Ee-JRIF
Ethiopian e-Journal
for Research and Innovation Foresight

***Vol 1, No 1 (December 2009) - Inaugural Issue: pp* (128-134)**

Is Eucalyptus Ecologically Hazardous Tree Species?

Tesfaye Teshome (PhD)

Wondo Genet College of Forestry, Debub University, Awassa, Ethiopia

Email: henos_tesfaye@yahoo.com

Ehiopia's natural forest mainly consists of broad-leaved trees often mixed with conifer species such as J. procera and P. falcutus. The natural forest of the country particularly the Juniperous-Podo-Olea forest around the capital city were depleted at faster rate for fuel and construction material. As a result the development of the capital city, Addis Ababa was threatened by a fuel wood scarcity. In 1895, Emperor Menelik II introduced Eucalyptus as a potential solution to the fuel and timber shortage. As it has been reported by Breitenbach (1961), it was a French railway engineer called Mondo-Vidaillet who established trail plantation of 15 eucalyptus species for first time in Ethiopia.

The introduction of this species was a great success. Sooner or later the planting of eucalyptus for fuel, particularly, E. globulus and E. camaldulensis was expanding in the

vicinity of Addis and other small towns in the country. By the beginning of 1980s the total E. globulus plantation in the country was estimated to be 91, 000ha(Henry 1973).

It is undeniable fact that eucalyptus plantations have played and will play a tremendous role in alleviating the fuel and construction material problems of the community. Since 1960, world wide eucalyptus planting has doubled every decade. In 1990 the total area in hectares planted by eucalyptus was 7 million. In spite of this, quite a number of people express their reaction against eucalyptus planting. These adverse reactions against eucalyptus planting are based on some ecological, technical and socio-economic arguments. As it has been reported by Davidson(1989) a lot of these arguments are unfair, biased, nationalistic or emotional. Most arguments are unjustified and could also be applied to some tree species such as Gravillea robusta which has allelopathic effect on most agricultural crops and Azadricata indica which is an invasive of native woodland. It is therefore worthwhile discussing some of the arguments to have a better understanding.

Water consumption of eucalyptus

Most people think that eucalyptus consumes a lot of water more than any other tree species and agricultural crop. This misconception is untrue. There are quite a number of research results which revealed that eucalyptus is efficient water user. For instance,

Davidson (1989) reported that on a “leakproof hectare” at Nekemet(with annual rainfall of 2158mm), E. saligna and E. grandis could produce 46.6 m3/ha/yr without drawing on water reserves(rainfall only) compared to 16.4, 16, 12.4 m3/ha/yr biomass production for the coniferous, acacia and broadleaf species, respectively. These figures reveal that for the same amount of water consumed eucalyptus produce higher amount of biomass which is economically profitable and acceptable.

Most eucalyptus species need on average 785 litres of water/kg of biomass produced as opposed to cotton/coffee/banana(3200), sunflower(2400), field pea(2000), cow pea(1667) soyabean(1430), potato(1000), sorghum(1000) and maize(1000) liters/kg biomass produced(Davidson 1989). The above figures show that eucalyptus species are efficient water users.

Does eucalyptus promote or pervert soil erosion?

There are two main ways to conserve soil. These are physical and biological conservation measures. Construction of check dams and bench terraces can be mentioned as some of the physical measures of soil conservation while planting tree species is a biological measure. Planting of any kind of tree species in the form of a monoculture should not be taken as the best solution to sheet or surface erosion. In state owned eucalyptus forests, eucalyptus stands are established at wider spacing particularly on

gentle slop sites. Wider spacing has an advantage to let the penetration of sun rays to the forest floor which is one of the many prerequisites necessary for undergrowth development. The presence of undergrowth minimises the surface runoff. Most of the Munessa Shashemene Forest Project eucalyptus stands have favoured the natural regeneration of P. falcutus, Croton machrostatchus and many other species. The depth of the accumulated letter in the above forests are found to be on average 20-30 cm. Nevertheless, in stands near very big towns and Addis Ababa, this is not the case as a result of human and cattle perplexity. Although eucalyptus generally produces less annual litter fall(1800kg/ha/yr) compared, for example, with A. lebbeck, 5000kg/ha/yr, if all litter were not totally collected by people for fuel, it would have been incorporated into the soil system to slow down runoff and improve infiltration. As a result of litter collection the ground is left bare and exposed to soil erosion. This misconception has incorrectly attributed to the allelopathy.

