

PROTOCOL

Studies on curative treatment of red palm weevil, *Rhynchophorus-Ferruginous* Olivier infested date palms based on an innovative Fumigation technique

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Endowment  
for Control of Red Palm Weevil in Palm Trees

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### Reference Studies

Various control methods, whether chemical, mechanical, physical, agricultural or biological, have been used in attempts to eliminate this pest, but all of these methods have failed to get rid of this pest. The aluminum phosphide compound has been used for decades in several attempts in several countries to combat red palm weevil. However, the method of use may not be correct, and the desired results were not obtained.

At the end of 2017 and early 2018, a number of experiments were conducted by Rasheed Mohammed Al Ballaa and Munira Mohammed Al-Hothaili Endowment fund (May the Mercy of Allah be upon them) in Al-Gassim region in Saudi Arabia, the aim was to develop a low-cost, easy to apply, very effective and CURATIVE method to control the red palm weevil in infested palm trees using aluminum phosphide compound. The protocol for applying the method is as follows:

#### **Required Tools and Materials:**

- 2 Toluene diisocyanate foam (as the one used for bed mattress) of 2 meters long, 25cm wide, 10cm thick, and 40 pressure (can be reused several times and can be any color).



- A black piece of polyethylene sheet of 4 meters length, 2.5 meters width, 150 micron thickness (can be reused multiple times)



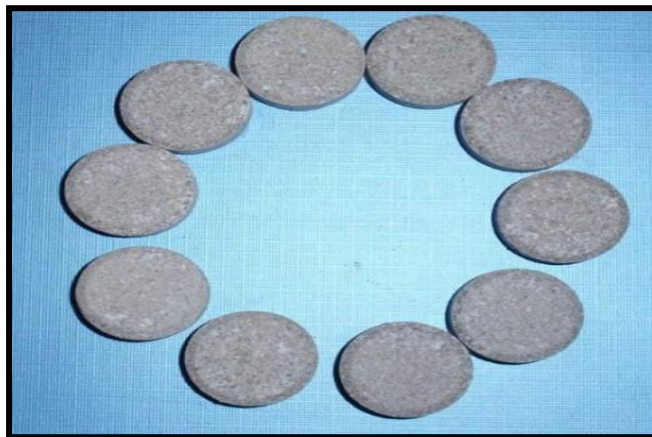
- 2 Tightening belts using mechanical tightening abaratus (can be reused repeatedly).



- Wide adhesive tape.



- Aluminum Phosphide tablets ( 3 g weight and 55-60% active ingredient).



## Method for treating Palm Trees Infested with Red Palm Weevil Using Aluminum Phosphide.

At first, a thorough survey must be carried out to identify the affected trees in the field looking for external signs as holes, sawdust, dark exudate...etc.



The following are steps to treat the infested palm trees with aluminum phosphide, these steps must be applied with high accuracy and according to what is described in this protocol and illustrated in pictures.

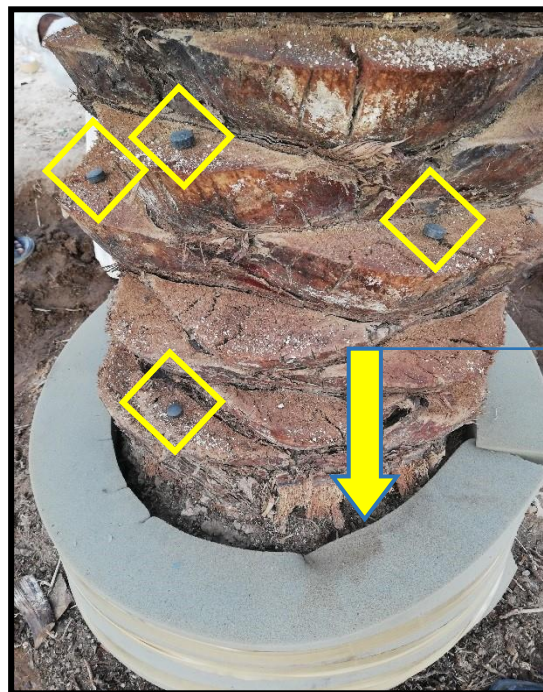
1. Clean the grass around the trunk of the palm.
2. Pruning of the trunk of the palm trunk very short to have maximum 5 cm base using a manual or automatic saw and remove any parts that may puncture the plastic (see the pictures),  
Note: There is no need to clean the places of the infection and remove the insect's stages.



