AUSTRALIAN JOURNAL OF BASIC AND APPLIED SCIENCES

ISSN:1991-8178 EISSN: 2309-8414
Journal home page: www.ajbasweb.com

Overview of the use of exotic species such as reforestation alternative in Brazil: black wattle and australian cedar

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ARTICLE INFO

Article history:
Received 26 August 2016
Accepted 10 October 2016
Published 18 October 2016

Keywords:
Reforestation, Acacia mearnsii, Toona ciliata.

ABSTRACT

Background: The productivity of brazilian forests put the country as major suppliers of raw materials for national and international industries. In comparison, Brazil has 456 million hectares of native forests and only 7.2 million hectares of planted forests, which represents 0.84 % of the country's forest area. This study aimed to provide information about two species, Toona ciliata and Acacia mearnsii since they present good adaptation, good growth and economic return, became an option for reforestation. **Objective:** The goal is to show the potential of two distinct species for reforestation, with different purposes and with high growth, showing its economic viability. For this will be described their floristic features and use**. Results:** The two species showed good adaptation and can be good alternatives for planting in reforestation areas, generating economic returns, and ecologically viable. The black watlle is an excellent supplier of wood and tannins, and the Australian cedar main use is in the production of high quality furniture, plywood, doors, windows and decorative products and has use in the cosmetic and pharmaceutical industry. **Conclusion:** We conclude that the two species have great economic and environmental potential, and can be used on a large scale in reforestation areas. It is necessary to encourage the planting of alternative species such as black wattle and australian cedar, in order to relieve the operating pressure on native forests. Both species has different uses with broad employability for producers, companies and government.

INTRODUCTION

One of the peculiarities about forest sector reside in an analysis and long payback, unlike the agriculture and livestock. In recent six decades, it was observed a significant increase in planted forests in Brazil, with fast growth and good adaptation species (ABRAF, 2013; IBA, 2015).

The evolution of the forest sector occurred with the replacement of the predatory extractive forest base for a planted forest installation phase, for timber and industrial purposes (VIANA *et al.*, 2002; ADEODATO *et al.*, 2011; BROSE, 2013). This substitution resulted in significant impact on the economy of many regions. The productivity of our forests put us as important suppliers of raw materials for national and international

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To Cite This Article: Thiago Wendling Gonçalves de Oliveira, Murilo Zavadinack, Jaçanan Eloisa De Freitas Milani, Lineia Roberta Zen, Manoela Mendes Duarte, Jaqueline Valerius., Overview of the use of exotic species such as reforestation alternative in Brazil: black wattle and australian cedar. ***Aust. J. Basic & Appl. Sci.,*** *10(15): 87-91, 2016*

industries. By comparison, Brazil has 456 million hectares of native forests and only 7.2 million hectares of planted forests, representing 0.84% of the country's forest area (SFB, 2013; IBA, 2015).

Notwithstanding this, one must consider the restrictions laws, governing the exploitation of native forests. As a compensatory and viable form of exploitation emerged reforestation, and satisfactory alternative to the exploitation of timber and non-timber products. The forestry industry in Brazil is considered one of the most promising for expansion in the world, both by climate and soil conditions that favor the development, or by increasing investments in new technologies (OLIVEIRA, 2008; ADEODATO *et al.*, 2011).

Brazilian consumption of roundwood and pulp from forest plantations and their multiple uses grew. In terms of roundwood this growth was 182.4 million m³ in 2013, an indicator 7.2% higher than in 2011. This indicated that the practice of reforestation is an alternative business that has expanded in the last year (ABRAF, 2013).

The objective of this work is to show the use of black wattle and Australian cedar, as alternatives to new species reforestation in Brazil.

Review:

Characterization of species:

Acacia mearnsii of Wild:

Acacia mearnsii - Fabaceae, is known as black wattle. It occurs naturally in southeastern Australia and Tasmania, at altitudes ranging from sea level to 1070 meters (BOLAND *et al*., 1984). The species was introduced in Brazil in 1918 and started commercial plantations from 1928 (OLIVEIRA, 1968).

As Foelkel (2008) the species has shrub or tree size ranging from 5 to 10 meters high. The leaves are compound, alternate, bipinnate with small leaflets. The black-wattle is an alógama species with hermaphrodite flowers and a 90% passing rate. In Brazil, flowering usually takes place between September and October and pollination is done mainly by bees. The fruits are vegetables, measuring 15 to 25 centimeters long, with hairiness and mature 12 to 14 months after flowering. Each fruit contains on average from 1 to 14 seeds of black color and ovoid shape.

Plantations with commercial seed of black wattle in Rio Grande do Sul reach 18% (TANAGRO, 2005), and planting can be done through the management of natural regeneration, direct seeding and seedlings grown in nurseries (MOCHIUTTI, 2007). In Rio Grande do Sul, the culture of black wattle has contributed to the economic growth of the producers, generating income, use of restricted areas and benefiting many families in activities linked to production (MOCHIUTTI, 2007).

The species has as main characteristic the rapid colonization of open environments (BOLAND *et al*. 1984), and excellent nitrogen fixer, showing no restriction to different soil types.

Suitable for afforestation of parks and gardens for ornamental feature for its pyramidal canopy is useful as a wind break in grouped plantations.

Tannin source is obtained from the bark and this was the reason for the introduction of crops on an industrial scale (LORENZI, 2003). The gluing of the raw material, wood, in any form (panels, waste, and others), has contributed indirectly to the conservation of natural forest, since it allows the production of by-products with equal quality to those produced with solid wood.

