

Extract from “green” Rooibos – a new raw material for the cosmetic industry

Frank Otto, Sabine Grüner and Bernd Weinreich

Adalbert-Raps-Zentrum für Arznei- und Gewürzpflanzenforschung
Am Forum 2
85350 Freising-Weihenstephan

Abstract

Based on centuries of traditional use as a tea - the Rooibos plant enjoys a strong positive image in its homeland South Africa. The substantially rising consumption of Rooibos tea in the western industrial nations can be explained by the fact that this positive image is transported more and more successfully to the European and American consumers.

Plausible and easily comprehensible advantages of Rooibos excerpts are their low tannin content and the fact that they are caffeine-free. Beyond that, knowledge on the health-promoting characteristics of Rooibos is not only based on the experience of traditional use. In fact, the antioxidative, anti-inflammatory, anti-microbial, anti-allergic and well-being promoting properties of natural Rooibos extracts are scientifically proven.

When using as a raw material for cosmetic applications it is recommended to use the entire power of the original vegetable ingredient spectrum. As for black and green tea – the ‘green’ variation which has not been fermented during processing can be regarded as the more valuable one. Quality criteria for Rooibos extracts are their antioxidative capacity along with their content of the dihydrochalcone aspalathin – a valuable antioxidant which is unique to Rooibos.

In co-operation with the scientists of the Adalbert-Raps Centre for Medicinal and Spice Plant Research in Freising-Weihenstephan, Germany; the company EURO Ingredients has developed a Rooibos extract, which transforms the quality of the vegetable raw material optimally.

Introduction

The history of the Rooibos plant has often been told. First mentioned in the records of the botanist Carl Peter Thunberg in 1772 (1) it took until the beginning of the 20th century to attract the Russian immigrant Samuel Ginsberg to the bush-like plant. Ginsberg, who originated from a tea merchant family, observed how South African natives cut leaves from the bushes and processed them into a traditional health-promoting beverage. He was the first who recognized the potential of the plant and began the trade in South Africa, later in Europe. Soon the constantly rising demand could not be covered by collection of wild plants any more and methods for the cultivation of Rooibos had to be developed (2) [Fig. 1]. Today approximately 4500 to 6000 tonnes of Rooibos are harvested in South Africa per year. Approximately 1900 tonnes of the harvest are exported. Germany purchased approximately 985 tonnes of this quantity in 1999 which is more than 50% of the exported quantity. Germany is followed by Japan, the Netherlands and England, where approximately 15 to 5% of the exported amount of Rooibos are consumed.

Ingredients and Effect

- Rooibos increases well-being and possesses anti-oxidative, anti-allergic, anti-microbial and anti-inflammatory features

Teas made from Rooibos contain a multitude of minerals and trace elements, above all Sodium, Magnesium and Potassium (2, 3). Its health-promoting characteristics however, are mainly ascribed to the numerous contained flavonoids like Aspalathin, Nothofagin, Quercetin, Quercitrin, Rutin or Vitexin (4). Whilst most of these antioxidative effective components occur ubiquitously in plants, Aspalathin was found so far exclusively in Rooibos (5) [Fig. 2].

Due to the rich flavonoid content, especially the content of the dihydrochalcone Aspalathin, Rooibos possesses a multitude of scientifically proven health-promoting effects:

- **Rooibos acts anti-inflammatory (6).** On the South African market this characteristic is already taken advantage of by using Rooibos excerpts in baby care formulations and ointments (2).
- **Rooibos acts anti-allergic (7).** Most of all the combination of anti-allergic and anti-inflammatory effectiveness is the reasons for using Rooibos excerpts for the acceleration of the healing process of various skin diseases. Areas of application for Rooibos preparations are e.g. eczema and sunburn (8).
- **Rooibos as an antioxidant (9,10).** The flavonoids contained in Rooibos protect the cells of the body against free radical attack (11). The measured antioxidative effect is comparable to green tea (12). Furthermore, there is evidence for distinctive radical scavenging activity of Rooibos excerpts against active oxygen species (13). These characteristics of Rooibos help to protect the organism from free radicals by swallowing as well as applying on the skin.
- **Rooibos acts antimicrobial (14, 15)** Scientists of the University of Stellenbosch, S.A. in cooperation with the ARC Infruitec, Stellenbosch, S.A., proved a considerable anti-microbial activity of Rooibos extracts. This makes it a valuable ingredient especially for facial care products such as facial wash or anti-acne preparations.
- **Rooibos increases well-being (7).** Quercetin, which is also contained in Rooibos is able to restrain the production of the enzyme Monoaminoxidase (MAO) in the human body. As a consequence a larger quantity of the neurotransmitter Serotonin is produced. Accordingly, the taking of rooibos excerpts causes an increase of well-being, a decrease of sleeplessness up to an anti-depressive influence, and counteracts nervous strain (7).

