Research and Development Report

FANCOR® ABYSSINIAN OIL

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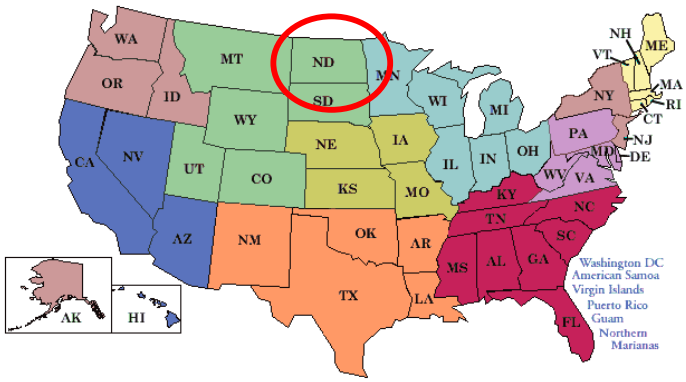
FANCOR® Abyssinian Oil
(Crambe Abyssinica Seed Oil)

Crambe abyssinica is native to the Mediterranean region and eastern Africa, particularly in the area originally called Abyssinia which today is known as Ethiopia.



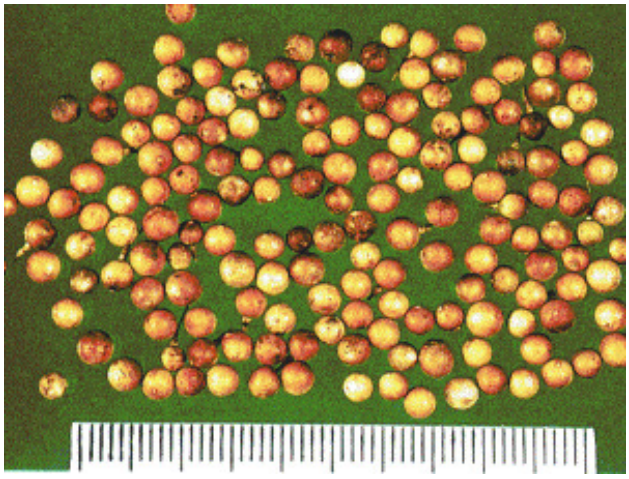
This plant was introduced into the United States in the 1940's and successfully grown in the northern central states chiefly in North Dakota. Crambe abyssinica is an erect annual herb with large pinnately-lobed leaves. The plant achieves a height of 24 – 40 inches depending upon growing conditions and plant density. Crambe produces numerous small white flowers.

Crambe young seedling

Crambe plants in bloom

Crambe flowers

Crambe ripe seed heads



Crambe seeds

The seeds are about 1/8 inch in diameter, round and singly borne in a hull or pod that remains on the seed after harvest. The breeding of this plant has been through natural selection without any genetic engineering. The oil obtained from Crambe abyssinica is a non-GMO natural product. The oil is fully biodegradable and free from any additives whatsoever.

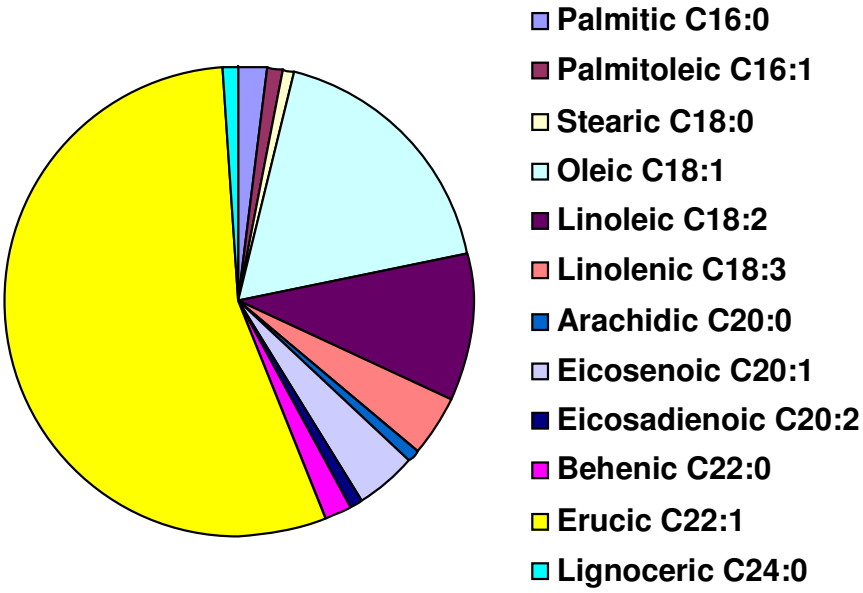
Physical and chemical characteristics:

Crambe abyssinica typically produces 30% oil with an unusually high level of a long-chain monounsaturated fatty acid: cis-13-docosenoic acid. This fatty acid usually accounts for more than 50% of the total fatty acids comprising the triglyceride oil. The high content of this fatty acid accounts in part for the exceptional skin and hair care benefits that will be discussed in detail in a later section of this report. Although cis-13-docosenoic acid is unsaturated, there are no conjugated double bonds and therefore the oil is quite stable.

