ISSN: 1684-0755

JEANARM

Journal of
East African Natural Resources Management

Volume 3
Number 1 (i-iv, 219-295) (2009)

J.E.Afr.Nat.Res.Mgt. Vol(3) 252-256. 2009

Insect pests and diseases associated with Eucalyptus hybrid clones in Kenya: A short communication

B. Otieno[1], K.E Mutitu[1], L. Mwangi[1], and M. Minjire [2].

[1]Kenya Forestry Research Institute (KEFRI), P. O. Box 20412, 00200, Nairobi
[2] Tree Biotechnology Project (TBP), P. O. Box 64159, 00620, Nairobi

Eucalyptus are exotic to Kenya and have been grown for about one hundred years for production of poles, fuelwood and timber. They grow rapidly and are easy to cultivate and adapt to a wide range of growing conditions. Whenever exotic trees are introduced, pests and diseases may arise from either a complex of indigenous agents adapting to the new host or exotic pests that are accidentally introduced. Indigenous disease causing organisms are also capable of adapting to new hosts and causing severe damage. In Kenya, plantations of *Cupressus macrocarpa* an exotic tree species were severely damaged by *Seiridium unicorne* (Sy. *Monochaetia unicornis*) an indigenous stem cankers causing fungus. Mycosphaerella are well known as important pathogens of *Eucalyptus* spp. A number of fungal foliar pathogens have been reported to impact negatively on yields of Eucalyptus plantations in Australia with Mycosphaerella spp. being the most important pathogens. The incidence and severity of these pathogens have been found to increase as the areas under cultivation expand. Exotic pest and disease agents in the absence of natural enemies in presence of a large supply of suitable host material, that may have little resistance to the new pest or disease, can build up rapidly and cause devastating losses.

In 1999, planting of Eucalyptus hybrid clones was initiated under the Tree Biotechnology Project whose goal was to transfer clonal tree propagation technologies from Mondi Forests, South Africa to Kenya as a means of hastening large-scale improvement of plantations. KEFRI has since 1999 been involved in monitoring of pests and diseases of the Eucalyptus hybrid clones. Eucalyptus growers are concerned about pest and disease problems and would be receptive to innovative management measures. It is envisaged that the introduction of Eucalyptus hybrid clones might lead to large scale planting which may lead to pest and disease outbreak situation. The objective of this study was to find out what pests and diseases are associated with Eucalypts clones in Kenya and whether any pest or disease might have been introduced.

The introduced Eucalyptus hybrid clones and the commonly grown species were planted at trials in several regions of the country to test their growth performance. Due to the importance of pests and diseases it was later found necessary to include monitoring on these and future trials. At each trial site, all the trees were monitored for insects and diseases infection by direct observation for presence or absence. This was done after six months and thereafter on annual basis based on the planting dates of each trial. Insects and diseases specimens were collected and taken to the laboratory for processing and identification. Clonal hedges, cuttings and seedlings at Karura were also monitored for diseases. Diseased materials were placed in 2% malt extract agar for the fungi to grow and these were identified using a microscope. Insect pests were identified using the reference collection at KEFRI and National Museums of Kenya.

Both insect pests and diseases attacked the planted material at different sites (Table 1). EM, EP, ED, GU4, MAU12 and MAU19 were not attacked although they were only planted at a single site compared to others planted in more than one site. The major insect pests and diseases found in the trials were Blue gum Chalcid (BGC), (*Leptocybe invasa*), eucalyptus snout beetles, eucalyptus psyllid, termites, chrysomelid beetles, Leaf spot and Botryosphaeria canker (Table1).

Blue gum chalcid is a small gall-forming wasp that has been reported on several Eucalyptus species in Algeria, Iran, Israel, Italy, Jordan, Morocco, and Uganda (Mendel *et al*, 2004). It was first recorded in Kenya in 2002 and attacks mostly seedlings and field saplings causing damage on its host by forming massive typical bump-shaped galls on tree canopy, specifically on the leaf midribs, petioles and stems of new growths.

Biological control agents of Blue gum chalcid, namely *Aprostocetus* sp. and *Megastigimus* sp. have been released in Israel and Turkey. This method has been found to work in well Africa in the recent past as is the case for cypress aphid in eastern and southern Africa, and thus can be used as most appropriate option. The use of chemical control may be attempted in the short term although it's environmentally unfriendly and economically unviable. Insecticides that are systemic such as imidachloprid, methomyl Chropyrifos and Fipronil need to be tested against this pest for use in high value crop only.

