A REVIEW OF THE INSECT PESTS AND DISEASES IN RELATION TO PHENOLOGY AND DISTRIBUTION OF *TRIPLOCHITON SCLEROXYLON* K. SCHUM (OBECHE) IN WEST AFRICA

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Summary

The insect pests and diseases of *Triplochiton scleroxylon* K. Schum (Obeche) are reviewed under five main headings, namely: i) phenology, taxonomy and distribution of Obeche in West Africa, ii) nursery pests and diseases, iii) pests and diseases of living trees, iv) pests and diseases of felled timber, and v) control measures. Research work on pests and diseases of *Triplochiton* have been slow and scattered along the West African sub-region and the paucity is attributable to shortage of manpower, equipment and low funding. It is suggested that in solving these problems, a total dependence on the advanced economies should be discouraged.

Introduction

Triplochiton scleroxylon K. Schum (Obeche) is a member of the Sterculiaceae and is a very important timber species in the forest areas of West Africa. There are various records on its utilisation in relation to its economic value and these were collated by Howland & Bowen (1977).

The authors also provided an exposition of the timber trade in Nigeria for 33 years from 1942-74. The total value of round and sawnwood of *T. scleroxylon* exported from Nigeria within this period was one hundred and twenty million, one hundred thousand Naira 120.1 m) ca.U.S.$600.5 m representing 48.7 per cent of a total of 246.6 million Naira (ca. $1,233 m) total earnings from the exportation of over 40 different timber species. The exportation of logs of Obeche and other species was stopped at the end of the civil war in 1970 to satisfy the increased pressure in local demand.

The level of exploitation of Obeche throughout its natural range of distribution in West Africa had been high. The insect pests and diseases of Obeche in the natural forest, in nurseries and established plantations, and the current status of research in identifying and solving the pest and disease problems are reviewed in this paper. The review is done under five main headings namely, phenology, taxonomy and distribution of Obeche in West Africa, nursery pests and diseases, pests and diseases of living trees, pests and diseases of felled timber and control measures.

Phenology, taxonomy and distribution of Obeche

A comparative analysis of round and sawnwood exports of *T. scleroxylon* from the four main producer countries of Nigeria, Ghana, Ivory Coast and Cameroon between 1951 and 1970 according to Ernfurth (1973) is shown in Table 1.

T. scleroxylon is a member of the Sterculiaceae. The only other species in the genus is *Triplochiton zambesiacus* Milne - Redhead, occuring in parts of the Zambesi valley (Pardy, 1956; White, 1962). Schumann (1901) first described the species. Wright (1903), Sprague (1909) and Roberty (1953) further named three species, *T. johnsonii, T. nigericum* and *Samba scleroxylon*, respectively, according to the number of lobes possessed by the leaves. Hutchinson & Dalziel (1958) synonymized all three species with *T. scleroxylon*. The flower has three protective bracts called epicalyx. Scleroxylon literally means 'hardwood' in Greek a misnomer in view of the nature of the timber (Bond, 1950).

The longitudinal range of *T. scleroxylon* ex-

TABLE 1

Round and sawnwood exports of T. scleroxylon *from the four main producer countries* in 1951 and 1970*

Round-wood *(1,000 m³)*

	1951			*1961*			*1971*		
	Obeche	*All species*	*%*	*Obeche*	*All species*	*%*	*Obeche*	*All speciec*	*%*
Nigeria	272	608	45	515	733	70	108	223	48
Ghana	65	258	25	353	774	45	301	600	50
Ivory Coast	27	178	15	293	1,029	28	717	2,514	12
Total	369	1130	32.6	1166	2689	43.4	1167	3666	31.8

Sawn-wood

	1951			*1961*			*1971*		
	Obeche	*All species*	*%*	*Obeche*	*All species*	*%*	*Obeche*	*All speciec*	*%*
Nigeria	9	28	32	19	63	30	17	45	37
Ghana	20	75	26	40	221	18	44	239	18
Ivory Coast	Nil	Nil	Nil	3	38	8	12	184	6
Cameroun	Nil	Nil	Nil	13	28	46	3	51	6
Total	29	103	28.2	75	350	21.4	76	519	14.6

* Data from Ernfurth (1973), not available from Liberia; export from the Congo negligible, and none from Gabon and Central African Empire.