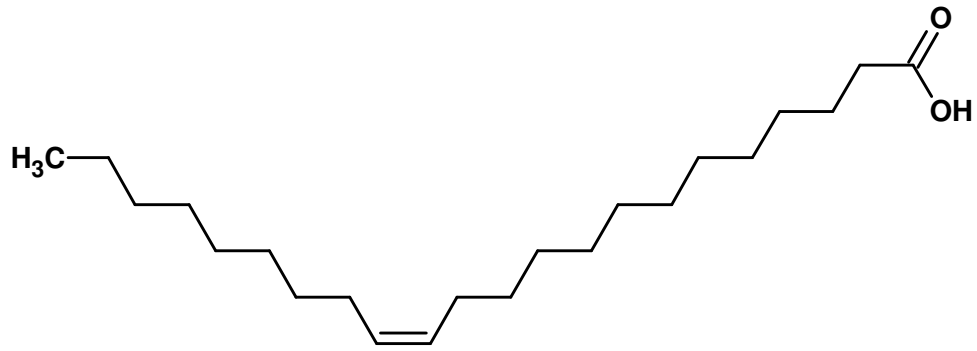
The fatty acid profile of FANCOR® Abyssinian Oil is typically as follows:

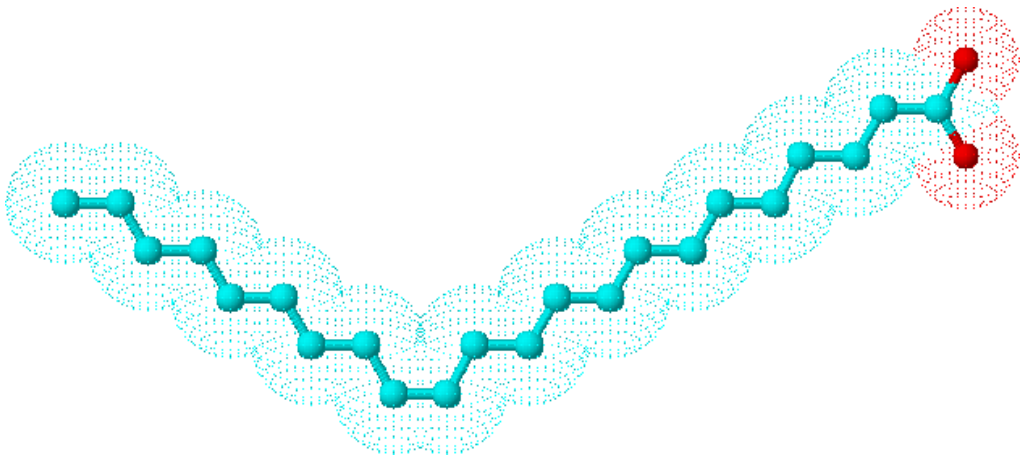
C16:0	Palmitic	1.0 - 4.0
C16:1	Palmitoleic	0.1 - 0.5
C18:0	Stearic	0.5 - 2.0
C18:1	Oleic	10.0 - 25.0
C18:2	Linoleic	7.0 - 15.0
C18:3	Linolenic	2.0 - 5.0
C20:0	Arachidic	0.5 - 2.0
C20:1	Eicosenoic	2.0 - 6.0
C20:2	Eicosadienoic	0.0 - 0.5
C22:0	Behenic	1.0 - 3.0
C22:1	Erucic (cis-13-docosenoic acid)	50.0 - 65.0
C24:0	Lignoceric	0.0 - 1.0

Fatty acid distribution in FANCOR® Abyssinian Oil



Molecular Configuration of Erucic Acid (cis-13-docosenoic acid)