Eucalyptus snout beetle, *Gonipterus scutellatus* attacked ES, ET, EU, GC14, GC514, GC540, GC581, GC785, GC784, GU8, TAG5 and GC522. However it was only found in Kabage, Meru, Sokoke, Gede, Msambweni and Karura trials. The beetle has also been observed to be widespread in the Kenya highlands where Eucalypts are grown. *G. scutellatus* is a significant insect pest of eucalypts in most countries where the genus has been introduced, but is usually of minor significance in its native country, Australia. In part of its native range, in Tasmania, oviposition of *G. scutellatus* was recorded on seven naturally occurring Eucalyptus species including the economically important species, *E. globulus* and *E. viminalis*, which have been previously reported as highly preferred hosts. Adult and larvae causes damage to Eucalyptus trees. Adults feed along the edge of the leaf as compared to the feeding by the larvae, which devour the entire epidermis of the leaf causing the greatest damage. A successful biological control programme was implemented in 1945 where an egg parasite, *Anaphes nitens* was introduced into Kenya from South Africa to control the pest. Since then, only minimal sporadic outbreaks of the pest have been observed.

Termite attacks on EG, ES, EU, GC3, GC581, and GC796 were observed in Meru, Timboroa and Karura by termites particularly Odontotermes spp and Macrotermes spp which have been commonly associated with damage to Eucalyptus in Kenya. Observed damage included ring barking and mortality of seedlings. However, high incidence was only observed in Meru trial. Soil treatment involving the application of chemicals surrounding the ground base of the seedling when transplanted in the field is recommended. The insecticides currently used include Chloropyrifos, imidachloprid and Fipronil.

Table 1. Major pests and diseases associated with Eucalyptus clones in Kenya (Blue gum Chalcid (BGC) - √, Eucalyptus Snout Beetle - ♠, Termites - ■, Chrysomelid beetles - ×, Botryosphaeria canker - ♦, Leaf spots - ♣)

Eucalyptus hybrid clones/species	Site and /Planting Date												
	Karura, April 1998	Embu, October 1999	Hombe, May 1999	Timboroa, May 1999	Gede, May 2002	Yala, July 2005	Sokoke, June 2002	Msambweni, April 2002	Turbo, April 2006	Kuja River, April 2006	Marigat, May 2002	Meru, May 2005	Kabage, (May 2002
EC		♣		♦ ♣	√ ♣	√ ♦ ♣	√ ♠	√ ♣		√ ♣	♣		
ED													
EG	■	♦ ♣	♦ ♣	♣ ■					√ ♦ ♣	√ ♣		■	♦ ♣
EH												♦ ♣	
EM													
EP													
ES			♦ ♣							√		♠ ■	
ET	♠	♣		♣	√ ♣ ♠		♠	♣ ♠			♦ ♣		
EU					√	♦ ♣	♦ ♠	♣ ♠		♣		♦ ■	
GC10						√			√ ♣	√		♦	
GC12						√ ♣			√	√		♦	
GC14						√	√ ♠ ×	√	√	√			
GC15				♦					√ ♣	√			
GC167						√ ♣	√	√	√	√			
GC3				♣ ■		√ ♣			√ ♣	√ ♣		■	
GC514					√ ×	√ ♣	√ ♦	√	√	√			♦ ♠
GC522	♠					√ ♣			√	√		♦	
GC540					×		♠ ×				♣		♦
GC581	♠ ■	♦		■	♦ ♠ ×		♦ ♠ ×	♦				■	
GC584						√	√	√	√	√			
GC642						√							
GC784					√						♣	♦	♦ ♣ ♠
GC785					♣	√	√ ♠	√	√	√		♣	
GC796						√	√ ♦	√	√	√		■	
GU21					√								
GU4													
GU7					♣		×						
GU8					♣ ×	♣	♦ ♠						♣ ♠
MAU12													
MAU19													
TAG5													♦ ♣ ♠

Chrysomelid beetles (*Colasposoma species*) were found to defoliate GC514, GC540, GC581 and GU8 in Gede while GC14, GC540, GC581 and GU7 were attacked at Sokoke. The population and damage was generally very low and according to records at KEFRI insect collection reference, the insect was first noticed in Tanzania on mixed species in June 1959 but no damage was associated with it.

