Microcapsules for biological pest control

H. Thielking[1], W. Koch[1], V. Gutberlet[2], J. Müller[2], T. Rose[3] und K.-D. Vorlop[3]
1 Wolff Walsrode AG, Postfach 1515, D-29655 Walsrode, Fon: +49 5161 442736, Fax: +49 5161 443376, E-Mail: heiko.thielking.ht@wolff-walsrode.de
2 Institut für Nematologie und Wirbeltierkunde - Biologische Bundesanstalt, Toppheideweg 88, D-48161 Münster, Fon: +49 251 871060, Fax: +49 251 8710633, E-Mail: bba.muenster@t-online.de
3 Institut für Technologie, Bundesforschungsanstalt für Landwirtschaft Braunschweig-Völkenrode, Bundesallee 50, D-38116 Braunschweig, Fon: +49 531 596 862, Fax: +49 531 596 363, E-Mail: rose@tec.fal.de

For the use of biological pesticides the formulation of the active substances is even more important than for synthetic preparations. For the encapsulation of so-called "living systems" adapted raw materials and an innovative technology are of the essence:

Sweet turnip nematodes cause a lot of economical damage in Europe. In Germany all nematicides which have been developed so far are no longer allowed. One approach to nematode control is the artificial settling of host specific fungi. The sweet turnip nematode Heterodera schachtii has various fungi for natural antagonists, however, without an appropriate formulation, which improves the effectiveness and storage capability, biological pest control cannot be carried out economically.

In a joint project a capsule system based on biocompatible symplex is being developed. During the encapsulation process an aqueous sulfoethylcellulose solution is made to react with a cationic polyelectrolyte. The fermented fungus material and the required nutrients are added to the sulfoethylcellulose solution so that they are finally covered by a polyelectrolyte membrane. Due to the structural design of the raw materials it is possible to control the properties of the membrane and therefore of the capsules.

Nutritive and antinutritive compounds in seeds and cake of *Camelina sativa* (L.) Crantz

Bertrand Matthäus[1] and Josef Zubr[2]
1 Bundesanstalt für Getreide-, Kartoffel- und Fettforschung im Forschungsverbund Produkt- und Ernährungsforschung, Institut für Chemie und Physik der Fette, Postfach 1705, 48006 Münster, Germany
2 MALINO CONSULT, Platanvej 26, 1810 Frederiksberg C, Denmark

Introduction

Camelina sativa (L.) Crantz, known as false flax or gold-of-pleasure is an ancient crop of the Brassicaceae family. Some excellent and positive agronomic attributes are the reasons for the increasing interest in *Camelina sativa*. In contrast to other oil crops, such as rapeseed, soybeans or sunflower, *Camelina sativa* is regarded as a low-input crop. In addition, the environmentally friendly cultivation of the crop concerning manuring and pesticides is very interesting.

The high content of a-linolenic acid in the oil of *Camelina sativa* is similar to linseed oil, so that it belongs to the fast drying oils. Due to this property it can be used in the industrial production of colours, varnishes, soaps, putties and linoleum.

The oil is just as interesting as a source of ω3 fatty acids. So the oil could be also very interesting for human nutrition.

The use of residues from the oil pressing process could be also interesting for animal nutrition, but according to the current regulations on animal feedstuffs it is not allowed to feed *Camelina sativa* or its residues to animals. To overcome these administrative barriers the knowledge of the nature and quantity of antinutritive compounds in the seeds is important.

Material and methods

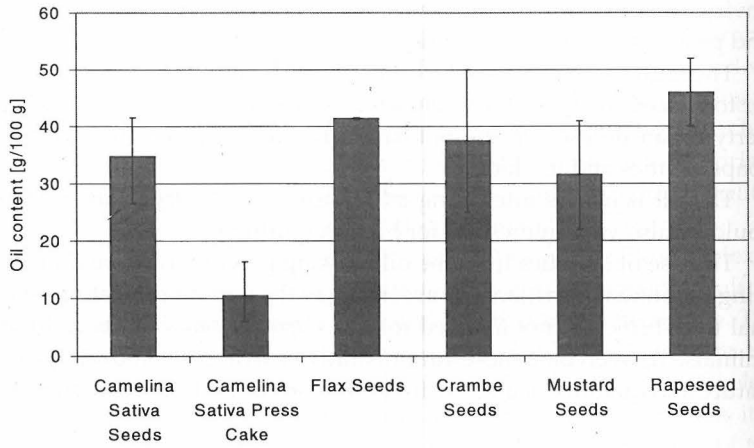
Material

49 samples of seeds of *Camelina sativa* were obtained from different locations in Denmark, Sweden, England, Scotland, Ireland, Finland and Germany. For the preparation of the press cake all samples were pressed by a small laboratory oil press, type Komet CA59 G (Monforts, Mönchengladbach, Germany).

