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First Record of *Euplatypus parallelus* (F.) (Coleoptera: Curculionidae: Platypodinae) which caused sudden death of Padauk (*Pterocarpus indicus* Willd.) in Myanmar

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ABSTRACT

An ambrosia beetle, *Euplatypus parallelus* (F.) was collected from infested Padauk *Pterocarpus indicus* Willd Trees in Nay Pyi Taw, Myanmar. Larvae and eggs were found in the holes and the galleries of infested padauk wood cuttings. The adults come out from the holes to the mesh that covers the infested padauk wood cuttings. Half of these infested trees were previously pruned while some of them appeared to be healthy. Findings of this study indicated that mass attacked and damaged by a large population of this beetle might be a cause of sudden decline or death of *P.indicus*. Aluminium phosphide and carbaryl insecticide had effect on the attack of ambrosia beetle to padauk.

Keywords: ambrosia beetle, aluminium Phosphide, carbary, Platypodinae, padauk.

ပိတောက်ပင်များအားရုတ်သရက်သေစေနိုင်သည့်ပင်စည်ထိုးပိုး *Euplatypus parallelus* (F.)

ရဲလွင်အောင်[၁]၊ အေမီအောင်[၂]၊ မျိုးထက်အောင်[၃]၊ ဒေါက်တာသန့်ရှင်း[၄]

[၁]ဦးစီးအရာရှိ၊ သစ်တောသုတေသနဌာန၊
[၂] ပိုးမွှားပညာရှင်၊ FD-AFoCO IPDM Project
[၃] စီမံကိန်းအတွင်းရေးမှူး၊ FD-AFoCO IPDM Project၊
[၄]ဒုတိယညွှန်ကြားရေးမှူး၊ သစ်တောသုတေသနဌာန

စာတမ်းအကျဉ်းချုပ်

Ambrosia beetle *Euplatypus parallelus* (F.) အား မြန်မာနိုင်ငံ၊ နေပြည်တော်ဧရိယာရှိ ပိုးကျရောက်ဖျက်ဆီးသော ပိတောက်ပင်များမှ စုဆောင်းခဲ့ပါသည်။ ပိုးကျရောက် ဖျက်ဆီးသော ပိတောက်သားဖြတ်စများ၏ ပိုးပေါက်နှင့် ဥမှင်လမ်းကြောင်းများတွင် ကျိုင်းကောင်၏ ဥအဆင့်နှင့် သားလောင်းအဆင့်များအား တွေ့ရှိခဲ့ပါသည်။ ပိုးကျရောက် ဖျက်ဆီးသော ပိတောက်သားဖြတ်စအား ဖုံးအုပ်ထားသော ခြင်ထောင်ဇာအတွင်းသို့ အရွယ်ရောက်ကောင်များသည် ပိုးပေါက်များမှ ထွက်ရှိလာသည်ကို တွေ့ရှိခဲ့ရပါသည်။ ပိုးကျရောက်ဖျက်ဆီးသော ပိတောက်ပင်ထက်ဝက်သည် ယခင်က အကိုင်းခိုင်ခြင်းများ ပြုလုပ်ထားရှိပြီး အချို့အပင်များသည် ကျန်းမာနေသည်ကို တွေ့ရှိခဲ့ပါသည်။ ဤလေ့လာမှုတွင် ကျိုင်းကောင် အရေအတွက်များစွာသည် အပင်တွင် အုပ်စုလိုက် ကျရောက်ကာ ဖျက်ဆီးမှုကြောင့် ပိတောက်ပင် သေဆုံးရခြင်း ဖြစ်နိုင်ကြောင်း လေ့လာတွေ့ရှိခဲ့ရပါသည်။ Aluminium phosphide နှင့် Carbaryl ပိုးသတ်ဆေးသည် ပိတောက်ပင်တွင် ၎င်းကျိုင်းကောင် ကျရောက်မှုအပေါ် ထိရောက်မှုရှိကြောင်း တွေ့ရှိခဲ့ရပါသည်။