Blue gum psyllid *Ctenaritaina eucalypti* attacked GC522, GC581, *E. grandis* and *E. tereticornis* at Embu and Machakos. The psyllid originates from Australia and attacks eucalyptus in Europe, North America, New Zealand and Africa. Adults and nymphs feed by sucking plant juices. The insect can be transmitted via rooted cuttings. Host damage includes distortion; wilting of foliage, mostly at the tips followed by leaf drop. Dieback of twigs and branches can occur during heavy infestations and reduction of growth in young plants may occur due to foliage loss. Nymphs exude filaments white waxy secretion or 'lerp' under which they shelter. Possible management option is to destroy infested germplasm.

Other insects found attacking the eucalyptus in the trials included unidentified species of scale insects on GU7, GU8 in Gede and *Apate sp.* on GU8 in the Meru. These are pests with wide host range and could have originated from the neighbouring non-eucalyptus hosts.

Botryosphaeria canker was the most common disease found at high elevations above 2000 m in Timboroa and Kabage with no apparent stress on trees. Symptoms of Botryosphaeria disease included formation of stem cankers, production of gum and stunted growth. In some cases, sections of infected stems showed a brown ring in the sapwood. The most affected material were GC581, GC514, EG, EC and EU. Other material also affected were: Kabage GC584 and TAG5, Gede GC581, Msambweni GC581, Meru GC522, GC12, GC10, GC784, EH and Marigat ET. At Kabage, site 10 (20%) infected trees of GC540 became stunted and died after two years. The main Botryosphaeria species found was *B. obtusa*. The disease has also been observed in Kenya mainly on *E. grandis*.

Mycosphaerella leaf spots have been commonly found on older leaves of most clones and species, the most affected were *E. tereticornis*, *E. camaldulensis* and *E. urophylla* and a few GC clones (Table 2). At Gede and Msambweni, infected trees of *E. tereticornis* were defoliated and stunted. However, one species of Mycosphaerella *M. keniensis* has been identified in Kenya on *E. grandis*. This disease is known to be serious on some Eucalyptus species such as *E. nitens* in other countries. The disease was however not serious in Kenya.

Powdery mildews have been found on the clonal hedges at Karura. Some clones were more susceptible to the disease such as GC785 and GC12 than others. The fungi that cause powdery mildrew are obligate parasites. The symptoms are whitish coating and curling of young leaves whish has at times affected production of cuttings. However, this has been managed through regular spraying with Ridomil (Benlate) and Milraz.

Several hedges at Karura have died due to attack by Phytophthora root rot disease. The fungus attacks the roots causing rotting. Initial symptoms of the disease include wilting of leaves followed by death of leaves, stem and roots.

Cylindrocladium sp. was found attacking GC cuttings during rooting and also causing cankers on young seedlings of *E. grandis*. In most cases, the disease was associated with high humidity. Several species of the genus are known to cause leaf spots, seedling blights, cutting rot and stem cankers, especially in nurseries (Crous *et al.*, 1991). In Kenya the species responsible have not yet been identified. In other countries *C. scoparium* has been the main species associated with Eucalyptus.

References

Crous, P. W., Phillips, A. J. L., and Wingfield, M. J. 1991. The genera *Cylindrocladium* and *Cylindrocladiella* in South Africa, with special reference to forestry nurseries. *South African Forestry Journal* 157 : 69 -85.

Mendel, Z., Protasov, A., Fisher, N. and La Sallae J. 2004. Taxonomy and biology of *Leptocybe invasa*. General and SP.N (Hymenoptera: Eulophidae), an invasive inducer on Eucalyptus. *Australian Journal of Entomology* 43: 51-63.

Mutitu, K. E., Otieno, B., Muchiri, M. N. and Musyoka, R. 2005. Effect of *Leptocybe invasa* (Hymenoptera: Eulophidae) attack on different Eucalyptus species. In: Recent advances in forestry research and technology development for sustainable forest management. (Ed. M.N. Muchiri, B. Kamondo, P. Tuwei and J. Wanjiku) Proceedings of the 2nd Kenya Forestry Research Institute's scientific conference held from 1-4 November 2004 at Muguga, Kenya. pp. 86-88.

Turnbull, J.W. 2000. Economic and social importance of eucalypts. Diseases and Pathogens of Eucalypts (Keane PJ, Kile GA, Podger FD & Brown BN, eds), pp. 1–10. CSIRO Publishing.