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RISING PEST PROBLEMS IN FOREST
PLANTATIONS IN GHANA

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ABSTRACT

There have been significant increases in outbreaks of insect pests and diseases in forest plantations in Ghana. Populations of some potential pests, which previously occurred below economic injury thresholds, have reached outbreak levels. In addition, pest problems previously unknown in forestry in Ghana are emerging. The sudden increase in the forest plantation estate, as well as fluctuations in environmental conditions may explain the escalating pest situation. In the past, the most devastating pest problems in forest plantations affected mostly indigenous species, such as Odum (*Milicia excelsa* and *M. regia*), Mahogany (*Khaya* and *Entandrophragma* spp) and Kokrodua (*Pericopsis elata*). Serious problems on teak, cedrela or other exotic species were quite uncommon, a situation that promoted the establishment of exotic species plantations to the neglect of indigenous species. But, exotic species are increasingly becoming vulnerable to pests nowadays. Major problems encountered during the reporting period (2004-2007) include: a) *Cedrela* stem infection, b) teak dieback and decline, c) Wood boring by *Apate* spp. (*A. monachus* and *A. terebrans*), and d) termite damage of Eucalyptus plantations. It is believed that a lot more outbreaks or potentially damaging symptoms go unnoticed or unreported. It is highly recommended for plantation developers to incorporate integrated pest management (IPM) plans in their projects

INTRODUCTION

The initiation of the National Forest Plantation Development Project has resulted in sharp increase in the total forest plantation estate, now estimated to be over 160,000 hectares (FAO 2006). The over 60% increase in total plantation estate within a period of five years is very encouraging indeed. This is against the backdrop of persistent failure of plantation development efforts in the past. Apart from perhaps financial and managerial constraints, fire and pests have been frequently cited as causes for the failures of the past. In Ghana, exotic species plantations have been generally more successful than indigenous species. Why is this so?

Pests Outbreaks on Native versus Exotic Species

Plantations of indigenous species have generally failed because pest problems of indigenous species are generally more acute than those of exotic species. For example, commercial scale planting of high value native species like “odum” (*Milicia excelsa*), mahogany (*Khaya* and *Entandrophragma* spp) and “kokrodua” (*Pericopsis elata*), has been abandoned. Although research efforts have yielded promising results for managing pests of some indigenous species, interest in indigenous plantations is still very low. Exotic species generally suffer lower pest damage than indigenous species because they are planted in environments in which their native pests are not present. For example, while teak (*Tectona grandis*) has been grown with little or no pest problems in Africa, teak plantations in India and other south east Asian countries, where it is indigenous, suffer significant economic damage from the teak defoliator, *Hyblaea puera* (Lepidoptera: Hyblaeidae)

However, exotic species do not remain ‘immune’ against pests in their new locations indefinitely. Over time, native pests from the country of origin may get accidentally introduced into the new environment. The frequency of these accidental introductions, or invasions as they are often referred to, has increased substantially in recent years because of increased global trade. It is now well known that large numbers of pests are frequently being transferred from country to country through especially wood packaging material (dunnage), as well as other shipments. When such situations occur the devastation on exotic plantations is even more acute than what pertains in the native habitats. This is because natural enemies of the native pests that help keep the population under control in their new habitats are often left behind during accidental introductions of the

pests. Another way by which exotic species may become attacked is when native pests adapt to them. That is, after a period of time, local pests 'learn' to feed and reproduce on the new species. Although this process may be gradual and take decades to reach economic damage levels, it eventually happens. If not properly addressed during the initial stages the problem could be devastating.

In Ghana, the main strategy against the problem of pests in planted forests was the shift from the planting of indigenous to exotic species. Teak (*Tectona grandis*) is the most dominant forest plantation species in Ghana. Other widely planted exotic species include Gmelina (*Gmelina arborea*), Eucalyptus, and Cedrela (*Cedrela odorata*). These species have generally had better success than indigenous species because of the absence of serious pest problems. But the situation is changing and we need to develop a more holistic approach to pest management in plantations.