In addition most of state owned forests are harvested on clear felling scheme particularly on steep slops which exposes the site for soil erosion. Eucalyptus species planted for catchment protection should be cut on selective basis. The root system of selected species for catchment protection influence the soil binding capacity as a result of which soil erosion is checked. E. globulus, for instance, has a strong tap root and good lateral root system that makes it very reputable species for catchment protection.

Soil nutrient consumption of eucalyptus

It is very difficult task to model soil/plant nutrient cycling in any forest type. This is mainly because there are a number of environmental factors influencing nutrient replenishment from parent materials as a results of weathering. Not only that the rate of leaching is also very difficult to quantify in natural systems as the system is not closed and controllable. The nutrient consumption of fast growing species like eucalyptus species need to be well studied before wrong conclusion and recommendation is being made. As fast growing species, it seems logical and sensible if the species consumes and drains nutrient from the soil. What matters is the economic return against the biomass produced per unit of water consumed and the management practices put in place to replenish the nutrient bank of the soil system. In fact, the presence of mycorrhizas is an advantage to most eucalyptus species which facilitates accumulation of nutrients even in poor soils. If the litter are left on the forest floor uncollected, substantial amount of nutrients may pass to the soil system. The soil nutrient levels under eucalyptus forest could also be improved by adjusting spacing and introducing leguminous planting. Mixing eucalyptus with acacia species (e. g A. nilotica which produces high amount of litter, 8000kg/ha/yr) increase the litter fall and thereby improve the soil nutrient bank.

Conclusion

From the above discussion it is apparent that eucalyptus planting is not harmful be it in ecological and financial terms. In a country such as Ethiopia where the community has no other energy alternatives and where about 90% of the annually produced wood is used for fuel, it is totally unacceptable to disfavour eucalyptus planting.

Most of the rural and urban dwellers also depend on eucalyptus planting for the production of construction poles. Eucalyptus flowers produce nectare for honeybees. Species like E. citrodora are also used for perfume and oil production(e. g. Wondo Genet Essential Oil Factory). From 600 different varieties 10 eucalyptus species are widely planted virtually in all sites and ecological zones of Ethiopia except the most arid. In most parts of the country, e. g., Hossahena and Wollayta , eucalyptus became the main stay of the community for additional income generation. Eucalyptus species are tolerant to severe periodic moisture stress, low soil fertility and fire and insect attack. These comparative advantages of the species made it part of the life of the rural people. Some indigenous species seem to have such advantages as they are adaptive to the local conditions and could be used for various purposes. The sad fact is that little is known about their growth, yield, soil nutrient/plant interaction, water consumption, silviculture and management. Foresters are challenged and confronted with such problems which they should solve in order to fill the knowledge gap and come up with more indigenous species pool for

reforestation and afforestation purposes. Until such time, however, eucalyptus seem to be planted widely in Ethiopia. In conclusion, it seems that there are no profound reasons not to continue or discourage eucalyptus planting in Ethiopia.

References:

Breitenbach, F. 1961. Exotic forest trees in Ethiopia. A. A. Ethiopian Forestry Association, Ethiopian Forestry Review. 2:19 - 39.

Davidson, J. 1989. The Eucalyptus dilemma. Arguments for and against Eucalyptus planting in Ethiopia. The Forestry Research Centre Seminar Note Series No. 1. A. A.

Henery, P. W. 1973. Notes on maps of the eucalyptus plantations around A. A. and the Menagesha State Forest, Ethiopia.. ODA. London. Misc. Report. 150:1-10.