Seeds of Flax (*Linum usitatissimum* L.), *Crambe abyssinica*, Mustard (*Sinapis alba*) and Rapeseed (*Brassica napus*) were obtained from the Thüringer Landesanstalt für Landwirtschaft, Jena, Germany and Deutsche Saatveredelung, Lippstadt, Germany.

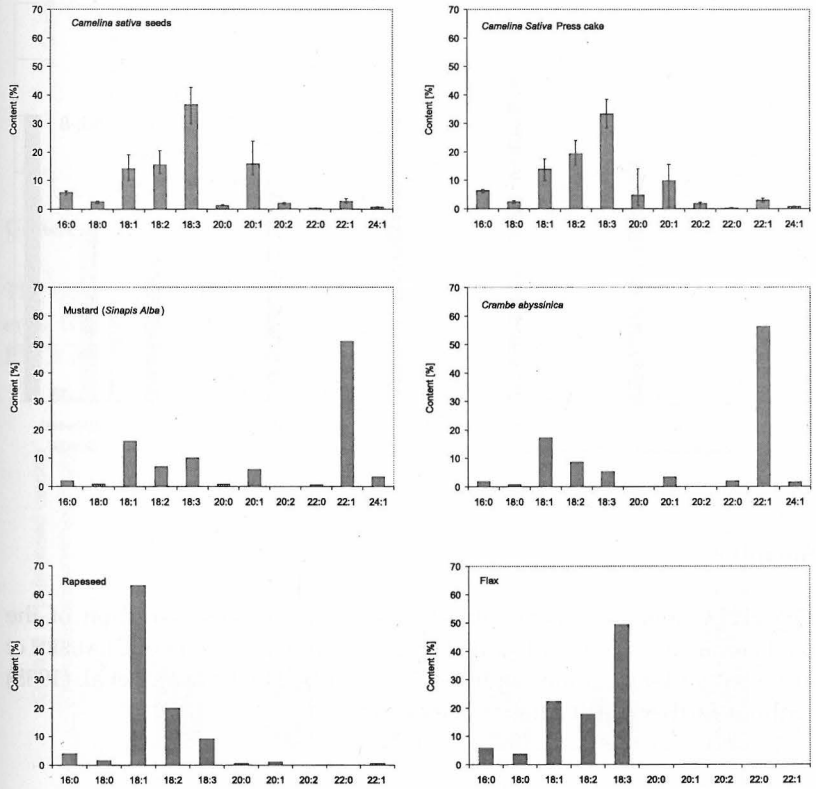
Oil content

The oil content was determined with the fexIKA 200 (IKA Labortechnik, Staufen, Deutschland). The principle of this apparatus is based on a cyclical succession of vaporization of the solvent, condensation, extraction, vacuum filtration and vaporization again. After extraction the solvent was evaporated and the sample dried at 105 °C for 2 1/2 h.



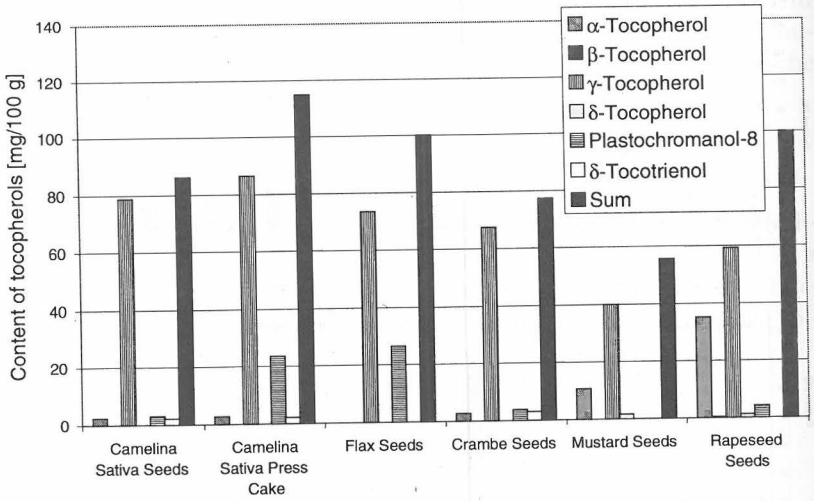
Fatty acid composition

The method for GLC determination of FAME follows the ISO draft standard (ISO/FDIS 5509:199). Gas chromatographic conditions: Capillary column, CP-Sil 88, 100 m long, 0.25 mm ID, film thickness 0.2 µm, temperature program: from 155 °C heated to 220 °C (1.5 °C/min), 10 min isotherm. Injector 250 °C, detector 250 °C, carrier gas: 36 cm/s hydrogen, split 1:50, detector gas: 30 ml/min hydrogen, 300 ml/min air and 30 ml/min nitrogen, manual injection, volume less than 1 µl.