First Record of *Euplatypus parallelus* (F.) (Coleoptera: Curculionidae: Platypodinae) which caused sudden death of Padauk (*Pterocarpus indicus* Willd.) in Myanmar

1. Introduction

Ambrosia beetles are one of the wood-boring insects. Invasive bark and ambrosia beetles (Curculionidae : Scolytinae and Platypodinae) are increasingly responsible for major economic damage to forests, planations and orchards worldwide (e.g. Haack, 2003, 2006; Gao et al., 2005; Alfaro et al., 2007; Kirkendall & Odegaard, 2007; Wood, 2007; Kirkendall & Faccoli, 2010; Hulcr & Dunn, 2011, E. M.Gum and A. Ergun, 2015). Curculionidae : Platypodinae abundant in the tropical and subtropical areas where some species are important pest for forest and tree plantation (Browne, 1986). *Euplatypus parallelus* (F.) (Platypodinae) is native to tropical America, but has been introduced to Africa (where it is widespread), Madagascar, Australia and Southeast Asia (Wood & Bright, 1992; Beaver, 1999). These beetles live in symbiosis with fungi and cause to tree mortality and decrease wood quality.

Padauk *Pterocarpus indicus* Willd. is a native tree to Southeast Asia distributed from southern Myanmar to the Philippines (Carandang, 2007). *P. indicus* is planted as ornamental or shade trees along roads, walkways, in parks and residential areas in the tropics. It is fast growing, evergreen, has an attractive canopy shape, and has a typically synchronised short flowering period (S. Bumrungsri *et al.* 2008). In the study area, this tree has been usually grown in a row more than 5 years with other forest trees and has been pruned before rainy season.

The control of the pest is difficult since most of its life cycle takes place within wood and reproduction. Carbaryl, cypermethrin (Bascialli et al., 1996), has proved to be highly effective against ambrosia beetle such as Mega. mutatus.

Chemical control for ambrosia beetle can be done by injecting insecticides into the galleries or spraying trunks (Santoro, 1962, 1965b, 1967). Fumigants have been widely used to reduce the threat of pests in wood. Aluminium phosphide or magnesium phosphide produces toxic gases .These gases readily penetrate into infested kernels and eliminate all insect life stages. Fumigation of wood with aluminium phosphide gave more than 90 % protection against wood decaying white and brown rot fungi (H Pant & S Tripathi, 2011). There is no previous information on attacks by *E. parallelus* on padauk in this area.

2. Objectives

1. To report the presence of infestation by Ambrosia beetles *E. parallelus* on *P. indicus* Willd in Myanmar
2. To explore the proper chemical control for the ambrosia beetle infestation on Padauk (*P. indicus).*

3. Materials and Methods

3.1 Study site

The study area is located in Nay Pyi Taw, Myanmar. Padauk and other forest trees were planted as shade trees along the road. The study period was from July 2023 to March, 2024.

3.2. Collection and identification

Recently dead/partly dead P. *indicus* and a nearby living tree were investigated for the particular signs of infestation by insects. Visually plants inspected at monthly interval for evidence of ambrosia beetle infestation (frass). One major branch of the partly dead tree with

sign of infestation was cut with a wood cutter and about 0.5 m wood pieces were transferred to the Department of Entomology laboratory, Forest Research Institutes to identify the pests. These wood pieces/cuttings were covered with fine cloth mesh to monitor the adult beetle. The adults come out from the wood cutting were collected. One major branch of the dead tree with sign of infestation was cut with a wood cutter and knife horizontally and vertically into pieces, and specimens of insects (adult and larvae) were collected. The adults were identified by comparing the external morphological features with published articles (Wood 2007; Sara Bumrungsri et al. 2008).

3.3. Effect of different pesticide on the incidence of Ambrosia beetles *E. parallelus* on *P. indicus* Willd

Insecticides selected for this study were those commonly used by the farmers and readily available in the market. Three pesticides namely lime, Carbaryl 85% WP and Aluminium phosphide were applied at manufacturer's recommended rates. Three methods of application were used to nine plants and no pesticide to one plant as follow.