Besides these scientifically well-documented effects, there are many applications for Rooibos which are based purely on experience and traditional use. Thus Rooibos extracts are known to prevent the skin from untimely ageing and to be beneficial in the treatment of sunburn, acne, allergies, eczema, teeth- and mouth

mucous membrane inflammations. Traditionally Rooibos extracts are among other things applied against food allergies, pyrosis, depressive detunings, sleep disturbances and for the support of the immune system (3, 16, 17, 18, 19).

A New Raw Material for the Cosmetic Industry

The specified characteristics, both the scientifically proven as well as those based on the experiences of traditional use, make Rooibos extracts an interesting new raw material predestined for the cosmetic industry. With rising popularity the strong positive image of the plant spreads far over the borders of its homeland South Africa. Compared to green tea which possesses also powerful antioxidative characteristics, Rooibos contains no caffeine and has a low tannin content. Tannins (tanning acids) bind calcium and iron and make them inaccessible for the body. In addition they show a tanning effect on the skin. The low tannin content of Rooibos extracts compared to green tee predestines Rooibos for the application in skin care products (20).

Influence of the Fermentation

- the use of unfermented raw materials is absolutely recommendable

As already described the positive health-promoting effect of Rooibos extracts is mainly due to its high flavanoid content. Especially its excellent antioxidative effect is closely linked with the content of a substance called Aspalathin in the vegetable material.

However, the process of traditional tea production – which supplies most Rooibos extract manufacturers with raw material for their products - includes a necessary fermentation step which gives the typical odour and colour to the final product [Fig. 3]. Besides, fermentation is a natural process which can - under the climatic conditions of South Africa - only be avoided at some expenditure after harvesting.

On the other hand fermentation is a strongly oxidizing interference into the ingredient spectrum of the vegetable material. The process leads to the loss of up to 90% of the plant's most valuable ingredient Aspalathin. Whilst unfermented plants show Aspalathin values between 3 and 12g / 100g Aspalathin, the proportion decreases during processing to 0.2 to 1.3 g / 100g (2, 21) [Fig. 4]. It is known that the Dihydrochalcon is partly converted into flavanoles during the fermentation process which possess their own antioxidative effect. Nevertheless, a substantial part of the Aspalathin is oxidized to an unknown polymer component, so that the antioxidative activity of the vegetable raw material declines inevitably [Fig. 5].

In total, approximately 70% of the antioxidative effect of Rooibos raw material is lost during fermentation. Therefore the use of an extract manufactured from unfermented raw material is to be regarded as absolutely useful for the cosmetic industry. The Aspalathin content in combination with the antioxidative effect (e.g. in accordance with the conditions of the ABTS test system) can be taken as quality criteria (21).

Shelf-life of Cosmetic Products with Antioxidative Additives

- moisturizer emulsions with Rooibos

Antioxidants protect the media in which they are contained by their preference to react with active species. Consequently they are preferentially diminished in presence of oxygen or other active components. For a cosmetic product the question of shelf-life occurs.

In our laboratory we tried to figure out by examining typical moisturizer emulsions how the products must be formulated to ensure the longest possible shelf-life of Aspalathin from unfermented Rooibos. The result is a stabilized formulation with an almost stable Aspalathin content [Fig. 6].

Applications for Rooibos Extracts

At present Rooibos-containing cosmetic products are almost exclusively available in South Africa. The range includes hair care products such as shampoo and conditioner, as well as products for facial care such as toners, wash products and body care products, e.g. showering gel and body lotion. Besides emulsion-based products such as hand and nail creams, also more special care creams with anti-ageing formulations as well as after sun products with Rooibos, are offered. A multitude of further care products is available in the areas of baby care and sports products. Furthermore Rooibos-containing health or well-being tablets are available. (3, 18, 22).

Conclusion

The trend towards authentic natural products is unbroken on the European and American market. The constantly increasing demand for raw materials with ethnic tradition can be settled effectively and in good quality by the use of extracts from unfermented Rooibos.

The extract was developed from the scientists of the Adalbert-Raps Centre for Medicinal and Spice Plant Research in Freising-Weihenstephan, Germany, and is available from EURO-Ingredients, Hamburg, Germany.

