

## CHAPTER 2

### CHARACTERISTICS OF EUCALYPTUS

#### 2.1. Ecological Aspects of Eucalyptus

Eucalyptus is an evergreen, broadleaf tree which belongs to the Myrtaceal family with more than 600 species. Most of them are native to Australia and Tasmania (Nishimura 1987). The roots of "eucalyptus" are the Greek words "eu" and "kaluptos"; "eu" means "well" and "kaluptos" means "covered" (Masaki 1991). Its ecological characteristics are; 1) leaves give off a strong smell when picked, 2) leaves have thick cuticles to sustain dry weather, 3) leaves are restrainable from evaporation, 4) leaves have palisade parenchyma and pores on both sides, 5) seedling roots have knots to store nutrition. However, the most remarkable characteristic of eucalyptus is its growth. Most eucalyptus species grow their roots deep into the ground. As a result, some species become very tall. Eucalyptus has the characteristic of fast-growth, and this can be seen prominently in young eucalyptus. Furthermore, except in old trees, eucalyptus has a strong ability to sprout out and put forth many new shoots after being cut down.

Among the 600 species of eucalyptus, *Eucalyptus camaldulensis* is the most popular species in Thailand for both the private and public sectors. After more than 25 species of eucalyptus were tried to grow in the country, *Eucalyptus camaldulensis* was finally chosen because it

can grow much faster than other species without regard to the type of soil. Moreover, it can tolerate heat better than other species (Somyos 1995). It has been planted mainly in the northeastern part of Thailand, which is the most deforested region in the country. It is often said that eucalyptus is the only species which can be grown in the northeastern region because the soil in the region is very dry and saline.\*

Eucalyptus is a useful species and is used in various ways. It is often planted at roadsides, parks or gardens as a foliage tree. Besides, its timber is used as raw material for buildings, pulp, fiberboard and plywood. Tannin from its bark can be used in leather production. Furthermore, eucalyptus oil from its leaves is useful for both medical and industrial purposes. Eucalyptus can also provide honey from its flowers (Nishimura 1987, Ubukata 1997).

Therefore, eucalyptus has been planted in more than 100 countries. According to Nishimura (1987)\*\* , it was in 1803 that eucalyptus was first planted outside of its natural habitat. After that, in the early 19th century, many countries, such as Italy, France, Brazil, Portugal, South Africa and India, started to grow eucalyptus. According to Masaki (1991)\*\*\* , the total area of eucalyptus plantations

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\* According to Siam Rath of August 1987, it was estimated that there were 500,000 rais of eucalyptus in the country in 1987, and 200,000 rais of these were in the northeast.

\*\* One of the leading scientists in the field of euclayptus utility and the author of Eucalyptus as a resource in the future, (1987).

\*\*\* National Expert, The United Nations Center for Regional Development

in the world was estimated at 4 million hectares in 1980. According to FAO (1995), by 1995, the eucalyptus planting areas had increased to 13.4 million hectares. This was equal to 15% of the total reforested areas in the world.

While eucalyptus plantations have significantly increased, their negative impacts on the environment are often argued. It is often believed that eucalyptus consumes much water as a result of its fast-growth, acidifies the soil and accumulates toxins in the soil.\* Eucalyptus tends to exist in a mono-cultural woodlot, because other neighbouring species can rarely survive. In such a mono-cultural woodlot, sparse canopies may not protect the soil from erosion. Rain and sunshine directly hit the ground, without shelter or screening because eucalyptus is tall and not thick with leaves (Tasaka 1992 and 1991, The Nation, Jan. 31, 1989). As a result, eucalyptus may bring

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(UNCRD), Nagoya, Japan.

\* Regarding the degradation of soil, Apichai, Somboon and Chaiyuth (1992) introduce an interesting study by Chakrit: *the same study reports the findings from experimental plots, composed of one kilogram of soil mixed with five grams of ground eucalyptus leaves. The experiment shows the reduction in fertility rate of many seeds, nursed in the said soil mixture with statistical significance. Examples of the seeds are corn, alfalfa, sesame, soybean peanut etc. If the content of ground eucalyptus leaves in the soil is 10 grams or more, it will have significant effect on growth of many varieties of plants (Chakrit 1989). The test result implies that the soil mixed with decayed eucalyptus leaves is not suitable to grow other crops (Apichai et al 1992, pp.200).*

changes in the ecosystem. This can be explained as follows: once a eucalyptus woodlot is established, earthworms will firstly disappear from the soil. Although some insects will come to eat its shoots when eucalyptus is still young, insects will soon disappear from the woodlot as the trees grow because the leaves of grown eucalyptus have a strong smell which insects hate. Following the decrease in small insects will be the lessening of birds. In the same way, small animals may also disappear. Thus, eucalyptus may destroy the original foodchain within the habitat (Tasaka 1991).

Nishimura (1987) observes that some species of eucalyptus disturb the growth of neighbouring weeds. Consequently, it sometimes causes bare land. Besides this, Saxena (1991)<sup>\*</sup> reports that in some cases in India, agricultural productivity in neighbouring farmlands decreased.<sup>\*\*</sup> Thus, it is undeniable that eucalyptus has the possibility to cause destruction in the original environmental system. Apart from these studies, there are similar reports which deal with these problems.<sup>\*\*\*</sup>

FAO (1995) admits: 1) eucalyptus consumes a lot of water as the result of fast growth, 2) eucalyptus woodlots will wear out the nutrients in the soil when they are cut in short cycles, and 3) eucalyptus might have an adverse influence on the growth of other

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\* The author of India's Eucalyptus Craze (1994)

\*\* Case in India where they have the most strong controversy against eucalyptus plantations.