Method (1) Lime 1kg and Carbaryl 85% WP (50 g) were mixed with 10 liters of water. The mixture was applied to the stem of the plant.

Method (2) Lime 1kg and Carbaryl 85% WP (50 g) were mixed with 10 liters of water. The mixture was applied to the stem of the plant. One Aluminium phosphide tablet was put into the stem with the help of nail. After putting, the hole was covered with tape.

Method (3) Lime 1kg and Carbaryl 85% WP (50 g) were mixed with 10 liters of water. The mixture was applied to the stem of the plant. One Aluminium phosphide tablet was put into the stem with the help of nail. After putting, the hole was covered with tape. One Aluminium phosphide tablet was buried into the soil which is nearby the stem.

No pesticide was applied to one plant as control plant.

4. Results and Discussion

4.1 Identification of beetle

A number of small holes (1 mm in diameter) and cylinders of frass (2-3 cm long) were observed on the major branches 5 m from ground and at the base of trunk of partly dead tree in late September 2023 (Plate 1 and 2). In recently dead tree, fine dust of frass was observed on the major branches, trunk and on the ground in late November, 2023 (Plate 3 and 4). Leaves on the other branches of that partly dead tree were found to have suddenly died, but were still attached to the tree. This frass sign of infestation by beetle was not found on live *P. indicus* grown in this area for several years. One to sixty galleries were found from each wood cutting (Plate 5). These galleries extended through the bark into the sapwood and hardwood (diameter of branches examined were under 12 cm). Most of the sapwood had rotted and smelled like fermented wood, while some was still alive.

Plate 1. Cylinder of frass at the base of trunk of partly dead tree

Plate 2. Cylinders of frass at the opening of holes on the branch made by this beetle in partly dead tree

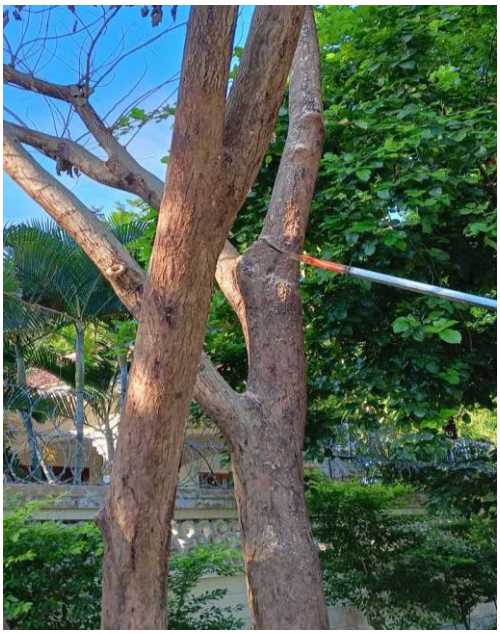

Plate 3. Fine dust of frass on the branches of recently dead tree

Plate 4. Fine dust of frass at the base of the recently dead tree

Some of the gallery walls were dark-stained with fungal mycelia. The gallery was simple, straight and 1 mm in diameter. Some galleries were not particularly straight, 1 mm in diameter, with a single branch. Galleries in examined wood cuttings varied in length, 10-25 mm probably indicating the duration of infestation in each part of the branch. Up to twelve larvae (range 1-12) of different sizes were found in each gallery. Adult was found the initial part of the gallery. Larvae of *E. parallelus* are creamy white and curved. Egg mass was also found both with and without larvae in some galleries (Plate 6). The adult collected from the gallery systems in the wood and come out into the mesh were identified as *Euplatypus parallelus*.

Plate 5. Adult, larvae and egg of *E. parallelus* in galleries. Gallery wall is dark stained.

