

Report of the studies on a transferred sample trunk  
infested with Red Palm Weevil  
(*Rhynchophorus ferrugineus*)  
Observing time from 15<sup>th</sup> of June 2003 to 1<sup>st</sup> of February 2004

**Part I**



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Gut Klein Goernow,  
19406 Klein Goernow - Germany

## **Red Palm Weevil - Transfer of an infested palm trunk sample**

Based on the cooperation regarding the development of an acoustic detection system and a control system for the Red Palm Weevil with the ministry of agriculture of the Kingdom of Saudi Arabia, an infested date palm sample trunk was transferred from Kingdom of Saudi Arabia to Germany in 2003.

The infested date palm was cut on the 9<sup>th</sup> of June 2003 and shipped via air cargo on the 12<sup>th</sup> of June to Germany. On the 15<sup>th</sup> of June the freight could be picked up from Hamburg Airport and was transferred to laboratory.

After storing the sample trunk in quarantine room at once life activity checks were done for proofing the condition of the trunk and larvae.



*Sample trunk in quarantine room*

A young living date palm was also put into the quarantine room. Then the final technical installation were done. This installations included a mercury steam lamp, temperature controlled electrical heater, humidity device, temperature devices, infrared video cameras with remote control, standard video cameras, bioacoustic measurement devices.



## *Living young date palm and sample trunk*

The observation program contained:

- documentation of the development progress of the Red Palm Weevil in the sample trunk
- studies on understanding the RPW system
  - Reactions on different smells
  - Different treatments and the reactions
  - Anatomic studies
  - Flight capabilities
  - Survive tests
  - Light / Dark test rows
  - Larvae development
  - Physiological tests (temperature tolerance for example)
- processing of an infestation of a living palm
- ecological studies
- physical studies on sound transmission properties of palms

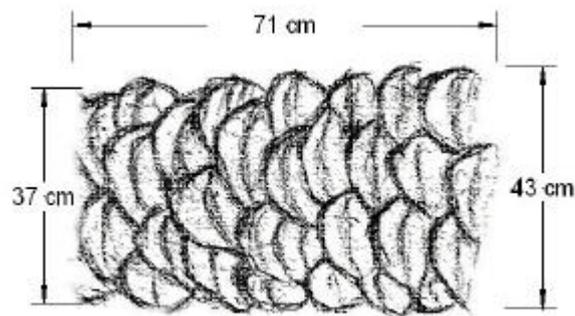
Some of the named test rows are still running. The fixed day of this short report is the 01.02.04 .

Additional to this work /observation program the calibration of the detection system could be finished.

### **1. Documentation of the development progress of the Red Palm Weevil in the sample trunk**

The background of this studies is to find out the level of risk which is coming up from an infested palm which was cut and the trunk parts are collected on collection point without any further treatment.

The transfered palm trunk had a length of 71cm, a cutting surface diameter of 37 cm on the one side and a diameter of 43 cm on the other side. The weight of the trunk was on a arriving date 117 kg.



### *Dimensions of the sample trunk*

The adults Red Palm Weevils left the trunk mostly in significant waves. With waves it means that a great number of weevils left the trunk during 3 days. Up to the 01.02.2004 the number of **251** adult weevils left the trunk and were caught.

The activities inside the trunk is slowly going down now, but up to this fixed day the acoustic signals are still available. This observation part is **still running**.

## **2. Studies on understanding the RPW system**

For better evaluation of the risk which is growing up from the Red Palm Weevil it is very important to understand the system of the Red Palm Weevil. The most important before the fight against an enemy can be started, is to know who the enemy is and which capabilities are available.

In this regard it is important to find the limitations of the weevil. All biotic and abiotic facts need to be taken in consideration. For example the temperature tolerance is such an abiotic fact. Possible biotic facts are any kind of predators. The collection of base data of the RPW system is the most important or should be the first step.

Well, different of this base studies were done in field and in laboratory. Such studies help also to find explanations why some, usual treatment methods, especially regarding the RPW not given the expected results. For example: Pheromone traps are usual used for catching adult beetles or weevils. Farmer watched that it seemed that regions with pheromone traps support the spreading

of the Red Palm Weevil. This was only an impression. The longtime videographic observation showed that the mature of the weevils happen inside the trunk. One female is maturing several times with male weevils. After this the female leave the trunk. And now it becomes to be very interest in comparison to other beetle / weevil species. Such a female RPW has only one task. The task is only to find a new palm for infestation. There isn't the absolute need for finding the other sex for mature. Well, if a male has the possibility to find a female outside the trunk then the male will take the chance for maturing. But this has only the function to reduce the risk of incest and should only expand the gene pool. But it isn't absolute necessary for the survive of the species.

If the use of pheromone traps is seen under this watching results then the lower efficiency of this method is explainable in comparison to the high efficiency of pheromone traps with other species where the survive of a species depend strongly on finding the other sex.

Additional ethology facts could also be documented during this observation. The cannibalism as self regulation factor could be found and that it is possible to deactivate this self regulation by using a not helpful treatment method. The result of this effect is that the spreading of the RPW is speeded up

There exist two different kinds of infestation methods. By the first method the weevil attack the palm over the leaves of the palm. The weevils leave the trunk in the early phase of daylight for finding a new palm. This fact is wellknown and discribed in the literature about the Red Palm Weevil. This can be confirmed by the results of the done light / dark test rows.

Additional to this facts it could be documented that after finding a new palm by the first kind of infestation the weevil crawling down to the base of the leave and hide itself by daylight. In dark phases the female weevils start the drilling of holes and putting the eggs inside this holes.

If the dark phase is broken from a light phase the female weevil stop at once the drill process and try to hide itself.



*Jaw of an adult Red Palm Weevil*

During the anatomic studies the functionality of the tools of the adult weevil was examined. The result is that the functionality of the jaw placed in the end of the snout is completely given. At later stages the use of this tools could be documented during the infestation of the young date palm which was also placed in the quarantine room.



*Opened mouth of an adult RPW*

**From: Benedikt von Laar**  
**BVL von Laar**  
**Gut Klein Goernow**  
**19406 Klein Goenow**  
**Germany**  
**Phone: +49 3847 451145**  
**Fax: +49 3847 451146**

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