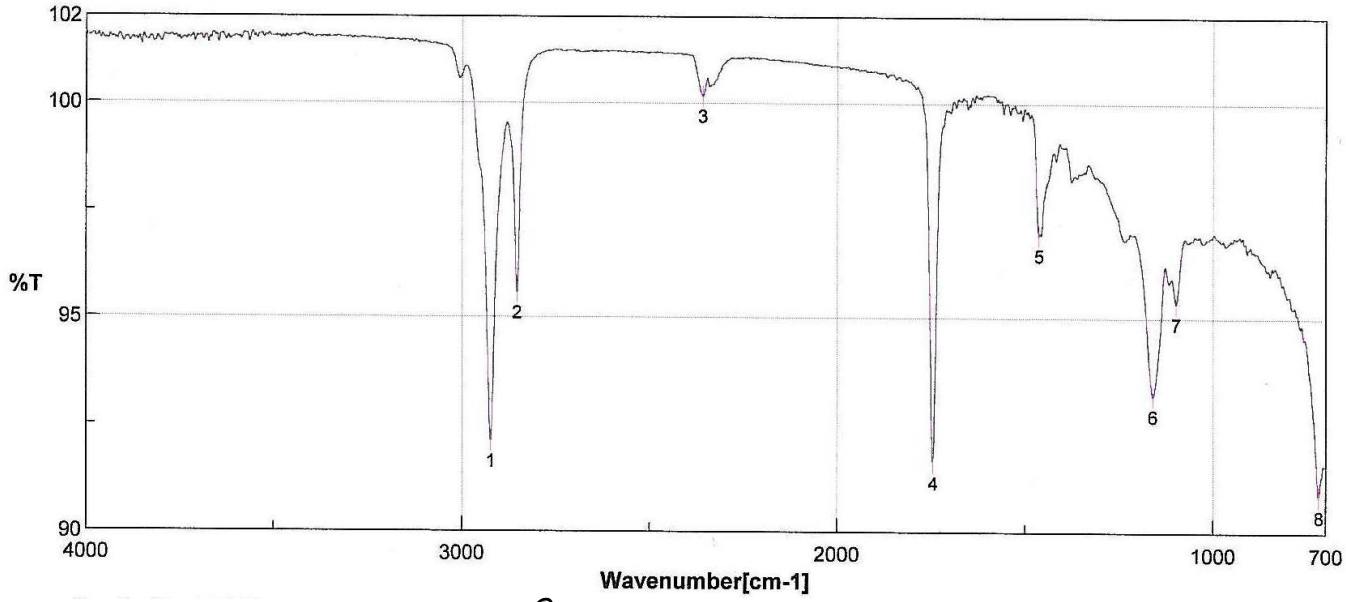




Other chemical properties (determined by USP methods):

Acid value	< 0.5
Specific gravity	0.906-0.911
Saponification value	160 -175
Iodine value (Hanus)	90 – 105
Refractive Index	1.465 – 1.475

FTIR Curve of pure FANCOR® Abyssinian Oil



(*FANCOR® Abyssinian Oil lot CW-7395)*

The FTIR curve is reasonably typical for a refined triglyceride oil

The physical properties of Abyssinian Oil include:

Appearance:	Very light clear yellow liquid
Rheology:	Highly fluid, no “drag”, spreads very easily
Odor	None

Color:

FANCOR® Abyssinian Oil is extremely light in color. The photographed samples in the following figure clearly demonstrate the comparative color of commonly used vegetable oils.

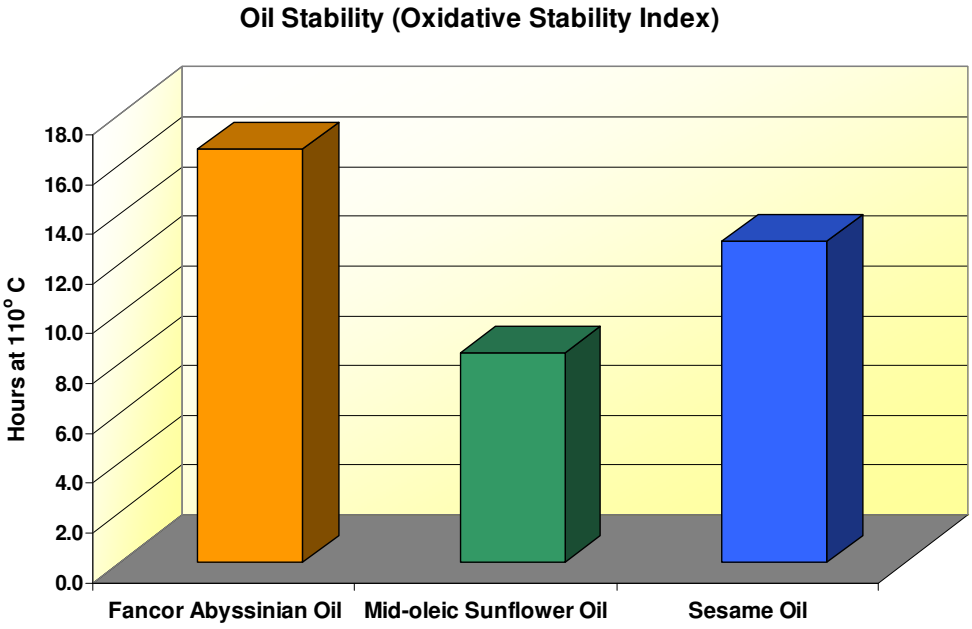
Wheat Germ **Olive** **Rice Bran** **Abyssinian** **Sesame** **Meadowfoam**

Stability Studies

FANCOR® Abyssinian Oil is extremely stable as evidenced by the following data:

High temperature tolerance: Abyssinian oil was kept at 100° C for 24 hours Acid value and color were measured at 3, 5 and 24 hours to determine the degree of hydrolysis and/or oxidation that occurred. Neither color nor acid value showed any increase indicating that the oil was exceptionally resistant to thermal degradation.

