Optimized analysis and quantification of glucosinolates from *Camelina sativa* seeds by reverse-phase liquid chromatography

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**A R T I C L E   I N F O**

Article history:
Received 26 April 2012
Received in revised form 9 July 2012
Accepted 11 July 2012

Keywords:
*Camelina sativa* L. Crantz
Glucosinolates
HPLC analysis
Purification
Seed analysis

**A B S T R A C T**

Gold-of-pleasure or false flax (*Camelina sativa* L. Crantz) is being developed as an alternative oil crop for biodiesel and for food use. The seed meal, which contains three relatively unique glucosinolates, is being evaluated for approval for use as an ingredient in animal feeds and for other uses. The objective of this research was to develop reproducible methods for the isolation of large quantities of pure camelina glucosinolates (glucorarabin, glucocaminlin, and 11-(methylsulfinyl)-undecyl glucosinolate) and develop efficient methods for quantifying these compounds. The separation and purification of the camelina glucosinolates were achieved using a combination of reverse phase chromatography, counter-current chromatography and ion exchange chromatography. An efficient reverse phase HPLC separation method was used to quantitate the glucosinolate content in camelina seed and plant extracts. The quantitation methodology was used to measure glucosinolate levels in seeds from 30 cultivars grown in a U.S. field trial and measure glucosinolate levels in sprouted camelina seeds.

**1. Introduction**

*Camelina sativa* L. Crantz, known as gold-of-pleasure, false flax, wild flax, linseed dodder, camelina, German sesame, and Siberian oilseed, is a flowering plant in the Brassicaceae. It is native to Northern Europe and Central Asia, but has been introduced to North America, possibly as a weed in flax. It has been traditionally cultivated in Europe as an oilseed crop to produce vegetable oil and animal feed. There is ample archiological evidence to show that it has been grown in Europe for at least 3000 years (Jones and Valamoti, 2005). Camelina was an important oil crop in eastern and central Europe, and has continued to be cultivated for its seed, which was used in oil lamps and as an edible oil. Interest in the use of camelina as a functional food and as a biodiesel feedstock continues to grow (Zeman, 2007; Moser and Vaughn, 2010). Camelina is a good alternative crop because it is much less weather dependent, has more consistent yields, and is cheaper to produce than other new crops (Moloney et al., 1998). Camelina has very low requirements for tillage and weed control (Putnam et al., 1993; Vollmann et al., 2007; Urbaniak et al., 2008). This could potentially allow this unique vegetable oil to be produced more cheaply than those from traditional oil crops, and it would be particularly attractive to biodiesel producers looking for a feedstock cheap enough to allow them to compete with petroleum diesel and gasoline. Significant new crop research is currently being conducted in the northern United States and in a number of Canadian provinces. The oil contains exceptionally high levels of omega-3 fatty acids, which is uncommon in vegetable sources (Budin et al., 1995; Abramovic and Abram, 2005; Abramovic et al., 2007; Schwartz et al., 2008) and over 50% of the fatty acids in cold-pressed Camelina oil are polyunsaturated (Budin et al., 1995; Abramovic et al., 2007).

Finding additional uses for the seed meal press-cake will make the crop more economically competitive. Camelina could be added to the growing list of functional foods. Current research efforts centers on its high levels of omega-3 fatty acids, as well as rich levels of antioxidants such as tocopherols which make the oil naturally

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0926-6690/ - see front matter. Published by Elsevier B.V. http://dx.doi.org/10.1016/j.indcrop.2012.07.018