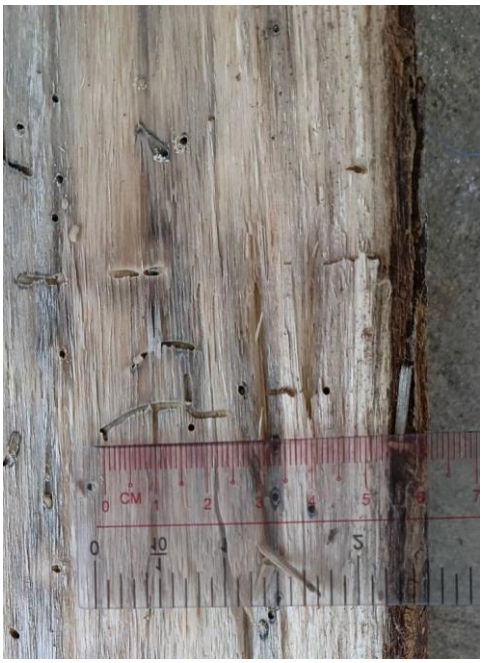

Plate 6. Gallery length of infested wood cuttings

4.2 Effect of different pesticide on the incidence of Ambrosia beetles *E. parallelus* on *P. indicus* Willd

Among the three methods of pesticide application, method (2) and method (3) had effect on the beetle infestation to padauk than method (1). Method (3) had more effect on the partly infested or partly died branches of trees than method (2). But, method (3) had bad effect on the young plant (under one year old) and died. Method (1) had effect on prevention of beetle attack to tree because of no odor of fermentation from the tree. Untreated plant had severely infestation of beetle to the tree and finally result tree motality.

There is no record *Euplatypus parallelus* on this tree in the literature before in Myanmar. *Euplatypus parallelus* is strongly polyphagous. Schedl (1965) records 65 host tree species in 21 families of plants in the Afrotropical region, and many others have been recorded in other parts of its range. Host trees include both broad-leaved and coniferous trees (Zanuncio *et al.* 2002; 2005). This sawed rubber wood *Hevea brasiliensis* has previously been recorded as a host tree by Schedl (1965) in Africa, and Browne (1980) in Malaysia, but the record from *Pterocarpus indicus* appears to be new. Since larvae of ambrosia beetle live symbiosis with ambrosia fungus, and ambrosia fungi is to be nonspecific to particular plant

species, polyphagy should be expected. It is observed that *F. oxysporum* caused death of *P. indicus* in Malaysia due to wilt disease (Philip, 1999). The dying *P.indicus* infested by *E. parallelus* in this study showed wilt symptom. *F. oxysporum* may be introduced into the tunnels by beetles and may be the possible cause of death of *P.indicus* in the south of Thailand (Sara Bumrungsri, Songklanakarin 2008). Some healthy-looking trees were also infested by this beetle, if a large population of beetle from nearby infested trees was transferred and mass attack to those healthy trees. Male platypodine beetles are able to release a pheromone which attracts other males and females (e.g. Renwick *et al.*, 1977; Milligan *et al.*, 1988; Tokoro *et al.*, 2007). This tree is one of the most common planted trees for shading and as ornamental plant because it grows well. Thus severely infestations can strongly affect the health of urban environments. Integrated pest management should be applied for the prevention of beetle attack and infestation. It is also needed to maintain the vigorous growth of this tree is recommended.

5. Conclusion

Since ambrosia beetles rarely attack healthy vigorous trees. Good cultural practice should be conducted for the vigorous growth of tree. Weakened or stressed trees apparently emit fermenting-like odors that attract ambrosia beetles. Healthy trees do not emit fermentation odors and that tree is unattractive to beetle. Insecticides may be needed occasionally. To prevent severely infestation, early detection and destruction of infested trees should be conduct as first approach. As second approach, chemical control can be conducted by injecting insecticides into the galleries or spraying trunks during adult emergence in spring. The findings presented in this paper showed carbaryl and aluminium phosphide are effective against this beetle. However, chemical control is costly and potentially harmful to the environment, people and animals. Chemical control (fumigation) should be carried out in high-value trees and in small defined areas. Mass testing of different kind of traps in monitoring population peaks could be a valuable help in the control of this beetle.

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