tends from approximately 11° East to 14° West, a distance of about 3900 km (Fig.1). In Nigeria, its most northerly occurrence is 9°50' N and its most southerly is 0°30' N, in Gabon, that is, a latitudinal range covering nearly 1000 km. It may also occur outside of these limits. However, for the most part it forms a belt only some 200 km, or less deep. Within these limits, *T. scleroxylon* is found mainly in association with the moist forest at low and medium altitudes, up to 900 m, which lie within the moist monsoon type of the humid semi-hot, equatorial forest belt (Jones, 1975). Hall & Bada (1979) reported that the highest concentrations of the tree are associated with altitudes less than 500 m, mean annual rainfall from 1100-1800 mm with a seasonal and two-peaked distribution and temperatures of 20-35°C.

Howland & Bowen (1977) described *T. scleroxylon* as one of the largest, deciduous forest trees in West Africa, commonly attaining 45

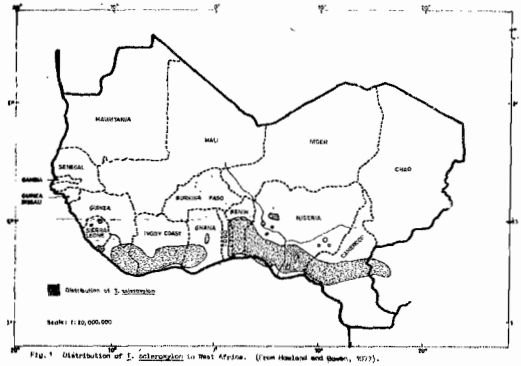

Fig. 1. Distribution of *T. scleroxylon* in W. Africa (Howland & Bowen, 1977).

m in height and 1.5 m in diameter in the high forest zones, but it is generally smaller in open farmland and in the drier zones. The stems of mature trees are often heavily buttressed, but usually free from branches and, therefore, clear timber in large dimensions is obtainable. However, form is frequently poor owing to forked or multiple stems and crooked boles. Natural regeneration is adequate, the fast growing seedlings being among the most successful colonizers of disturbed forest. Young trees have a cylindrical shaped crown bearing foliage almost to the ground (Fig.2). Self pruning gradually modifies this to a high, circular crown which finally becomes flat-topped when trees are old (Fig.3).

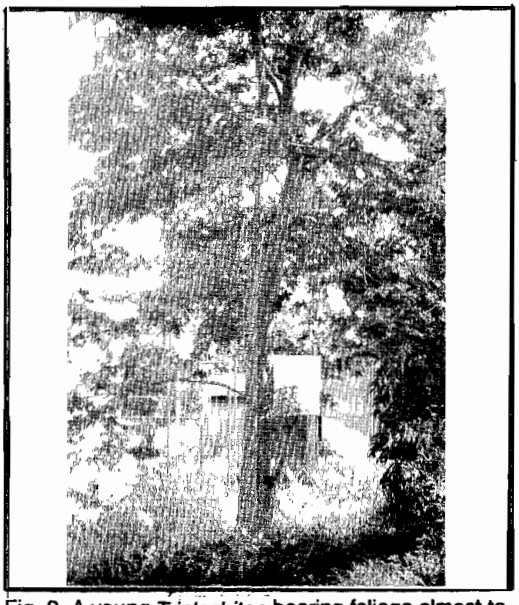

Fig. 2. A young *Triplochiton* bearing foliage almost to the ground.

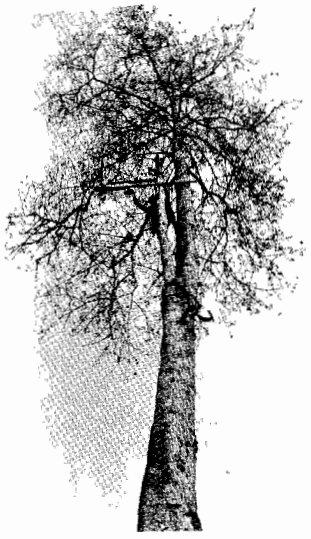

Fig. 3. A big circular-crowned *Triplochiton*.

Nursery pests and diseases

Forestry in many West African countries is at a critical phase in its development, changing from a system of extensive exploitation of the natural forest to intensive plantation schemes. A rapid expansion of plantation forestry is currently planned in several countries to meet the rising demands of their internal markets, which can no longer be met from the previous system of management. The problem is especially acute in Nigeria, where a shortfall of timber was predicted for the mid 1980's (Howland & Bowen, 1977).