3. Install the two pieces of foam carefully around the trunk of the palm so that the first shall be at a level of about 1.25 meters above entry site and the second at a level about 1.25m below entry site or at the level of the soil surface if the infection site is low, and hold the foam in place using the adhesive tape.



4. Place the aluminum phosphide tablets (10 tablets) or 15 tablets if transparent plastic sheet is used - around the trunk of the palm near the entry site. (The aluminum phosphide compound usually start emitting toxic phosphine gas 1 hour after exposure to air)



A number of disks can be placed in the vacuum between the trunk of the palm and the piece of foam

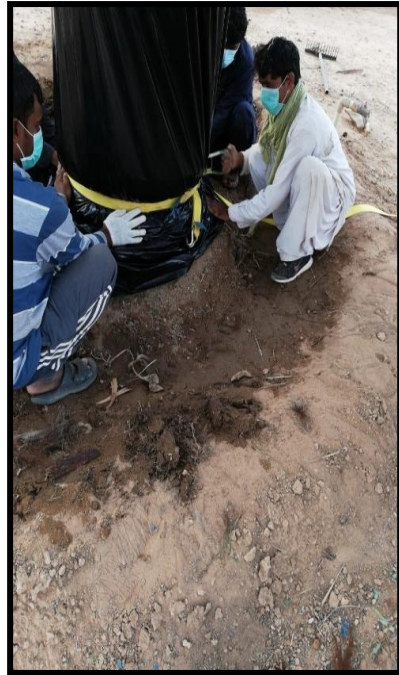
5. The plastic sheet is placed neatly and quickly around the trunk of the palm so that it becomes two continuous layers of plastic around the trunk and is fixed in place using the adhesive tape.



6. The tightening belt should be placed on the plastic sheet on the middle of the width of the foam. The belt should be tightened so that the tightening strength reaches maximum to prevent phosphine gas from escaping out.



7. The tightening belt is also placed around the plastic sheet on the middle of bottom foam and the belt is tightened in the manner described above



8. Soil is placed above the bottom of plastic sheet and the soil is compacted.



9. After 7 days from the date of applying treatment for the palm, the plastic sheet should be removed quietly and carefully after removing the tightening belts from the top and bottom, the plastic sheet and belt can be used again several times provided it is not punctured.

This method can also be used in case of infestation is found on the upper trunk of the tree, and the following picture shows how to apply the method of treatment in such case.



### **Treating of Planted Offshoots (Young palm trees) Infested with red palm weevil**

The above method can be used to treat red palm weevil in Young offshoots using the following steps and modification.

- 1 – Pruning the offshoot short until a flat area appears below the crown. A trench is also dug 30 cm from the trunk of the planted offshoot at a depth of 20 cm.
2. Fix one foam piece carefully around the trunk of the palm just below the crown fix it using a wide adhesive tape.







3. Place 15 tablets of aluminum Phosphide compound on the trunk of the palm.



4. Cut the piece of plastic according to the required measurement, and twice wrapped around the trunk of the offshoot and fix using the adhesive tape, then put the tightening belt on the plastic on the middle of the foam and tighten, to maximum.



5. Bury the bottom of the piece of plastic in the trench with soil and compact it.



6. After 7 days of treatment, the tightening belt and plastic sheet are removed carefully, the plastic sheet can be used again, provided it is not punctured.

It should be noted that the time required to apply the treatment method (putting the foam, the aluminum phosphide compound, covering with plastic, tightening, fixing and closing the plastic) is about 20 minutes, requiring 2 personnel.