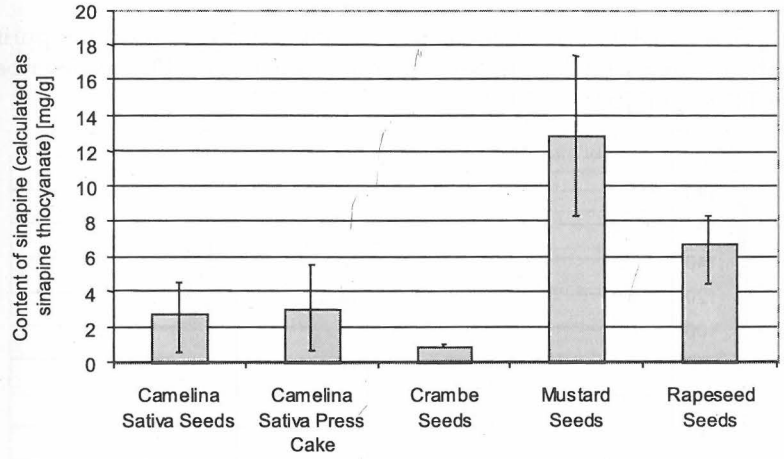
Tocopherols

For the determination of tocopherols 5 g of ground seeds were extracted for 3 hours with 60 ml tert. butyl methyl ether in a Twisselmann apparatus. The extracts were evaporated to dryness under vacuum purging with nitrogen. 20 µl of a solution of 250 mg oil in 25 ml heptane was injected onto a Diol phase HPLC column 25 cm x 4.6 mm ID (Merck, Darmstadt, Germany). A Fluorescence Spectrophotometer (detector wavelengths for excitation 295 nm, for emission 330 nm) was used as detector /8/.



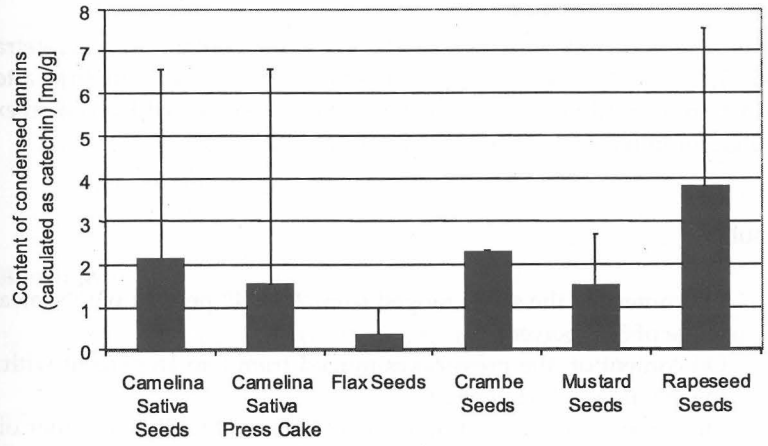
Sinapine

The HPLC method for sinapine was performed after extraction of the seeds with 70 % methanol according to a modified method of CLAUSEN et al. (1983) under isocratic conditions as described by CLAUSEN et al. (1985) without further purification of the extract /3/.



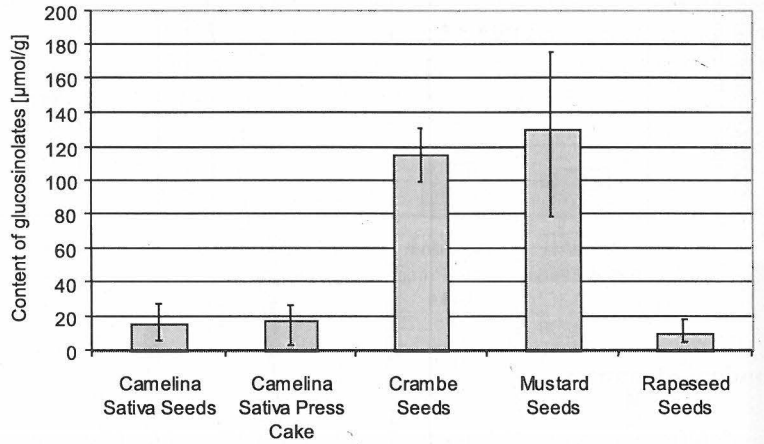
Condensed tannins

The determination of condensed tannins and their monomeric components was carried out with a photometric method as recommended by PRICE et al. (1978) and BUTLER et al. (1982).



