

MARKET CHAIN ANALYSIS OF CANDEIA TIMBER (*Eremanthus erythropappus*)

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ABSTRACT: This study characterized and analysed the market chain of candeia timber intended for oil production, and estimated the marketing margin retained by each chain participant. The study site encompassed two regions of Minas Gerais state whose distinctive mark is great abundance of native candeia forest (*Eremanthus erythropappus*). Data were collected through interviews with rural workers, candeia woodland owners and manufacturers of candeia oil and alpha-bisabolol. The marketing margin was computed as the percentage retained by each chain participant on each kilo of alpha-bisabolol sold. It was concluded that alpha-bisabolol distributors are the participants reaping the greatest marketing margin, and also that rural producers should sell candeia timber directly to oil manufacturers, with no middlemen wholesalers, in order to boost their marketing margin.

Key words: Alpha-bisabolol, candeia oil, marketing margin.

CADEIA DE COMERCIALIZAÇÃO DA MADEIRA DE CANDEIA (*Eremanthus erythropappus*)

RESUMO: Objetivou-se, neste trabalho, caracterizar a cadeia de comercialização da madeira de candeia para a produção de óleo e estimar a margem de comercialização de cada participante da cadeia. A área de estudo compreendeu duas regiões situadas no estado de Minas Gerais, cuja característica marcante é a ocorrência, em grande abundância, de candeias nativas da espécie *Eremanthus erythropappus*. A coleta dos dados foi por meio de entrevistas pessoais a trabalhadores rurais, proprietários de terra onde ocorre a espécie e proprietários (gerentes) de indústrias que produzem óleo de candeia e alfa-bisabolol. A margem de comercialização foi calculada como sendo a porcentagem do valor do kg de alfa-bisabolol que fica com cada membro da cadeia. Concluiu-se que os distribuidores de alfa-bisabolol beneficiam-se da maior margem de comercialização. Para conseguir uma margem de comercialização maior, o produtor rural deve vender a madeira de candeia diretamente para a fábrica de óleo, ou seja, sem a intermediação do atacadista.

Palavras-chave: Alfa-bisabolol, óleo de candeia, margem de comercialização.

1 INTRODUCTION

Candeia is a tree species belonging to the pioneer or early secondary ecological group and considered a precursor in grassland invasion (CARVALHO, 1994). It develops rapidly in open grasslands, forming relatively pure stands. It can also develop inside the forest where a disturbance exists, since candeia is a sun-loving species and the incidence of light benefits it (CORRÊA, 1931). Candeia belongs to family Asteraceae (Compositae), to gender *Eremanthus* and, according to MacLeish (1987), it comprises a total of 18 species, of which *Eremanthus erythropappus* (DC.) Macleish and *Eremanthus incanus* (Less.) Less are the species of greater economic importance and occurrence in Minas Gerais state.

Candeia timber (*Eremanthus erythropappus*) is widely used in production of fence posts to divide pastures

in rural properties and also in production of essential oil, whose main component alpha-bisabolol has antiphlogistic, antibacterial, dermatological and spasmodic properties (TEIXEIRA et al., 1996). Alpha-bisabolol is used by the perfume, medicine and cosmetic industry to formulate lipsticks, suntan lotions, dental creams, after-shaves, shaving creams, hair removal products, to name a few.

Recent studies by Perez (2001), Perez et al. (2004) and Scolforo et al. (2004) about candeia (*Eremanthus erythropappus*) have produced the following findings: the average stack factor (relation between bulk apparent volume and solid volume) for clear trunk and branches up to 3 cm in diameter is 1.92; the average diameter growth rate, as estimated by the trunk analysis technique, is 0.73 cm/year; the minimum cut diameter is 5cm if timber is intended for oil production and 7cm if for fence post production; the oil yield produced by a solid cubic meter

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of timber from small DBH trees (5 to 10cm) is approximately 6 kg, while from large DBH trees (40 to 45cm) the yield is approximately 11 kg. This same trend is observed for volume inside bark and stacked logs, although measure scales differ in such cases; commercial exploration of candeia should only take place in areas where it accounts for 70% or more of the local vegetation.