Role of Protection in Plantation Development

From the preceding discussion, we can understand that forest protection is crucial for plantation projects like the kind Ghana is currently implementing, irrespective of the species i.e. indigenous, exotic or both. It is important that we conduct routine monitoring of plantations for pests, develop preventive strategies to protect our plantations against major outbreaks, and develop the necessary management strategies alongside the needed protocols and logistics to combat sudden outbreaks.

The publication seeks to provide a snapshot of the current tree pest problems of forest plantations in Ghana. It is intended to alert tree growers in the country of the major tree pest problems encountered in recent years with information on their origin, causes, predisposing factors, management measures, and other relevant information necessary for effective tree protection. In this maiden edition of what we hope will be a yearly publication, the information we provide goes back from 2004.

REPORTED PEST PROBLEMS IN RECENT TIMES

Already, reports indicate that pest problems in plantations are on the rise in Ghana (Table 1). Reports and observations made by staff of the Forestry Research Institute of Ghana (FORIG) in

recent years suggest a changing paradigm for forest pest problems in the country. Information on pest damage to trees was obtained in two ways: a) Reports from individual / private tree growers, b) Official reports received from the Forest Services Division (FSD) and c) Forest health monitoring and surveillance activities by FORIG staff. This is by no means comprehensive as most pest problems go unnoticed or unreported. However, this article marks the beginning of our efforts to increase awareness on the rising pest problems in forest plantations in Ghana.

Table 1: Major forest pest problems reported by individuals and organizations between 2004 and 2007.

Pest problem	Causative organism	Areas recorded	Remarks
Stem boring of teak	Apate spp	Ekumfi Akotsi (Private plantation) Agogo Nyantokuro (Private plantations)	Removal of infested trees (sanitation thinning) recommended. However, plantation owners did not comply but instead applied chemical treatment which resulted in some measure of control.
Cedrela stem infection	Fungi	Ahwiaso South Forest Reserve, Bibiani Afram Headwaters Forest Reserve, Abofour Worobong South Forest Reserve, Begoro	New disease in Ghana. No control measures known. Research in progress
Teak dieback	unknown	Yaya F.R. (Takyiman)	Cause of dieback not known. Studies to begin soon on this problem
Termite attack of Eucalyptus	Subterranean termites	Wa Gwallu	Plantation sanitation recommended.

EXAMPLES OF RECENT PEST OUTBREAKS

Cedrela Stem Infection

Cedrela stem infection is a new disease, which was first observed on *Cedrela odorata* in a plantation by FSD field officers at the Anhwiaso South Forest Reserve, Bibiani Forest District in 2005. In the latter part of 2006, disease symptoms were observed on some Cedrela trees in a taungya plantation at Afram Headwaters Forest Reserve, near Kwapanin in the Offinso Forest District

(Bosu, et al 2006). In 2007, three infected trees were recorded in a small plantation near Bosuso, in the Eastern region while one infected tree was observed in a plantation in the Worobong South Forest Reserve, near Feyiase, Begoro Forest District.

Description: Attack begins on a point on the stem, anywhere between the base and the live crown, and gradually spreads in all directions. Stems of affected trees are dark brown to black in colour. In more advanced stages, there is heavy flow of brownish resin which eventually turns black, due perhaps to the activity of decay fungi. Leaves of newly attacked trees first turn yellowish and shed off as the infection advances (Apetorgbor and Bosu, 2006) (Figure 1).

Pest Management: No control measures are known so good plantation sanitation, including timely weeding and removal and burning of severely infected trees are recommended.

Whilst the disease is currently not a major concern, we believe it has the potential threat to cause major havoc to *Cedrela* plantations in the country. Studies are currently underway to identify the causes and methods for their control. Several pathogenic fungi isolated from infected trees are being investigated. Preliminary trials with pesticides are currently in progress in plantation at the Anhwiaso South Forest Reserve



a



b

Figure 1: Infection of *Cedrela odorata* stem by an unknown disease at the Anhwiaso South Forest Reserve.

a) Infected stem showing flow of sap on bark.

b) Coppicing of shoots near the base of an infected *Cedrela* stem.

Teak Dieback Decline

The first and only occurrence of this disease was reported from a 40-acre plantation at Dagyanso near Kuntunase in the Ashanti Region in 2004. No new infestation has since been observed or reported.