In Nigeria, Obeche had been propagated naturally in the high forests through seed dispersal. After the inception of the Forestry Research Institute of Nigeria (FRIN) in 1952 the species was propagated by the use of seeds but more recently between 1972 and 1977 vegetative propagation had been embarked upon. The earliest record of attack of Obeche in the nursery was by Eidt (1963). He reported that larvae of a noctuid *Anomia leona* Schaus ate old and new foliage in transplant beds. *Gymnogryllus luceus* (Wlk) (Orthoptera: Gryllidae) 'crickets' cut the foliage which they carried to their burrows. Wastage was reported to be high. *Anua subdiversa* Prout. (Lep: Noctuidae) larvae defoliate nursery stock (Browne, 1968).

Apophylia nigricollis Allard., *Podagrica sjostedti* jhar. (Coleoptera: Chrysomelidae) and *Lagria villosa* F. (Coleoptera: Lagriidae) are beetles reported feeding on the edges of leaves of young trees in nurseries. Two species of the psyllid genus *Diclidophlebia* Crfd., *D. eastopi* Vond. and *D. harrizoni* Osisanya are pests of Obeche. The psyllid attack is particularly severe on young seedlings in nursery and transplant beds

before they are well established (Eidt, 1963). The psyllids feed and complete their life-cycle on the leaves which are shed prematurely, and kill the apical buds causing the stems to die-back. This results in stunted growth and copious branching of the stems to produce trees unsuitable for timber (Osisanya, 1970).

In Ghana, Kudler (1968) reported the attack of Obeche seedlings by *D. eastopi* Vond. Nutrients were sucked from leaves and shoots. *Lophocrama phoenicochlora* Hamp. defoliate seedlings (Kudler, 1969). There are, however, no records of disease problems on Obeche in the nursery.

Pests and diseases of living trees

Nigeria

Defoliation of *T. scleroxylon* by the larvae of *Anaphe venata* B. (Lep: Notodontidae) was recorded by many workers such as Pomeroy (1923), Kennedy (1936), Golding (1942), Browne (1968), Roberts (1969) and Jones & Kudler (1971). Little is known about the population dynamics of *A. venata* and the effect of defoliation on the tree (Jones, 1974). Field observations between 1971 and 1980 in southern Nigeria by the author of this paper showed no attack on the foliage of the grown plantations of *T. scleroxylon* by *A. venata* larvae. However, naturally occurring trees were occasionally defoliated by the larvae. Although defoliation was not quantified, cursory observation by Ashiru (1975) showed that up to 70 per cent of the canopy leaves were eaten.

Ashiru (1986) showed that larvae of *Anaphe* did not feed on *Triplochiton* saplings aged between 3 and 28 months. However, 22 and 26 per cent defoliation respectively occurred on two trees in the field. These levels of foliage loss to *Anaphe* larvae was considered too low to show an easily detectable injurious effect on *Triplochiton*. Browne (1968) reported that *Epanaphe moloneyi* Druce (Lep: Notodontidae) larvae are polyphagous leaf-feeders that defoliate *T. scleroxylon* mature trees occasionally. He also reported that larvae of *Polyptychus* sp. Huebner (Lep: Sphingidae) and *Sylepta retractalis* (Lep: Pyralidae) defoliate *Triplochiton* occasionally.

Outbreaks of the larvae of a polyphagous defoliator *Achaea catocaloides* (Guenee) (Lepidoptera: Noctuidae) in large numbers were recorded in West Africa (Robers, 1969). Two such outbreaks occurred in 1963 (Ayangba) and 1966 (Omu-aran). *Pyralis manihotalis* (Guenee) (Lepidoptera: Pyralidae) were also reported to attack seeds and fruits. Roberts (1969) recorded the lamiid *Ancylonotus tribulus* (Fabricius) (Coleoptera: Lamiidae) breeding in *Triplochiton* trees. He also recorded three successful attacks of bole boring by *Doliopygus unispinosus* Schedl (Coleoptera: Platypodidae) in felling areas in Shasha Forest Reserve.