References

- (1) Morton, J.F.; Rooibos Tea (*Aspalathus linearis*), caffeineless, low-tannin beverage; *Economic Botany* 37 (1983), 164
- (2) H. Schulz et al.; Rotbush-Tee; *Deutsche Apotheker Zeitung*, 140, (2000), Nr. 33, 47
- (3) Info from website: <http://www.rooibos.com> (08/2003)
- (4) Rabe, C. et al. ; Phenolic metabolites from Rooibos tea (*Aspalathus linearis*); *Phytochemistry*, 35, (1994), 1559
- (5) Koeppen, B.H. et al.; C-Glycosyl flavonoids. The chemistry of Aspalathin; *Biochem. J.*, 99, (1966), 604
- (6) Kunishiro et. al.; Effects of Rooibos extract on antigen-specific antibody production and cytokine generation in vitro and in vivo ; *Bioscience Biotechnology Biochemistry* 65 (10), (2001), 2137
- (7) Snykers, F. et al.; Studies of South Africa medicinal plants. Part I: Quercetin as the major in vitro active component of Rooibos tea; *J. S. Afr. Chem. Inst.* 27, (1974), 5.
- (8) Shindo, Y. et al.; Effect of Rooibos tea on some dermatological diseases; *Proceedings of the International Symposium on Tea Science, Shizuoka* (1991), 385.
- (9) Gadow et al.; Effect of extraction time and additional heating on antioxidant activity of Rooibos tea (*Aspalathus linearis*) extracts, *J. Agric. Food Chem.*, 45, (1997), 1370.
- (10) Gadow et al.; Comparison of the antioxidant activity of Aspalathin with that of other plant phenols of Rooibos tea (*Aspalathus linearis*), α -Tocopherol, BHT and BHA, *J. Agric. Food Chem.*, 45, (1997), 632
- (11) Shimoi, K., et al.; Radioprotective effects of antioxidative plant flavonoids in mice ; *Mutation Research*, 350 (1), (1996), 153
- (12) Gadow et al.; Comparison of the Antioxidant activity of Rooibos tea (*Aspalathus linearis*) with Green-, Oolong- and Black tea; *Food Chemistry*, Vol. 60, 1, (1997), 73
- (13) Yoshikawa, T., et al. ; Scavenging effects of *Aspalathus linearis* (Rooibos tea) on active oxygen species; *Adv. Exp. Med. Biol.* 264, (1990), 171
- (14) Info from website: <http://www.arc.agric.za> (08/2003)
- (15) Shepers, S. MSc Food Science in Progress. Evaluation of compounds from rooibos tea as microbial inhibitors. University of Stellenbosch.
- (16) Info from website: <http://www.beate-online.com> (08/2003)
- (17) Info from website: <http://www.redbushtea.com> (08/2003)
- (18) Info from website: <http://www.annique.com> (08/2003)
- (19) Info from website: <http://www.savanahimports.com>
- (20) Info from website: <http://www.herrlein.com> (08/2003)
- (21) H. Schulz et al.; Quantification of quality parameters for reliable evaluation of green Rooibos (*Aspalathus linearis*); *Eur. Food Res. Technol.*, 216, (2003), 539
- (22) Info from website: <http://sa-tea.virtualave.net> (08/2003)