Description/Symptoms: The infection is characterized by crown dieback which destroys the terminal bud, extending downwards and causing necrosis of the leaves and subsequently killing the sapling. The transverse section of diseased stem showed stains in the cambium / phloem layer down to the roots. Part of the xylem is also stained at the base of the saplings. Root rot at soil level and below ground was also observed. One pathogenic fungus, *Lasiodiplodia theobromae* has been isolated from infected plants.

Cause(s): The cause of this disease is unknown but poor soil factors are suspected. Mineral deficiency, wet soil or a combination of these two is believed to predispose plants to infection.

Pest Management: No management strategies are known. Studies are, therefore, needed to determine the cause of the disease and management options.

Teak Dieback

The first complaint was received from a technical officer at Akumadan, in the Offinso Forest District during the early part of 2004. He had observed several teak trees dying suddenly with no apparent cause (s). In 2006, we observed substantially high teak mortality in community plantations in the Yaya Forest Reserve (Bosu and Apetorgbor, 2006).

Description/Symptoms: Tree first loses all its leaves and begins to dieback. After the tree dies there is usually prolific coppicing at the base of the stem.

Causes: The exact cause of mortality is unknown but we are of the view that more than one factor may be involved. Poor site factors, example poor soil conditions, and drought might be the main predisposing factors. Damage by subterranean termites, root disease, or a combination of the two might be involved.

Pest Management: No specific management strategy is known. Good plantation Silviculture is

recommended namely: a) avoid planting teak in wet soils or on rocky terrain, b) ensure vigorous growth by thinning and pruning plantation to an acceptable stand density, and c) ensure regular weeding of plantation, especially during early years of growth.

Important Note: Studies are thus needed to determine the exact cause (s) of the disease and management options.

Apate Stem Borer

Apate species have long been recognized as important borers which attack a wide variety of economic trees in Ghana including, both indigenous and exotic species. In recent years *Apate* damage has been reported from several locations across the country. In November 2004, a report was received from Ekumfi Akotsi in the Central Region where a private landowner had observed substantial damage to his 4 year-old backyard teak plantation. Up to 65% of the trees had been attacked, about 20% severely damaged.

However, no tree mortalities had occurred. The second report was received in February 2005 from a tree grower in Kumasi whose 8 hectare teak plantation at Nyantokuro, near Agogo in Ashanti Region had been attacked. The report described severe damage close to 100 trees scattered in isolated pockets throughout the plantation.

Description: The two commonest species are *Apate monachus* and *Apate terebrans* (Coleoptera: Bostrichidae). The members of the family Bostrichidae are commonly referred to as branch and twig borers.

Damage: Damage is caused by the adult beetle which bores into living stems to lay eggs. In standing trees, the oviposition tunnel runs from the point of entry upward and may reach 30 cm. The tunnels generally follow the wood grain and reach a length of approximately 40 cm and a maximum width of 1.3 cm. They generally exploit the entire available depth of the sapwood, but may also occur in the heartwood. The frass is packed very tightly in the tunnel. Damage is more severe during the dry season when tree vigour is very low (Wagner *et al.*, 2008)

Pest Management: Good sanitation on plantation sites before out-planting is recommended. This involves removing and burning all infested wood. Also, removal of heavily infested individual trees to reduce the probability of spread and further damage is recommended.

CONCLUSION

We believe that the recent pest outbreaks that are being experienced in plantations are only the beginning of major pest events that are likely to be encountered in the not too distant future. Earlier, it was mentioned that the expansion of the forest plantation estate as a pre-condition for increased outbreaks. However, the effects of climate change on modifications of tree-pest dynamics could be a more crucial factor in pest outbreaks in the future. Stakeholders of forest plantation development in Ghana should of necessity make integrated pest management (IPM) an integral part of plantation projects, beginning at the planning stage.

Early detection of a pest is a major step in preventing future catastrophic outbreaks. Tree growers and the general public are encouraged to report unusual changes to trees / plantations to the nearest office of the Forest Service Department, extension officers or to the Forestry Research Institute of Ghana.

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