Although the exploration of candeia and subsequent sale of its by-products can generate income, information is still scarce on the marketing of its main products (timber for fence posts and oil production), not only as regards quantities marketed but also as regards price and destination of these products.

According to Guedes (1999), the path followed by a product from point of origin to end user demands several actions involving both the marketing system and its agents, forming an aggregate ensemble. Thus, in order to derive maximum benefit from a product, an adequate marketing infrastructure is desirable to facilitate its flow until it reaches end users to meet their needs.

The objective of this study is to characterize the marketing chain of candeia timber intended for oil production, and to estimate the marketing margin of each participating agent.

2 MATERIAL AND METHODS

2.1 Study site

To characterize the marketing chain of timber intended for oil production, from point of origin to manufacturer, the study site encompassed two regions of Minas Gerais whose distinctive mark is great abundance of native candeia forest, species *Eremanthus erythropappus* (Figure 1).

2.2 Data collection

Data collection comprised interviews based on a 'focused interview' agenda, a technique that enables topics to be explored as questions emerge throughout. According to Mattar (1993), an interview is a form of social interaction whereby the interviewer introduces himself or herself to the respondent and formulates questions in the hope of getting information related to the subject investigated. More specifically, it is a way of engaging in asymmetric communication, with one party as information seeker and the other as information provider. It is very suitable for obtaining information about what people know, believe, expect, feel, wish, and what they intend to do, currently do

or did in the past, as well as their explanations or reasons for preceding statements.

The prompts/questionnaires used were useful in understanding the importance of candeia forests as a source of timber for production of alpha-bisabolol, in describing the marketing chain of the species, and also in estimating the income and marketing margin retained by each participating agent.

2.3 Sampling

A non-probabilistic sampling technique was used. According to Cervo & Bervian (1983), in this method the possibility of choosing a given element of a universe is ignored. Among the categories of non-probabilistic sampling, the type used in this study is purposive or judgmental sampling, the basic assumption of which is that with good inference and a suitable strategy cases to be included in the sample can be appropriately picked to ensure satisfactory results regarding the intended purpose of the research (MATTAR, 1993).

Purposive sampling allowed choosing people and manufacturing companies specifically dedicated to the exploration, production and marketing of candeia timber, and better equipped to pass on the required information.

Site visits and personal interviews were conducted with rural workers, candeia plantation owners and manufacturers of candeia oil and alpha-bisabolol. A standard semi open-ended questionnaire was custom prepared to address each marketing agent. Additionally, existing studies on the topic were analyzed along with other relevant literature, and cross-checking techniques were also used to assess the level of reliability of each information source.

2.4 Income received by participants in the marketing chain

According to Ferreira (1993), 'income' is the amount received as a result of an economic activity. In his study about income generation processes among communities demanding land redistribution reform, Guanziroli (1994) categorizes income items as follows:

Net monetary agricultural income: income obtained from selling agricultural products, less relevant production costs.

Net monetary animal income: income obtained from selling animals and their by-products, less relevant production costs.

Own consumption income: income from consumption of one's own produce, that is, the income a