The seeds and fruits of *Triplochiton* are attacked by the weevil *Apion (Catapion) ghanaense* Voss. and Ashiru (1975) recorded fruit damage ranging from 1 per cent in April to 95 per cent in December. Ashiru & Momodu (1981) reported that the larvae of the cossid *Eulophonotus obesus* karsh bore the boles of *Triplochiton* causing loss of wood as well as sap and gum (Fig 4). Such damage may predispose the host to secondary infestations and infections by other pests and diseases. Trees in the 62.5-

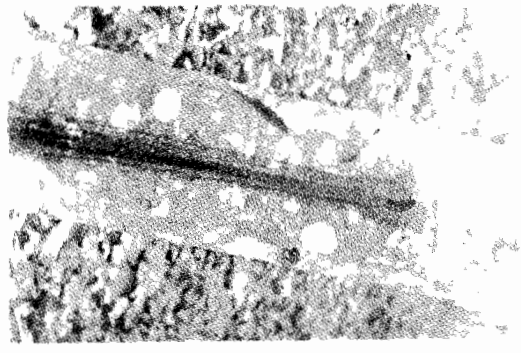

Fig. 4. An exit hole of *E. obesus* showing sap run-off.

75 cm girth range had the highest attack.

Limited disease problems have been recorded on *Triplochiton* in Nigeria. Odeyinde (1975) recorded *Mycosyrinx nonveilleri* as a smut pathogen of the flowers and fruits while Ofong (1978) reported on chemicals which inhibited the growth of the fungus on agar medim.

Ghana

Roberts (1960) reported *Trachyostus ghanaensis* Schedl, an ambrosia beetle which attacked only living trees of *Triplochiton*. Kudler (1966) reported defoliation of Triplochiton trees by *Anaphe venata* B. (Lepidoptera: Notodontidae). The development of flowers and frruits of the tree is occasionally affected by colonies of sucking nymphs of the psyllid *Diclidophlebia eastopi* Vondracek as well as by feeding of caterpillars of a cosmopterid *Clyphipterix* spp., a pyralid *Bocchoris inspersalis* Zeller and a noctuid *Selepa* spp. (Kudler, 1968). The noctuids *Earias ogovana* Holl., *E. biplaga* Walk., *Lophocrama phoenicochlora* Hamps., *Eublemma* sp., *Characoma* sp., *Characoma nilotica* Rogenh. and *Selema* sp. bored and fed on the content of the developing flower buds.

The weevils *Apion (Pseudapion) ghanaensis* Voss and *A. nithonomoides* Voss also bred in fruits of *Triplochiton* along West Africa (Kudler, 1969). He reported a fruit damage of 40-76 per cent in Ghana, 32-76 in Nigeria, 41-76 per cent in Cameroon and 0-77 per cent in Ivory Coast due to the attack by the weevils on fruit samples collected from these countries. Kudler (1970) further recorded a tortricid, *Tortrix dinota* Meyr. and a noctuid, *Eublemma* sp. n.r. *aurantiaca* Hamps, as pests that destroy flower buds and fruits of *Triplochiton*.

Browne (1968) recorded *Anomis microdonta* Hampson (Lepidoptera: Noctuidae) as a minor defoliator and *Delococcus tafoensis* Strickland (Hemiptera: Pseudococcidae), a scale insect which feeds on the sap of *Triplochiton, Terminalia superba* etc. Also adults of a sub-circular scale insect, *Newsteadia wacri* Strickland (Hemiptera: Orthoziidae) feed on the sap beneath the protection of flakes of bark.

The disease reported are *Polyporus occidentalis* (Klotzsch) Fr., Basidiomycotina, Aphyllophorales which caused (root rot) and *Meliola triplochitonis* Hughes, Ascomycotina, Erysiphales, a dark mildew which forms spots on foliage of *Triplochiton* (Browne, 1968). Ofosu-Asiedu (1971) reported that *Botryodiplodia theobromae* was isolated as a blue stain fungus. Spaulding (1961) had earlier recorded a wound parasite *Calonectria rigidiuscular* (Berk and Br.) Sacc. Ascomycotina, Hypocreales associated with die-bark of numerous dicotyledonous trees on *Triplochiton* in West Africa but did not name exact locality.

Cameroon

Three Lepidopterans namely, *Characoma* sp., *Pamea* sp. or *Cydia* sp. and *Pyroderces* sp. and two weevils namely, *Apion congoense* Hoffmann and *A. lamottei* Hoffmann have been recorded on flowers and fruits of *Triplochiton* (Mbondji, personal communiications). Pujol (1957) recorded *Anaphe venata* B. as a defoliator.