\*\*\* See Ubukata (1997)

crops, especially in dry weather.\* On the other hand, they emphasize that eucalyptus is not prominent in causing soil erosion. Furthermore, eucalyptus woodlots have better ecosystems than bare lands. They conclude their study as follows, in short: the arguments and confrontations concerning eucalyptus were brought on by the other aspects such as opposition against governmental reforestation policy and dissatisfaction with the social inequality, rather than the ecological impact of eucalyptus plantations.

Frankly speaking, the ecological impacts of eucalyptus have not been studied enough to judge it to be harmful. However, it is necessary to recognize it may have negative impact on the environment when it is planted in the wrong way, or at least the possibility to make adverse impacts on the environment.

## 2.2 Economic Aspects of Eucalyptus

As was pointed out in 2.1., eucalyptus is a species which can provide various products. Therefore, eucalyptus is considered to have high economic value. In most cases, eucalyptus is sold as charcoal, logs, and chipwood. Charcoal from eucalyptus is mainly produced for farmers' own consumption; however, some is also sold in the market at the same price as that of chipwood.

Chipwood is the main product from eucalyptus. Chipwood is mostly sold to the big pulp and paper enterprises. To produce

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\* They suggest to reduce the number of trees, and not plant each eucalyptus too closely.

chipwood, planters cut the eucalyptus from four to six years of planting. Among prices for eucalyptus products, chipwood is the lowest. Eucalyptus is generally traded at between 600 baht/ton and 700 baht/ton, as a raw material of chipwood. However, as was already mentioned in the previous chapter, contract eucalyptus planting is often seen in rural villages and eucalyptus are sold as chipwood as the most: to secure a certain amount of eucalyptus, enterprises offer contracts for eucalyptus plantings that call for companies to supply seedlings and technical support, offer deposits, and set the minimum price of grown trees.

Eucalyptus is often sold as logs, too. The smaller logs, around 5cm. in diameter and 3 years old are usually used as scaffoldings at construction sites. The market prices of these small logs are higher than the prices of chipwood. If the eucalyptus is bigger than 15cm. in diameter, planters sell it to lumber mills and furniture factories. The prices of these logs depend on their quality. However, in general, these logs are dealt with at two times the price of chipwood. However, to sell this size, planters have to wait for 10 to 12 years.

Ubukata (1997)<sup>\*</sup> introduces a couple of former studies regarding the profits from eucalyptus planting. According to him, Pearmsak (1994) compares the profits of eucalyptus plantations and cassava plantations in Chachoengsao, and points out that eucalyptus plantations have higher profits in that area. In addition, Niskanen (1993)

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\* The author of the thesis Expansion of Farm Forestry and Influential Factors in Northeast Thailand; Case study of Eucalyptus Plantation(1997)



calculates the profits of eucalyptus plantations considering ecological loss as well.

Masaki (1991) estimated the net profits of eucalyptus plantations in his research, even though it was difficult to get an average. He firstly mentions the expenses of eucalyptus plantations: *"its depends on physical conditions, land holding type, and labour cost. But labour cost may can be neglected because family labour is available for small farmers. The cost of seedling is usually 1 baht,.... Generally total cost per rai (1-4 years) is ranging 2,500 baht to 3,900 baht. .... For the future, eucalyptus planters will have to spend more money to rent or buy tractor. Because when eucalyptus tree have to remove (more than 4 coppicing, or 16 years); it will need to use a tractor".*<sup>1</sup> Regarding the expenses of the eucalyptus plantations, Ubukata (1997) also points out that some planters hire other villagers to plant seedlings, and it generally costs the planters 50 to 60 baht a day per labourer. Other planters plant seedlings by themselves. If the planters rent a tractor, it costs them 100 baht per rai, excluding the cost of gasoline.

Masaki describes the profits as farm gate prices ranging from 320 baht to 600 baht per ton.\* After 4 years of growth, the net profits of eucalyptus plantations per rai range from 4,985 baht (1,246 baht/rai/year) to 6,965 baht (1,741 baht/rai/year). The profits of eucalyptus are higher than the profits of other crops like cassava (607

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1. Masaki 1991, pp.12

\* This was the market rate in Khon Kaen and the near eastern seaboard of Thailand.

baht/rai/year), cashew nuts (559 baht/rai/year), and corn (219 baht/rai/year).

In present northeastern Thailand, eucalyptus is practically traded at 700 baht/ton (or 4,000 baht/rai) on an average (REX, 1993, Ubukata 1997). According to a JICA study (1997), eucalyptus in the northeastern region from 10 to 15 ton/hectares (1.6 to 2.4 ton/rai) are grown annually. In general, planters plant 400 eucalyptus in a rai at 2m to 2m intervals. If the growth rate of eucalyptus is 15 ton/hectare, it is possible for the planters to have 75 tons of eucalyptus per hectare after 5 years. These eucalyptus plantations can bring from 40 to 50 thousands baht\* of net profit as a raw material for chipwood (REX 1997).

Thus, the planter's profits from eucalyptus are estimated at 1,300 baht/rai/year (8,000 baht/hectare/year). Furthermore, it may be worthwhile to mention that the planters can expect these profits several times from one plantation because a eucalyptus tree can be cut several times (at least 4 times in a 5-year rotation). From the second rotation, planters can expect higher profits because they do not have to invest in seedlings and hire labourers to plant seedlings.

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\* Considering that a wage labourer at the construction sites in Khon Kaen can earn only 140 baht/day, this is equal to the salary of 11 to 14 months for the locals.