The Oxidative Stability Index (OSI) of FANCOR® Abyssinian Oil was determined in comparison to other vegetable oils. OSI is measured by heating the oil to a definite temperature (110°C for this experiment). As the oil is heated gases are produced into the headspace above the oil. Theses gases are captured and dissolved in water thereby changing the conductance of the aqueous system. The oil eventually “fatigues” and there is a very rapid rise in conductance. The time required to fully fatigue (i.e. complete thermal stress of the oil) is called the OSI or Oxidative Stability Index. It is measured in hours, the longer the OSI time the more stable the oil. In this case, FANCOR® Abyssinian Oil was compared to two commonly used oils namely mid-oleic sunflower oil and sesame oil.



Applications and Benefits

Skin care studies

Application protocol: 4 applications within a single day
Subject: 63 year old Asian male
Test (active): 2% Fancor® Abyssinian Oil™ in a simple cream base made with NF self-emulsifying wax containing no other conditioning agents
Control: 2% water in a simple cream base made with NF self-emulsifying wax containing no other conditioning agents

Treated with 2% Abyssinian Oil

Treated with 2% water (control)

FANCOR® Abyssinian Oil is easily absorbed into the epidermal tissue generating a very noticeable smooth texture to the skin. Even in the case of highly wrinkled and/or exceptionally dry skin, FANCOR® Abyssinian Oil makes a significant improvement in tone and texture. Since FANCOR® Abyssinian Oil is so light in color and essentially odorless, it can be used at reasonably high levels in skin care products and decorative cosmetics without interfering with the aesthetic excellence of the finished formula. In the case of decorative cosmetics, FANCOR® Abyssinian Oil can assist in the dispersion of pigments and promote an even smooth delivery of the final formulated product.

Summary of Skin Care Applications and Benefits

Application	*Use Level (%)*	*Selected Benefits*
Creams and Lotions	1-4	Panel tests show consistent preference for products containing Abyssinian oil. Non-greasy effective moisturization. Smooth, supple skin. Wrinkle removing
Body wash, Spa products and Liquid soap	1-2	Skin conditioning, replacement of essential skin lipids
Decorative (color) Cosmetics		
Lipstick and lipgloss	0.5 or more	Hydrates and conditions the lip surface. Assists in an even pigment delivery and prevents “lip caking”. Enhances gloss. May be used to improve current oil systems
Mascara and eye products	0.5-1	Aids in water-proofing. Helps even spread of pigments. Compatible with aliphatic hydrocarbons to achieve “longer lash” look. Non-irritating
Foundations and blushes	0.5-1	Thin film tends to be non-occlusive thereby imparting good moisturization without blocking pores. Aids the even spread of pigment and moisturizes with a light non-greasy lipid film.

Hair Care Benefits

FANCOR® Abyssinian Oil produces a natural radiant luster. The oil glides onto the hair surface to form a very light continuous lipid layer which provides lubricity to help detangle and lock in essential moisture.

Motions salon herbals, a new hair care product made by Alberto Culver, uses FANCOR® Abyssinian Oil to "restores natural shine, conditions, moisturizes, detangles and lubricates the hair and scalp".

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Summary of Hair Care Applications and Benefits

Application	*Use Level (%)*	*Selected Benefits*
Shampoos and Conditioners	1-2	Excellent lipid after-feel, improved manageability, conditioning
Styling Aids	1-2	Shine, lubricity, moisturization and detangling
Pomades	5-10	Improves spreadability and shine, removes tack and greasiness from waxes and petrolatum
Relaxers and Texturizers	2-5	Abyssinian oil is stable at high pH Imparts protection against irritancy from caustic systems.

Summary

FANCOR® Abyssinian Oil

- Long-chain unsaturated fatty acids are biologically preferred and highly conditioning for both skin and hair
- 100% pure vegetable oil
- Very light, non-greasy, easily absorbed
- Safe and "Environmentally friendly"
  - Non-GMO
  - Biodegradable
  - Never tested on animals
  - Pure unadulterated vegetable oil
- Very stable
  - highly resistant to oxidation
  - highly resistant to thermal degradation
- Cost efficient (very high benefit/cost ratio)