Pest and diseases of felled lumber

Nigeria

Roberts (1969) recorded 41 insect species belonging to three orders and 12 families (Table 2) which attack felled lumber and dead logs. Recently, Ashiru & Momodu (unpublished) showed that *Platypus hintzi* Schaufuss, *Xyloperthella picea* Oliv., *Heterobostrychus brunneus* Murr., *Bostrychopsis tonsa* Imhoff, *Doliopygus dubius* Sampson, *Xyleborus ferrugineus* F. and two unidentified clerid in order of importance attacked billets of *Triplochiton*. The disease-causing fungi were *Botryodiplodia theobromae* and *Paecilomyces variotii* Bainier. They cause blue staining of *Triplochiton*.

Ghana

The sapwood of converted trees are attacked by bostrychid beetles *Apate tenebrans* Pallas and *Heterobostrychus brunneus* Murray (Logan, 1946). Mackay (1947) recorded *Apate degener* Murray boring into logs while Kudler (1965) reported that *Bostrychoplites cornutus* Olivier and

TABLE 2

Insects reported on Triplochiton scleroxylon *(Roberts, 1969)*

Insect	*Order*	*Family*	*Part of* Triplochiton *affected/general remarks*
Phloeotragus gigas (Fabricius)	Coleoptera	Anthribidae	Adults reared from large branches taken in a forest locality
Anisognathus	-do-	Brenthidae	Adults found below barks of newly felled, poisoned and dying trees
Orphanobrentus picipes (Olivier)	-do-	-do-	Adults found under bark of large dead logs
Mecedanum tomentosum (Hinton)	-do-	Colydiidae	Adults taken from newly felled and poisoned trees
Ogmoderes sculpticollis (thomson)	-do-	-do-	Adults found in dead branches, logs and timbers
Sosylus bistriatus (Fair maire)	-do-	-do-	Adults found in newly felled and poisoned trees
Sosylus spectabilis (Grouvelle)	-do-	-do-	-do-
Amorbaius cavicollis (Quedenfeldt)	-do-	Curculionidae	Adults reared from dead trees
Amorbaius infestus (Bohemann)	-do-	-do-	-do-
Curanigus Kraatzi (Faust)	-do-	-do-	Adults taken under barks of newly felled logs
Phaenomerus hirtipectus (Marshall)	Cleoptera	Curculionidae	Adults taken in and under bark of newly felled and dead trees
Phaenomerus strigicollis (Faust)	-do-	-do-	Adults taken in and under bark of logs
Scolytoproctus angustirostris (Marshall)	-do-	-do-	Adults recorded on logs and fallen trees
Scolytoproctus schaumi (Faust)	-do-	-do-	Adults taken in and under bark of newly falled, poisoned and dying trees
Stasiastes glabratus (Faust)	-do-	-do-	-do-
Ancylonotus tribulus (Fabricius)	-do-	Lamiidae	Breeds in felled and standing trees
Lyctus africanus (Lesne)	-do-	Lyctidae	Common in well seasoned lumber in Nigeria markets in many parts of savanna
Lyctus brunneus	-do-	-do-	A cosmopolitan pest of timber found in the sapwood
Minthea obsita (Wollaston)	-do-	-do-	Common pest of sawn timber in the wetter savanna
Minthea rugicollis (Walker)	-do-	-do-	Most common as a pest of veneer cores, packing cases and seasoned timber

TABLE 2 (Cont.)