Fig. 1: Rooibos plantation near Graafwater, Cedarberg area, South Africa



Fig. 2: Rooibos branch

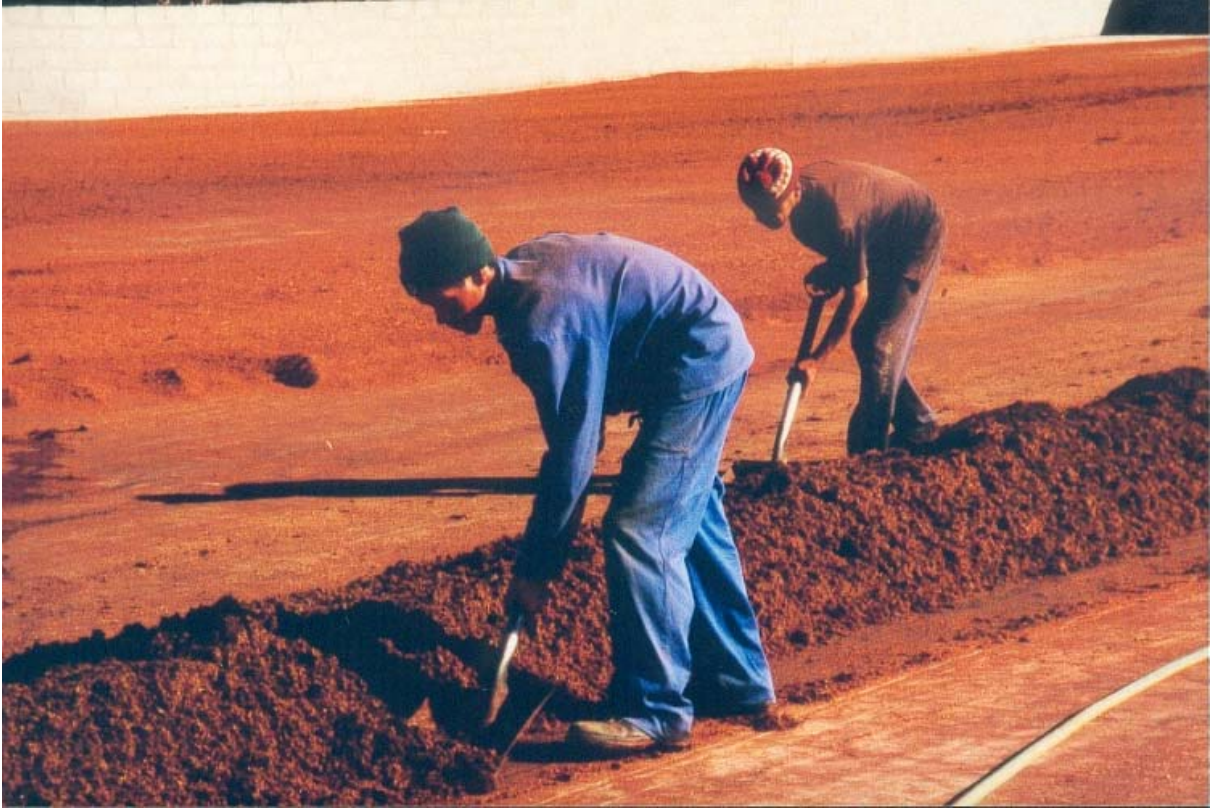


Fig. 3: Fermentation process – under the influence of moisture, atmospheric oxygen and the heat of the sun the tea develops its typical odour and colour.

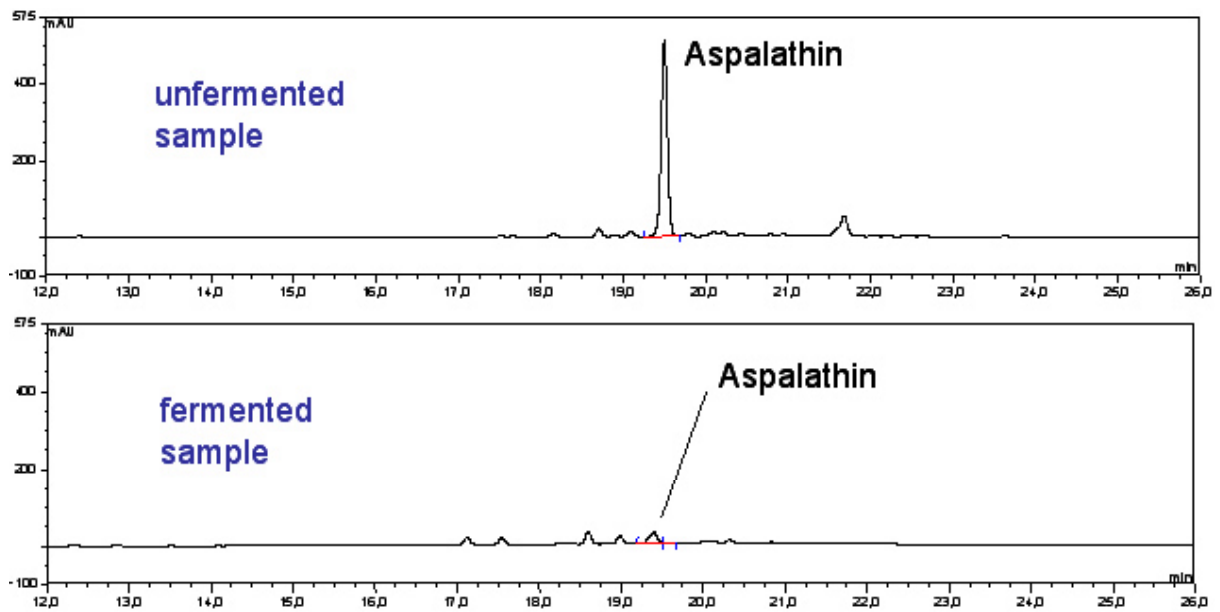


Fig. 4: Fermentation process - up to 90% of the plants most valuable ingredient Aspalathin get lost during fermentation.