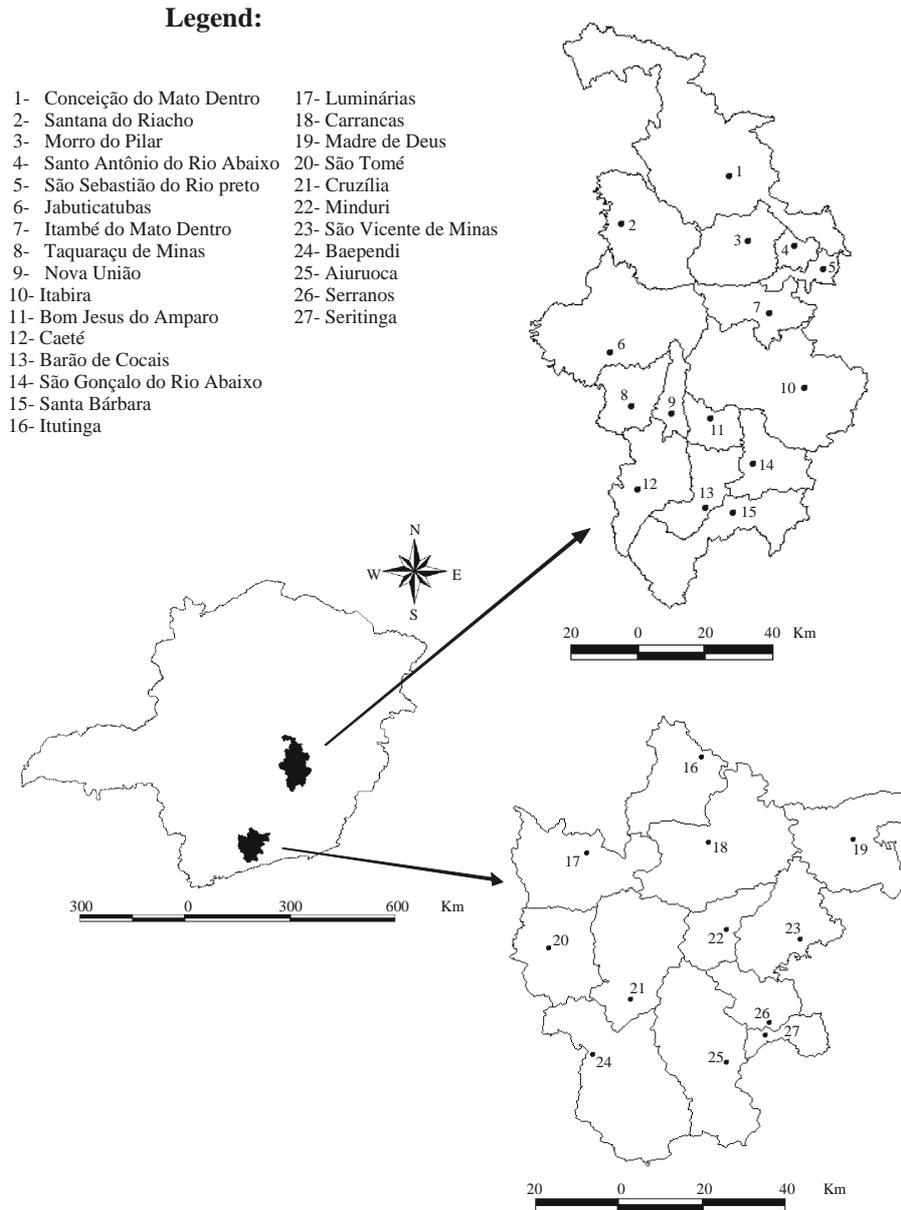


Figure 1 – Location of study sites in Minas Gerais state, Brazil.

Figura 1 – Localização das regiões de estudo no Estado de Minas Gerais.

farmer would obtain from selling this particular share of his produce rather than consuming it.

Income from other jobs: wages or salaries earned by family members from temporary or permanent jobs.

Income from other sources: occasional sale of non-

agricultural products, e.g. timber, coal, extraction, small-scale trade and handcraft.

This study considered the income obtained from extraction and trade of candeia timber, as well as income from the sale of crude natural candeia oil and alpha-

bisabolol. The estimated income is the gross monetary income, since neither the costs involving exploration and transportation of candeia nor any other cost involved in the production of oil or fence posts have been taken into account.

2.5 Marketing margin

According to Marques & Aguiar (1993), marketing margin is the difference between purchase and sale price of a product across different levels of the marketing chain, that is, the gain percentage retained by each participating agent.

In this study, marketing margin indicates the price percentage retained by each chain participant for one kg of alpha-bisabolol. For instance, the marketing margin retained by loggers, which is the relation between price received by them to cut and remove the quantity of timber in stere meter (one cubic meter of stacked logs, interspaces included) required to produce 1 kg of alpha-bisabolol and price received by distributors of alpha-bisabolol, as given by the formula:

$$M_L = (P_L / P_{AL}) \times 100$$

where:

M_L = marketing margin of loggers in percentage;

P_L = price received by loggers to cut and remove to a roadway edge the quantity of timber required to yield 1 kg of alpha-bisabolol;

P_{AL} = price received by distributors for one kg of alpha-bisabolol.