Insect	*Order*	*Family*	*Part of* Triplochiton *affected/general remarks*
Trogoxylon aequale (Wollaston)	Coleoptera	Curculionidae	A cosmopolitan pest occasionally taken in both the rain forest and the savanna
Atractocerus brevicornis (Linnaeus)	-do-	Lymexylidae	Infests large felled and fire-damaged trees
Molittoma africannum (Thomson)	-do-	-do-	-do-
Pentalobus barbatus (Fabricius)	-do-	Passalidae	Adults found beneath wet bark of old felled logs
Doliopygus perbrevis (Schedl)	-do-	Platypodidae	Felled and poisoned trees together with branchwood attacked
D. chapuisi (Duvivier)	-do-	-do-	Usually large poisoned, newly or damaged trees and large branch wood attacked
D. conradti (Strohmeyer)	-do-	-do-	Newly felled logs, dying or injured trees of moderate to large size attacked
D. dubius (sampson)	-do-	-do-	-do-
D. serratus (Strohmeyer)	-do-	-do-	Attacks stems of 10cm diameter and large felled logs and damaged trees
D. unispinosus (Schedl)	-do-	-do-	Felled and dying trees of medium to large size attacked
Periommatus excisus (Strohmeyer)	-do-	-do-	Adults recorded on poisoned and rarely in felled trees
Platypus hintzi (Schaufuss)	-do-	Platypodidae	Attack newly felled and dying and rarely poisoned trees
Xyleborus affinis (Eichhoff)	-do-	Scolytidae	Attack poisoned and newly felled trees
X. allusudi (Schaufuss)	-do-	-do-	Large logs, felled and dying trees and large branchwood attacked
X. ferrugineus (Fabricius)	-do-	-do-	-do-
X. semiopacus (Eichhhoff)	-do-	-do-	Found in logs, large branches, small stems and branches
X. torquatus (Eggers)	-do-	-do-	Tropicopolitan. Newly felled, fallen dying and branchwood attacked
X. tropicus (Hagedon)	-do-	-do-	Found in logs and branchwood
Bostrychoplites cornutus (Olivier)	-do-	Bostrychidae	Adults attack sawn and seasoned timber
Heterobostrychus brunneus (Murray)	-do-	-do-	Adults attack sawn and seasoned timber
Xylocopa torrida (Westwood)	Hymenoptera	Xylocopidae	Found in structural timbers and dead trees

Heterobostrychus brunneus Murray damage logs.

Control measures

Pests and diseases of nursery plants

Eidt (1963) observed that nymphs of *Diclidophlebia* were preyed on by various syrphid larvae. He recommended a chemical control by two applications of a 0.1 per cent malathion emulsion sprayed at 3-4 weeks interval. He also suggested that a more economical method of control demands that plants be moved into transplant beds as soon as possible after the rainy season has started. This enables trees to resist more effectively attack by the psyllid which starts late in the rainy season. Osisanya (1970) recommended shading *Triplochiton* seedlings in the nursery and transplant beds with palm fronds on bamboo frames as a method of silvicultural control.

Ashiru, Idowu & Agbavwe (1985a) showed that *Triplochiton* seedlings raised in the nursery are better protected against psyllid attack by screening the seedlings with gauzed cages than by spraying with chemical insecticides. Ashiru *et al.* (1985b) confirmed that *Triplochiton* seedlings protected with wire gauze screens in the nursery performed better than those protected with chemical insecticides after 7 months in transplant beds. They also agreed with Eidt (1963) and Osisanya (1970) that seedlings should be transplanted early in the rains to allow firm establishment before the beginning of the dry season, when the field population of the psyllid is at its peak. No specific control measures exist in literature for other pests which are probably considered minor.

Pests and diseases of living trees

Although defoliation of *Triplochiton* ranging up to 70 per cent had been recorded in Nigeria, Ashiru (1986) reported that generally field observations and laboratory experiments suggest that *A. venata* is an occasional defoliator of the tree. Because of the generally low level of defoliation, particularly on merchantable trees and the irregularity of such defoliation, it is not considered a serious pest of *Triplochiton*. In the Cameroon, however, *A. venata* was reported to be effectively controlled through sound crop sanitation practices plus a spray of 10 per cent DDT on *Cola* spp., a sterculiaceae like *Triplochiton* (Pujol, 1957).

Recently Ashiru & Momodu (1986) showed that a combination of furadan, thimet (144 g/tree) and weeding was promising in the control of *Eulophonotus obesus* Karsh, the bole borer or *Triplochiton* and proposed an integrated management system for the pest. Ofong (1978) in a bioassay showed that the incorporation of benomyl and ethoxy ethylmercury hydroxide in Sabouraud-dextrose agar inhibited growth of the smut fungus *M. nonveilleri*. Ofosu-Asiedu (1971) reported that the blue stain fungus *Botryodiplodia theobromae* was killed after exposing it to 40°C for 4 days in blocks of wood. Twelve and half hours was suffficient to kill the fungus at 60°C.

