the same enzyme, and their effects are complimentary, so the oil is potentially valuable as a health food and cosmetic component.

The seed oil from Echium contains a unique ratio of omega-3 and omega-6 fatty acids. These lipids, previously obtained from other plant sources, have been used for many years in food supplements. Of potential interest for health food applications are the appreciable amounts of g-linolenic acid (GLA) as well as the unusual polyunsaturated fatty acid – stearidonic acid (cis 6,9,12,15 – 18:4). Stearidonic acid is the equivalent position of GLA in the omega-3 metabolic pathway (see below).

These two essential fatty acids cannot be manufactured in the body and without them a range of deficiency symptoms appear. The symptoms associated with a deficiency of omega-6 are much more severe and may lead eventually to death. (Lapinskas, P. 2000)

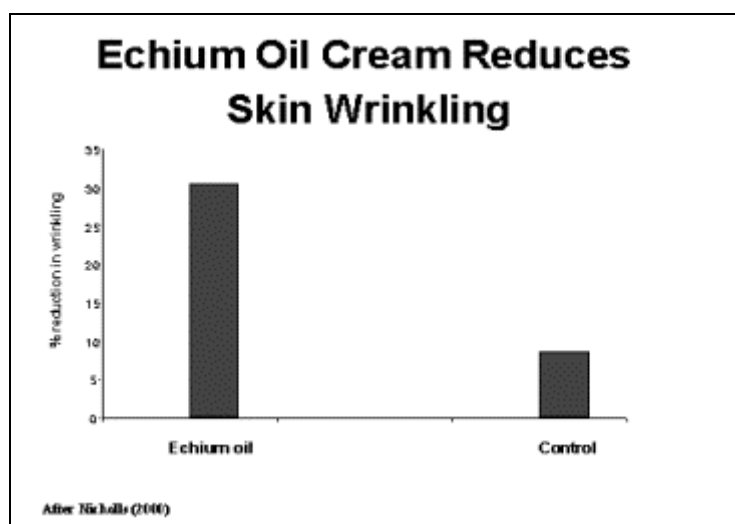
Fig. 1.

Biochemical Pathways of Essential Fatty Acids



Echium is probably the best agricultural source of this material at the moment. The seed oil is used in cosmetic products because of its moisturizing and anti-inflammatory action:

Fig.2.



Source: Nicholls, P. (2000)

Honey from bees on vipers bugloss in New Zealand has been shown to have antibacterial activity.

Current Production and Yields

Currently Echium is only grown as pilot studies for industrial purposes in the UK, details of production around Europe are unknown. (IENICA, 2000)

Table 1. The area under production on set-aside land in the UK (ha)

Year	Area under production in ha
1997	20
1998	190

Source: DEFRA. (These figures are based on information submitted under the Arable Area Payment Scheme, and do not take into account crops grown without support.)

Constraints upon Production

The techniques for producing echium as an oilseed crop are now well understood by a number of growers, and the oil extraction and processing parameters have been

established. The missing link at present is a commercial company who is prepared to develop the market by promoting echium oil to consumers. Although an application to the Advisory Committee for Novel Foods and Process (ACNPF) has now been put forward for echium oil by John K Kings and sons Ltd in the UK.

Markets and Market Potential

Echium oil could be used as an alternative to existing oils and fats currently on the market such as blackcurrant seed oil and evening primrose oil which are used as dietary supplements or a source of essential fatty acids in other products such as nutritional bars. Because of the levels of omega-6 and omega-3 fatty acids , cosmetics and skin products care products are incorporating Echium oil.

The UK Advisory Committee on Novel Foods and Processes (ACNFP) has received an application for echium oil. The application is to market the food within the EU under the EC Novel Foods and Novel Foods Ingredients Regulation (258/97). Although this Regulation also covers applications to market GM foods, this application is for a non-GM novel food. The application has been submitted by John K Kings and Sons Ltd and is for Echium oil, a natural vegetable oil rich in omega-6 and omega-3 polyunsaturated fatty acids. Echium oil could therefore be used as an alternative to existing oils and fats, rich in omega-3 and omega-6 polyunsaturated fatty acids, currently available on the market such as blackcurrant seed oil and evening primrose seed oil. It is proposed that Echium oil will be used as a dietary supplement or as a source of essential fatty acids in other nutritional products such as nutritional bars. (<http://www.foodstandards.gov.uk>)

The flowers of vipers bugloss are crystallized and added to salads. A leaf infusion is a general tonic, taken to reduce fevers, and to relieve coughs, inflammatory pain, nervous complaints, headaches and colds.

The root of Echium vulgare gives a red fabric dye.

Vipers bugloss was once an important medicine for snake venom.

In western traditional medicine, leaves of *Echium amoenum* have been used as a diuretic, demulcent, emollient and expectorant.

Other Information

A less common plant of the Boraginaceae family is *Anchusa officianalis*, common name Alkanet or Dyers bugloss. This plant occurs in the wild in wasteland and rocky habitats throughout Europe and in Asia. It is a perennial or biennial with erect stems, blue early-summer flowers, and a carrot-like root. The flowers and young leaves can be added to salads and were once used to make a conserve. The powdered root rind is used to colour hair, and in some medicines. The root also yields a range of red fabric dyes.

Echium is a member of the borage family and like borage it grows quickly, competing well with weeds.

Research

The SEEDEx Project funded by the Biotechnology and Biological Sciences Research Council (BBSRC) and the Engineering and Physical Sciences Research Council (EPSRC) in the UK, is focusing on the natural very long chain fatty acids that are potentially very valuable for use in skin care products, and as anti-inflammatory agents as well as in other therapeutic applications. Researchers are using compressed carbon dioxide rather than conventional organic solvent, to extract the fatty acids from the seeds. Preliminary work has focused on examining different pre-treatments for optimising the amounts of fatty acids that can be extracted and microscopic studies on the structure of the seeds themselves, as well as an extraction process using a pilot scale compressed carbon dioxide system.

Amirghofran, Z et al (2000) studied the effects of an extract of *Echium amoenum* on

1. Spontaneously mitogenic activity in lymphocytes
2. in vitro lymphocyte proliferation and mixed lymphocyte reaction
3. in vitro humoral antibody response.

This was to determine whether the folklore efficacy of *E. amoenum* may be attributed to an immunological mechanism of one of the plants secondary metabolites.

They found that although the extract showed the capacity to augment lymphocyte proliferation in the presence of mitogen or alloantigen, humoral antibody synthesis on both primary and secondary response was inhibited.

Useful Websites

<http://www.bbsrc.ac.uk> BBSRC features – Crop-derived industrial raw materials
(January 2001)

<http://www.springdale-group.com> Specialty crops Echium

<http://www.ct-botanical-society.org> Connecticut Botanical Society: Echium vulgare.

<http://www.foodstandards.gov.uk> ACNFP – Echium oil.

<http://www.lapinkas.com> Omega-6 fatty acids – What, why, where and how?

BioMat Net

[Bugloss \(Echium vulgare\)](#)

[Crops for Pharmaceuticals/Cosmetics](#)

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