Available online at www.sciencedirect.com
ScienceDirect
South African Journal of Botany 77 (2011) 869–886
SOUTH AFRICAN JOURNAL OF BOTANY
www.elsevier.com/locate/sajb

Rooibos (*Aspalathus linearis*) beyond the farm gate: From herbal tea to potential phytopharmaceutical

E. Joubert [a, b,*], D. de Beer [a]

[a] *Post-Harvest and Wine Technology Division, ARC (Agricultural Research Council of South Africa) Infruitec-Nietvoorbij, Private Bag X5026, Stellenbosch 7599, South Africa*

[b] *Department of Food Science, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa*

Abstract

Aspalathus linearis (Burm.f.) Dahlg. (Fabaceae, Tribe Crotalarieae), an endemic South African fynbos species, is cultivated to produce the well-known herbal tea, rooibos. It is currently sold in more than 37 countries with Germany, the Netherlands, the United Kingdom, Japan and the United States of America representing 86% of the export market in 2010. Its caffeine-free and comparatively low tannin status, combined with its potential health-promoting properties, most notably antioxidant activity, contributes to its popularity. First marketed in 1904 in its fermented (oxidised) form, green rooibos is a new product recently on the market. The utilisation of rooibos has also moved beyond a herbal tea to intermediate value-added products such as extracts for the beverage, food, nutraceutical and cosmetic markets. Its potential as a phytopharmaceutical, shown in recent scientific studies, has not yet been exploited. This review focuses on past and current research aimed at enhancing the value of rooibos herbal tea as a specialised, niche product and expanding its value-adding potential against the background of its traditional use and the current market. The focus falls specifically on aspects such as composition, processing, quality and rooibos as food and potential medicine.

Keywords: *Aspalathus linearis*; Herbal tea; Industry; Phytopharmaceutical; Processing; Quality; Rooibos; Value-addition

1. Introduction

The genus *Aspalathus* (Fabaceae, Tribe Crotalarieae) comprises more than 270 species of which most are endemic to the Cape Floristic Region (Dahlgren, 1968). Rooibos tea, produced from *A. linearis* (Burm.f.) Dahlg., had no commercial value at the beginning of the 20th century, but today it is a well-known herbal tea, enjoyed in more than 37 countries. A recent report by the Swiss Business Hub South Africa (Anon, 2007) stated that 'Rooibos appears to be headed towards becoming the second most commonly consumed beverage tea ingredient in the world after ordinary tea (*Camellia sinensis*)'. In South Africa it is well established, enjoying popularity amongst an estimated 10.9 million households (data supplied by SA Rooibos Council (SARC), 2011).

Several reviews dealing with rooibos have been published over the years since Cheney deemed it of too insignificant economic importance as a beverage to include it in a review of the biology and economics of the global beverage industry (Cheney, 1947). A different point of view, appreciating its value as a beverage with wide appeal, was later offered (Cheney and Scholtz, 1963). In her review, Morton (1983) campaigned for wider recognition and better distribution of rooibos in the United States of America. It continued to fascinate researchers and recent reviews cover diverse topics such as the development path of rooibos (Rampedi and Olivier, 2008), bioactivity and potential health benefits (Joubert et al., 2008a; Marnewick, 2010; McKay and Blumberg, 2007), and production, processing and quality aspects of rooibos tea and related products (Joubert and Schulz, 2006; Joubert et al., 2008a). The relevance of the

* Corresponding author at: Post-Harvest and Wine Technology Division, ARC (Agricultural Research Council of South Africa) Infruitec-Nietvoorbij, Private Bag X5026, Stellenbosch 7599, South Africa. Tel.: +27 21 8093444; fax: +27 21 8093430.
E-mail address: joubertL@arc.agric.za (E. Joubert).

0254-6299/$ - see front matter © 2011 SAAB. Published by Elsevier B.V. All rights reserved.
doi:10.1016/j.sajb.2011.07.004

major rooibos flavonoids in the diet in terms of their bioactivity, bioavailability and potential herb–drug interactions were addressed by Joubert et al. (2009a). The major focus of the present review will be on past and current research aimed at enhancing the value of rooibos herbal tea as a specialised, niche product and expanding its value-adding potential against the background of its traditional use and the current market. Within the context of enhancing the value of rooibos, aspects such as composition, processing, quality, and rooibos as food and potential medicine (phytopharmaceutical) will be discussed.