Economic importance of black wattle:

Black wattle is a species of great economic importance for the southern region of Brazil, as ranks among the species used in reforestation, as well as an excelente supplier of wood and tannins (MELLO-FARIAS *et al*. 2008).

The acacia cultivation has come to occupy in recent years an important role in the setting of forestry in Brazil (PERRANDO, 2008). According to ABRAF, 2013 the *Acacia* genus has a planted area of 148,000 hectares, plantations occur mainly in the states of Rio Grande do Sul, Paraná, Mato Grosso, Amapá, Roraima and Amazonas. It is certainly a kind of great importance for reforestation and industrialization, with fast growth, wood and bark are utilized fully, can be used in the production of tannin, cellulose paper and charcoal or simply for power generation (SCHNEIDER *et al* . 1991).

Such a range of use such as production of hardboard, wood and charcoal (SANTOS *et al*., 2001), has a widely known biological function, which is to assist in fixing carbon (SCHNEIDER *et al*., 2005) of nitrogen and protects the soil (KANNEGIESSER, 1990; FORESTER *et al.*, 2012).

Tannin is the main compound extracted, the main reason for the introduction and establishment of black wattle in Rio Grande do Sul, this by-product is used for tanning leather (MORA *et al*. 2001) and is considered environmentally friendly, low toxicity, little aggressive and obtained from renewable form (FOEKEL, 2008). Tannins are produced from dispersants, resins, chelating agents and preservatives (SIMON, 2005).

Despite its economic importance, the species also contributes to the social development, considering that about 60% of acacia plantations are small land owners, according to Azeredo (2011) much of the product has the exploitation of the species in the off season of crops property.

Also according to Azeredo (2011) it is common plantation species with other fruit in intercropped areas. The author is careful practice is satisfactory, since the root systems of plants are distinct and nutritional need too, that make the availability of nutrients do not become a limiting factor for growth.

Toona ciliata M. Roem:

Toona ciliata, popularly known as Australian cedar belongs to the Meliaceae family and Swietenoideae subfamily, which has species with wooden high economic value in the world (BYGRAVE, 2005). It occurs naturally in Australia and Southeast Asia (EDMONDS, 1993).

The first of the species introduction records in Brazil was in 1973 by Aracruz Celulose, which aimed to conduct small plantations, with many exotic species of economic interest, among them the Australian cedar, for the formation of genebanks (SOUZA *et al*., 2010). Currently in Brazil the plantations are concentrated in the Southeast and in the South of Bahia (PINHEIRO *et al*., 2003).

According to Lorenzi (2003), the Australian cedar is a deciduous tree that reaches 20-35 meters in height, with straight and cylindrical trunk, compound leaves, paripinnate, with light green color on both sides. It has creams or inflorescence with white flowers 0.5 cm long. Flowering usually occurs in October and November. The fruits formed constitute woody capsules, reddish brown dehiscent.

The production of seedlings can be clonal or seed (BELA VISTA FORESTRY, 2013), having nutritional requirements mainly S, Ca and N (MORETTI *et al*., 2011). Its rapid growth allows consortia with agricultural and livestock activities in the first two years of planting.

The species tolerate light frosts, but does not support soils with physical impediment, poorly drained (BELA VISTA FORESTRY, 2014), and low natural fertility, and such restrictions end up nullifying the initial development of plants (MORETTI *et al*., 2011).

In addition to the favorable conditions that the species found in Brazil, it is not susceptible to attack from *Hypsipylla grandella* moth, major pest that attacks Meliaceaes of Brazil, causing damage to the apical meristem of the trees (LUNZ *et al*, 2009; BELA FOREST VIEW, 2014). The wood is unattractive to attack dry wood termite *Cryptotermes brevis* (CUNNINGHAM, *et al*., 2005) and is considered a hardy species.

The species has high potential as an energy resource, reaching around 20:12 MJ / kg (Mayer, *et al*., 2015)

Economic importance of the australian cedar:

The species provides a light wood and good natural durability. Constantly it being employed in the construction and furniture production. It has stood out in the wood sector mainly sawn in countries like Brazil, Argentina and Puerto Rico (LORENZI, 2003). His sawing and drying are very compensatory, given their low density (BYGRAVE, 2005).

Its main use is in the production of high quality furniture, plywood, doors, windows and decorative products and has use in the cosmetic and pharmaceutical industry (SORAGI, 2009). Potential these that make the wood be of great interest for reforestation.

Its use in reforestation ensures wood supply to meet the demand of the country of species considered noble, that meet a portion of the local and international market (ZIECH, 2008). The same author also points out that the potential is ensured because it is a species that has intermediate characteristics between the cedar (*Cedrella odorata*) and mahogany (*Swietenia macrophylla*) in terms of quality and use.

Its advantage compared to native woods is the possibility of operating the same, since the vast majority of the noble considered native species are threatened with extinction due to its intense exploitation, and protected by restrictions of the legislation.

Information about reforestation are still scarce in local planting and different ages, as well as technical information about your woodworking. However, wood australian cedar has similar characteristics to brazilian species of great economic value, may become in the future as alternative use of these (ZIECH, 2008).

Conclusion:

We conclude that the two species have great economic and environmental potential, and can be used on a large scale in reforestation areas. It is necessary to encourage the planting of alternative species such as black wattle and australian cedar, in order to relieve the operating pressure on native forests. Both species has different uses with broad employability for producers, companies and government.

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