The marketing margin of rural producers is the relation between price received by them less price received by loggers and price received by manufacturers of alpha-bisabolol, and is given by:

$$M_P = [(P_p - P_L) / P_{AL}] \times 100$$

where:

M_P = marketing margin of land owners;

P_p = price received by producers for sale of timber (delivered to roadway edge) required to yield 1 kg of alpha-bisabolol.

To calculate the marketing margin of other chain participants, the same procedure was adopted.

3 RESULTS AND DISCUSSION

3.1 Marketing of natural alpha-bisabolol

The marketing chain of candeia oil/alpha-bisabolol begins with extraction of timber, an activity performed by

candeia loggers who are typically rural workers or small rural producers (Figure 2). Loggers receive payment either for a day's work or based on volume harvested, the latter being more common.

For felling and removing timber, a logger receives about R\$23.17 (US\$13.25) per stere meter (stm). Values can vary conditional on tree diameter and height, on tree density per unit of area, on proximity of target roadways, on local topography, and on other obstacles encountered by loggers to accomplish their job.

Loggers work for large rural producers and for wholesalers, who act as middlemen in timber trade for oil production. These middlemen obtain standing timber on site for a price ranging from R\$40.00 (US\$22.85) to R\$60.00 (US\$34.20) per stm, or else they obtain it already felled and removed to the roadway edge for a price ranging from R\$75.00 (US\$42.85) to R\$85.00 (US\$48.50). In the first case, middlemen bear the costs associated with tree felling, removal, taxes and post-harvest land management, whereas in the second case these costs are born by candeia forest owners.

Candeia is sold to manufacturers of essential oil who pay between R\$110.00 (US\$62.85) and R\$120.00 (US\$68.50) per stm of logged timber delivered to the roadway edge. Price varies mainly as a function of timber quality for oil yield. A good visual parameter to evaluate wood quality is the log diameter. Typically, the greater the diameter the greater the value, as larger pieces contain a higher proportion of heartwood than sapwood and oil is mainly stored in the heartwood portion.

Information available indicates that Brazil has a total of seven manufacturers of candeia essential oil, two of which in São Paulo, three in Minas Gerais, one in Paraná and one in Bahia (Table 1).

It is estimated that more than half the candeia essential oil produced in Brazil is intended for export for subsequent processing. The remaining oil is partly used by manufacturers themselves for distillation of alpha-bisabolol, and partly sold in the domestic market to other manufacturers of alpha-bisabolol. The price asked by manufacturers of candeia essential oil ranges from US\$35.00 to US\$40.00 per kg.

In Brazil, distillation of candeia essential oil for production of natural alpha-bisabolol is done by two companies from São Paulo and by one company from Minas Gerais (Table 1).

The alpha-bisabolol produced in Brazil is sold to distributors and to medicine and cosmetic manufacturers,