2. Utilisation of *Aspalathus linearis*

The first person to realise the commercial potential of rooibos as a herbal tea was Benjamin Ginsberg, a merchant of Clanwilliam, who started marketing it in 1904. He obtained the tea from descendants of the Khoi who crudely processed it during the warm summer months. It was, however, only by 1930 that the agricultural value of rooibos was recognised by a medical practitioner and nature lover, P. Le Fras Nortier of Clanwilliam. His early cultivation experiments, carried out with the help of local farmers, O. Bergh and H. Riordan (Anon, 1985), laid the foundation for the industry. Growing participation of other farmers in rooibos production and increased demand over the years expanded the area under cultivation to 36 000 ha (Pretorius, 2007), with production mainly concentrated in the Clanwilliam area (Fig. 1). Since expansion has threatened biodiversity of the Greater Cederberg Biodiversity Corridor, SARC in partnership with CapeNature, formed the Rooibos Biodiversity Initiative. One of its aims was to undertake a joint planning process for expansion to minimise loss of threatened natural habitat (Pretorius, 2007). Following this, a current initiative of SARC is to establish the Right Rooibos Sustainability Standard (http://sarooibos.org.za).

In the early years, different *Aspalathus* species and ecotypes, naturally occurring in the Cederberg mountain area, were used to produce rooibos tea (Dahlgren, 1968, 1988). Today only the so-called red type or Rocklands type, originally from the Pakhuis Pass area, is of commercial importance. The red type is divided into the selected, improved Nortier type (cultivated; Fig. 2), and the Cederberg type (wild-growing). The latter type has broader and coarser leaves than the Nortier type (Morton, 1983). Characteristics associated with the cultivated type are bright green, needle-like leaves on straight, slender branches with relatively short internodes. The leaves should turn red-brown when bruised (Dahlgren, 1968).

Tea is also sometimes made from small quantities of a closely related species, *A. pendula* Dahlg. and several wild types of *A. linearis* (Van Heerden et al., 2003). The grey, black and red-brown types were harvested in the wild, processed and sold to the Rooibos Tea Control Board until 1966, after which the marketing of the grey and black types were discontinued due

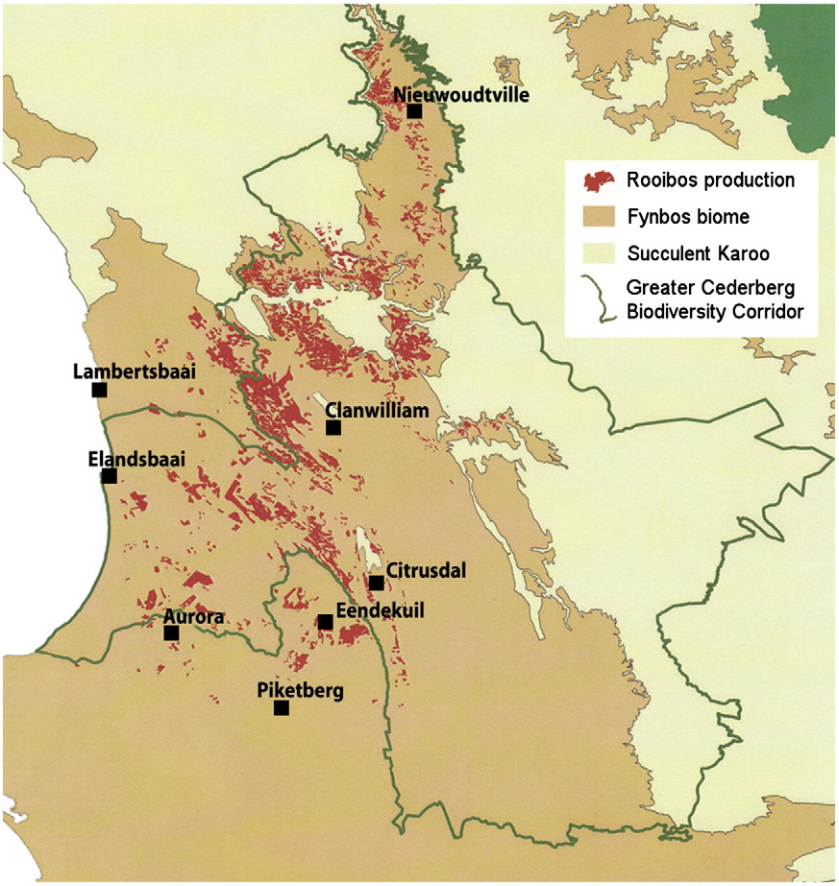

Fig. 1. Production areas of *Aspalathus linearis* in and around the Greater Cederberg Biodiversity Corridor (map supplied by SARC).