Desulfoglucosinolates

Glucosinolates were determined as desulfoglucosinolates after purification with a DEAE Sephadex A-25 mini column by HPLC as described by FIEBIG and JÖRDEN (1990).

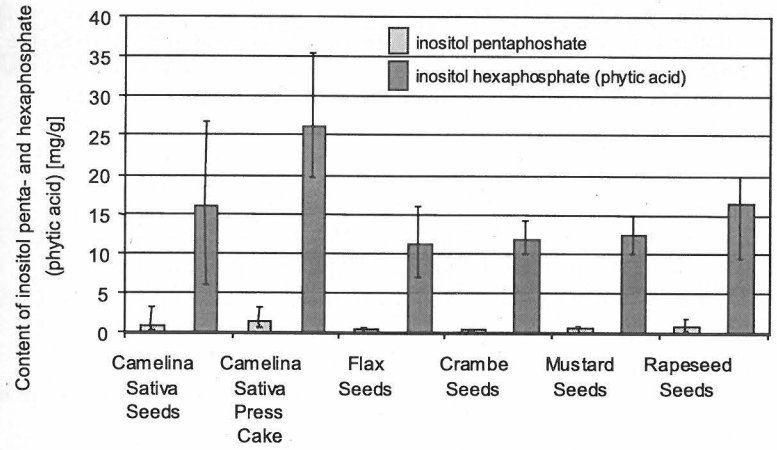


Phytic acid

Phytic acid and its degradation products inositol pentaphosphate, -tetraphosphate and -tri-phosphate were determined by an HPLC method after extraction with 0.5 M HCl and purification of the extract with an anion exchange column as described by MATTHÄUS et al. (1995).

Results

- Oil content of the seeds ranged from 27 to 42 percent with a mean value of 34.7 percent
- Oil content of the press cakes ranged from 6 to 16 percent with a mean value of 10.3 percent
- Oil content and content of tocopherols comparable with other oilseeds (rapeseed, mustard, crambe, flax)



- High content of α-Linolenic acid compared to other oilseeds, similar to flax
- Content of glucosinolates comparable with rapeseed and lower than crambe or mustard
- Lower content of sinapine compared to rapeseed or mustard
- Content of inositol phosphates comparable to rapeseed, but higher than crambe or mustard
- Great variation of the content of condensed tannins, but mean value comparable with other oilseeds
- Significant enrichment of sinapine, inositol phosphates in the press cake
- No significant change of the content of glucosinolates or condensed tannins in the press cake

Literature

/1/ Clausen, S., O. Olsen and H. Sorensen: J. Chromatogr. 260 (1983) 193 - 199
/2/ Clausen, S., L. M. Larsen and A. Plöger: Martinus Nijhoff/Dr. W. Junk Publishers (1985) 61 - 71
/3/ not published results
/4/ Matthäus, B., R. Lösing and H.-J. Fiebig: Fat Sci. Technol. 97 (1995) 289 - 291
/5/ Fiebig, H.-J. and M. Jörden: J. High Res. Chromatogr. 13 (1990) 377 - 379

/6/ Price, M. L., S. van Scoyoc and L. G. Butler: J. Agric. Food Chem. 26 (1978) 1214 - 1218
/7/ Butler, E. J., A. W. Pearson and G. R. Fenwick: J. Sci. Food Agric. 33 (1982) 866 - 875
/8/ Balz, M., E. Schulte and H.-P. Thier: Fat Sci. Technol. 94 (1992) 209 - 213

Crambe meal as source of chirality: Production of enantiopure *epi*-goitrin derivatives

O. Leoni[1], R. Iori[1], S. Palmieri[1], D. Gueyrard[2] and P. Rollin[2]
1 I.S.C.I., MiPA, via di Corticella 133, 40129 Bologna, Italy
2 I.C.O.A., Université d'Orléans, B.P. 6759, F-45067 Orléans Cedex 2, France

Keywords: chirality; fine chemicals; epi-goitrin; *Crambe abyssinica*.

Abstract

The *epi*-progoitrin obtained from defatted crambe meal can be readily transformed into enantiomerically pure *epi*-goitrin through a high-yielding enzymatic precess. /1,2/