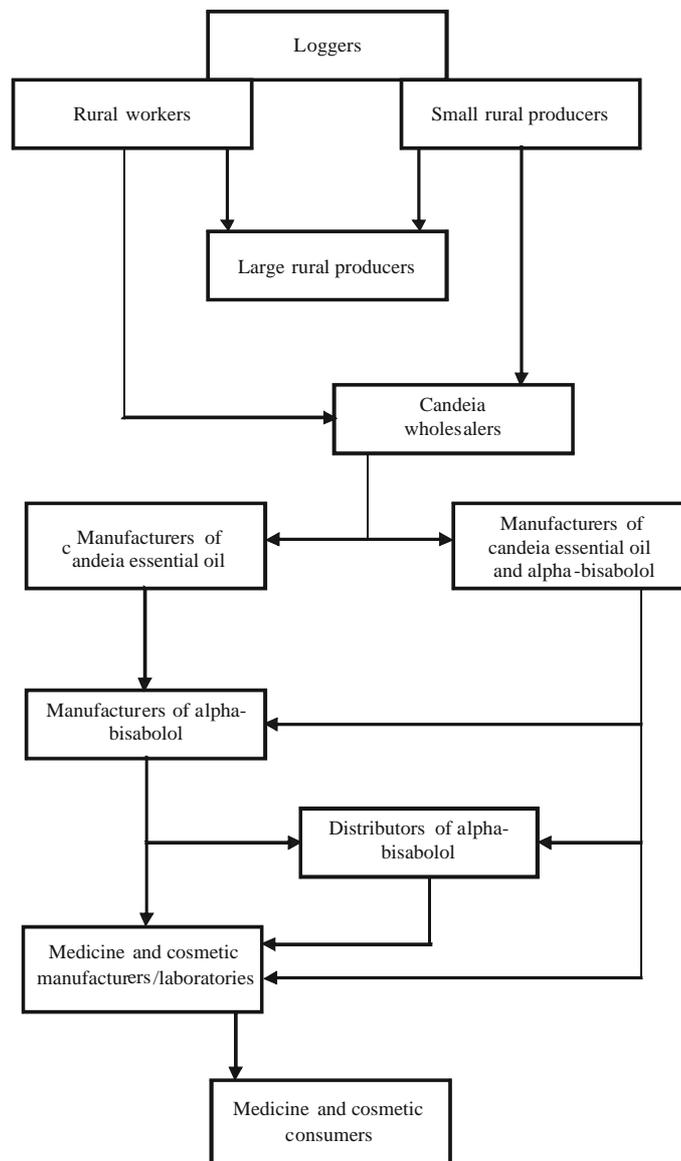


Figure 2 – Marketing chain of natural alpha-bisabolol.

Figura 2 – Cadeia de comercialização de alfa-bisabolol natural.

in Brazil and abroad, for prices that range from US\$80.00 to US\$90.00 per kilo, while prices asked by distributors of alpha-bisabolol range from US\$140.00 to US\$ 160.00 per kilo.

Table 2 illustrates the price received by participants in the alpha-bisabolol marketing chain for sale of products/ services. The calculations of amounts received were based

on a benchmark price of US\$ 150.00 per kg of alpha-bisabolol sold by distributors.

The price received by loggers, for instance, refers to amount received for felling and removing to the roadway edge the timber required to yield 1 kg of alpha-bisabolol (P_L). To estimate this price it is necessary to derive the ratio of stere meter (stm) of timber to one kg of alpha-

Table 1 – Manufacturers of crude natural candeia oil and/or natural alpha-bisabolol.**Tabela 1** – Indústrias que extraem o óleo de candeia natural bruto e/ou alfa-bisabolol natural.

Manufacturer name	Municipality	State
Citróleo óleos essenciais indústria e comércio Ltda*	Torrinha	São Paulo
Citrosul**	Carrancas	Minas Gerais
Citroflora Ltda**	Morro do Pilar	Minas Gerais
Citroflora Ltda**	Ituaçu	Bahia
Atina*	Pouso Alegre	Minas Gerais
Purita óleos essenciais indústria e comércio Ltda*	Torrinha	São Paulo
Destilaria Maripá – Óleos essenciais**	Maripá	Paraná

* manufacturer of candeia essential oil and natural alpha-bisabolol

** manufacturer of candeia essential oil

Table 2 – Price obtained by each marketing chain participant from selling their products.**Tabela 2** – Preço recebido pelos participantes da cadeia de comercialização pela venda de seus produtos.

Marketing chain participants	Price received (in R\$ / Kg) ¹
Loggers (P _L)	8.83
Rural producers (P _P)	30.48
Wholesalers (P _W)	43.81
Manufacturers of candeia essential oil (P _{MO})	45.94
Manufacturers of alpha-bisabolol (P _{MA})	148.75
Distributors of alpha-bisabolol (P _{DA})	262.50

¹P_L = price received by loggers to cut and remove to a roadway edge the timber required to yield 1 kg of alpha-bisabolol (reference:- 1 stm of logged timber: R\$23.17 / US\$13.25).

P_P = price received by rural producers for sale of timber (delivered to the roadway edge) required to yield 1 kg of alpha-bisabolol (reference:- 1 stm of logged timber: R\$80.00 / US\$45.70).