## Effects of aluminum phosphide compound on date palm and on product quality

Global experiments have shown that aluminum phosphide compounds leave no residual in dates and have no adverse effect on the quality of dates and does not cause harm to the palm tree.

Aluminum Phosphide is a safe compound if used according to instructions and by trained persons. The following are general safety rules for the use of aluminum phosphide compound:

### General safety rules when using aluminum phosphide compound

#### Storage of aluminum phosphide:

- The storage area of the aluminum phosphide compound should be dry, well ventilated and away from heat.
- The storage place should not be subject to water entry, whether rainfall or any other source of water.
- The storage place must be at least 3 km away from the nearest population or animal breeding area.
- Do not store pesticides with water, food or animal feed stuff in one place. Aluminium Phosphide should not be stored in buildings occupied by humans or animals.
- The necessary warning signs such as the skull logo, the entry ban for non-official workers, and telephone numbers of the company and civil defense should be placed in a clearly visible place.
- Ensure that none of the following materials and devices are in the storage area: electric motors, copper spray heads, batteries, battery chargers, forklifts, temperature control systems, electric switches, copper and copper compounds.
- Ensure availability of fire extinguishers using sand and carbon dioxide or using dry chemicals approved by civil defense to extinguish fire, and DO NOT water.

#### Transport of aluminum phosphide:

- The transport of aluminum phosphide compound shall only be carried out by qualified and trained personnel.
- Do not place the aluminum phosphide compound inside the driver's compartment.
- Do not use any public transport to transport the aluminum phosphide compound.
- Do not carry people or animals with aluminum phosphide compound
- At least two trained and licensed persons shall carry out the treatment process so that if one of them suffer from serious exposure, the second person can assist in rescuing him.
- Open the package outdoors and away from any flame source.
- Do not eat, drink or smoke while handling and using the aluminum phosphide compound.

#### Procedures to be performed before using of Aluminum Phosphide Compound:

- Prepare all supplies and plan well.
- Read the label affixed to the package and follow the instructions carefully.
- Place clear warning signs on the areas of treatment.
- Use protective clothing (see below)
- Ensure that first-aid kits are available.
- Ensure that the nearest population or animal and bird breeding areas are at least 150 meters away.

**Steps to be performed while using aluminum phosphide compound:**

- Be sure to close the package well after the process is completed and place a tape showing that the package is sealed
- Ensure that there is no leakage of gas at the place of treatment.
- Ventilate clothes before washing them.
- Wash your hands thoroughly with soap and water.
- Phosphine gas levels should be monitored in the atmosphere after the treatment process is completed, and there are a number of devices that can be used for this purpose.

Levels of phosphine in the atmosphere after use should be less than 0.03 ppm.

**Protective clothing and equipment when using aluminum phosphide compound**

The person who deals with the Aluminum Phosphide Composite must wear the following clothing to maintain its safety and comply with all safety rules.

**Clothing to wear:**

- Glove: which must be dry and can be made of cotton or other material
- Overall covering the whole body.
- Face mask covering the whole face and to protect the face and respiratory system. NOISH / MSHA can be used if phosphine levels in the air are 0.3-15 ppm, and if they are higher than 15 ppm, the SCBA should be worn.



NOISH / MSHA

**Disposal of Aluminum Phosphide Composite Containers:**

- The empty container should not be reused after use.
- Rinse empty containers with soap and water several times.
- Recycle the containers or bury them after they have been punctured in special places prepared for this purpose.

**First aid when poisoning with phosphine gas:**

- In case of inhalation of phosphine gas you should move into the open air and remove the tight clothes and sit in a comfortable position and the person will recover within one to two hours in case of mild poisoning.
- In case of acute poisoning, ambulance should be called and the affected person should be taken to the nearest hospital. If breathing stops or is irregular, artificial respiration should be done to the affected person as there is no antidote to this pesticide.