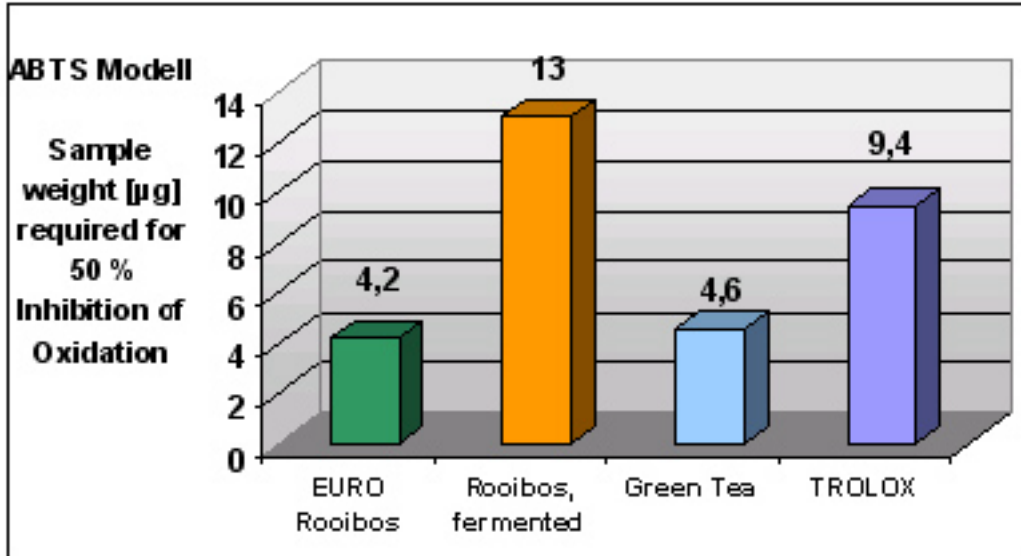


Fig. 5: Comparison of antioxidant potential evaluated by the world wide approved ABTS model system. **Lower values indicate improved activity.** Rooibos extract from EURO Ingredients, exhibits a threefold higher antioxidative potential compared to similar processed extracts from conventional fermented Rooibos material. Green tea and the water soluble Vit E derivative Trolox were applied as positive control substances.

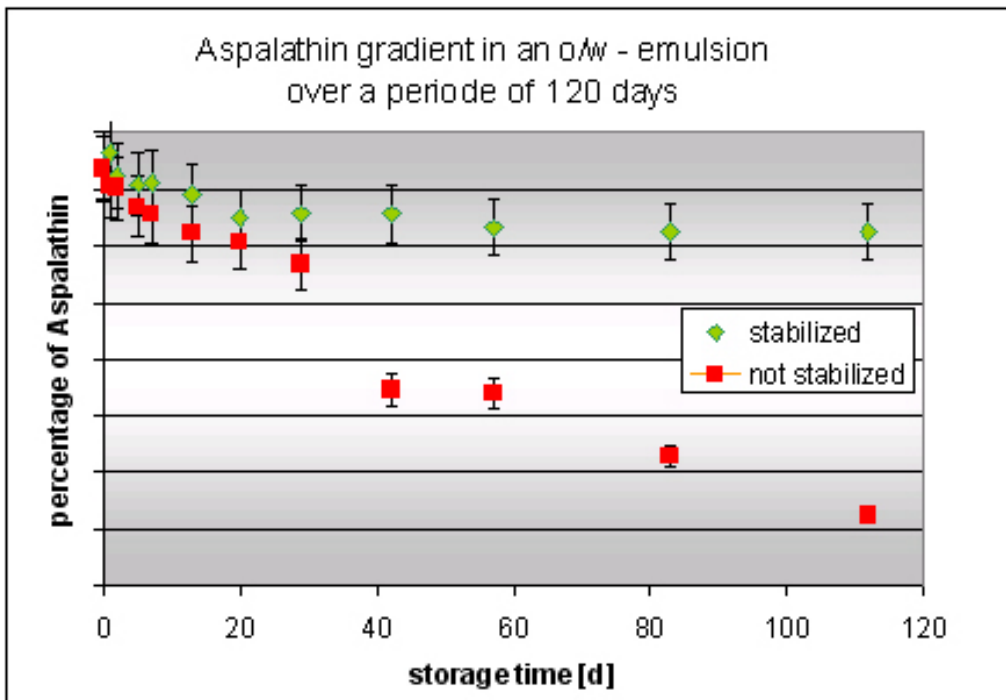


Fig. 6: The diagram shows the typical dismantling process of Aspalathin in an o/w-type emulsion compared to a specially developed stabilized formulation. The stabilized emulsion is based on a typical formulation used in the cosmetic industry.