P_W = price received by wholesalers for sale of timber (delivered to the roadway edge) required to yield 1 kg of alpha-bisabolol (reference:- 1 stm of logged timber: R\$115.00 / US\$65.70).

P_{MO} = price received by manufacturers of essential oil for the sale of oil required to yield 1 kg of alpha-bisabolol (reference:- 1 kg of essential oil: R\$65.63 / US\$37.50).

P_{MA} = price per kg received by manufacturers of alpha-bisabolol (reference:- 1 kg of alpha-bisabolol: R\$148.75 / US\$85.00).

P_{DA} = price per kg received by distributors of alpha-bisabolol (reference:- 1 kg of alpha-bisabolol: R\$262.50 / US\$150.00).

Exchange rate used: US\$1.00 = R\$1.75 (on 2/13/2008)

bisabolol. Considering the yield of 10 kg of oil/m³ as estimated by Pérez (2001) and an average 70% yield in the extraction of alpha-bisabolol from essential oil, 1 m³ of timber yields 7 kg of alpha-bisabolol. Using a candeia stack factor of 2.67 and doing the necessary calculations, the following relation is derived: 0.381 stm of candeia is consumed for each kg of alpha-bisabolol produced. Along these lines, if on average candeia loggers receive R\$23.17 for each stm of timber delivered to the roadway edge, the P_L is equal to R\$8.83 (R\$23.17 x 0.381). Likewise, prices received by rural producers and by wholesalers can be

obtained following the same logic, while prices received by manufacturers of essential oil are obtained by multiplying oil price by factor 0.7 (average yield in the extraction of alpha-bisabolol).

Based on Table 2 values it is possible to estimate the marketing margin of each chain participant, that is, the relative participation of each sector in the candeia production chain to form the aggregate final price. For instance, the marketing margin of loggers – given by the relation between price received by them to extract the quantity of timber in stm required to produce 1 kg of alpha-

bisabolol and price received by distributors of alpha-bisabolol – is 3.36%

Figure 3 provides relative percentages found. It was noted that distributors of alpha-bisabolol are the ones reaping the greatest marketing margin – 43.33% of the total price paid by consumers. Similarly, candeia loggers are the ones reaping the lowest marketing margin – a mere 3.36%.

It should be noted that the basis for calculating marketing margins was the sale price of alpha-bisabolol by distributors. So any reduction or increase in this amount will affect all marketing margins. Another consideration is that manufacturers of alpha-bisabolol could sell it directly to consumers and thus avoid one or more middlemen distributors. Here, the price of alpha-bisabolol as sold by manufacturers could be reduced in comparison to when it is sold by distributors, and this too substantially alters marketing margins. Finally, it could happen that rural producers would sell candeia directly to oil manufacturers, in other words, without intermediate wholesalers. In this case their marketing margin jumps from 8.25% to 13.33% as they retain the wholesaler margin.

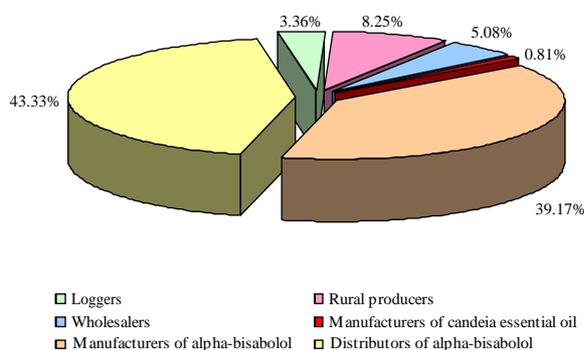


Figure 3 – Marketing margin of each candeia chain participant for production of alpha-bisabolol.

Figura 3 – Margem de comercialização dos participantes da cadeia de comercialização da candeia para a produção de alfa-bisabolol.

4 CONCLUSIONS

As regards the candeia marketing chain, distributors of alpha-bisabolol were found to be the participants reaping the greatest marketing margin.

To secure a better marketing margin, rural producers should sell candeia timber directly to oil manufacturers, in other words, without intermediate wholesalers.

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