Pests and diseases of felled lumber

Logan (1946) remarked that attack of logs by beetles was more likely on bushy sites than on clean isolated sites. He observed that 2.5 and 5 per cent Santobrite (Sodium pentachlorophenate) solutions were effective against pinhole borers. He also suggested that (1) only heartwood of *Triplochiton* should be used while the sapwood should be burnt; (2) *Triplochiton* logs should be extracted, converted and seasoned as quickly as possible after felling; (3) Stackyard in which converted *Triplochiton* logs are stored must be kept clean. The first suggestion seems impracticable today because of the ever-increasing demand for wood which is in short supply.

Mackay (1947) observed that the control of all the various agencies causing damage to logs and timber such as powder-post beetles, pinhole borers, stain, longhorn borers, rotting fungi and excessive sun provide a complex problem. He noted that the effective treatment of one often encouraged another and also varied for different species and in different localities for a single species. He proposed that (1) Pinhole borer and stain damage may be prevented by rapid conversion and kiln seasoning even in the most difficult

cases; (2) If starch depletion method is used, rapid surface drying of logs may be necessary to prevent pinhole borer damage hence lime-washing is generally effective; (3) The important thing is to know the limiting factors for each of the destructive agencies and the significant factors of the locality of working and decide on the most effective control technique.

Ashiru & Momodu (unpublished) recorded three powder-post beetles namely *Heterobostrychus brunneus* Murray, *Bostrychopsis tonsa* Imhoff and *Xyloparthella picea* Oliveier and three platypodids namely, *Doliopygus dubius* Sampson, *Platypus hintzi* Schaufuss and *Xyleborus ferrugineus* F. on *Triplochiton* billets. The platypodids can, therefore, be carriers of propagules for some of the fungi identified. However, a 1 per cent concentration of Arkotine controlled the insects for one week. It was inferred that no fungal stain occurred within the one week since blue-stain fungi are only propagated by the ambrosia beetles. They proposed that an effective insecticidal control of the ambrosia beetles will prevent blue-staining and in turn help to reduce cost of spraying logs with preservatives before coversion. Selection of water-miscible preservatives will also further reduce costs than oil-miscible preservatives. The study also showed that billets kept in clean areas are less attacked than those kept in bushy areas.

Conclusion

In spite of the economic importance of *Triplochiton* in the timber trade of West Africa, little work appear to have been done on the pests and diseases of the species. The level of research work can be related to shortage of manpower, equipment and above all the need for a rational dispensation of funds. The training of required research personnel seem to have been very slow for reasons that would vary from one country to the other. For example, Anderson & Batzer (1976) listed seven scientists in forest pathology and entomology in Africa (excluding South Africa) compared to eight in India and 242 in the United States of America (Table 3). The number of listed scientists recorded in 1985 changed to 31 in Africa, 12 in India and 262 in the United States of America (Anderson & Batzer, 1985). Out of the seven forest pathologists and entomologists recorded in 1976, two from Nigeria worked on *Triplochiton* (Table 4). The trend, however, changed positively as at 1985 when 12 researchers worked on *Triplochiton* with 10 from Africa and one each from Sweden and the United

TABLE 3

Forest pathologists and entomologists in selected parts of the world in 1976 and 1985+

Countries	*Number in 1976*	*Number in 1985*
USA	242	262
Australia	22	31
Great Britain	17	24
India	8	12
Newzealand	11	10
Africa		
Algeria	-*	3
Egypt	1	5
Ghana	-	5
Ivory Coast	-	6
Kenya	3	1
Liberia	-	1
Nigeria	1	9
Senegal	-	1
Zambia	2	-

* A dash indicates nothing recorded.
+ Compiled from Anderson & Batzer (1976, 1985)

TABLE 4

Records of forest pathologists and entomologists working on T. scleroxylon *in the world in 1976 and 1985+*

Countries	*Number in 1976*	*Number in 1985*
USA	-*	1
Sweden	-	1
Africa		
Nigeria	2	4
Ghana	-	3
Ivory Coast	-	3
Cameroon	-	-

* A dash indicates nothing recorded.
+ Compiled from Anderson & Batzer (1976, 1985)

States of America (Table 4).

It must be emphasized that third world countries in the West African sub-region must beef-up their research efforts backed with adequate equipment to solve the problems arising from the disturbances to the forest ecosystems, where *Triplochiton* is an integral part, on a continual basis. Full dependence on the advanced economies must be gradually phased out.

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