

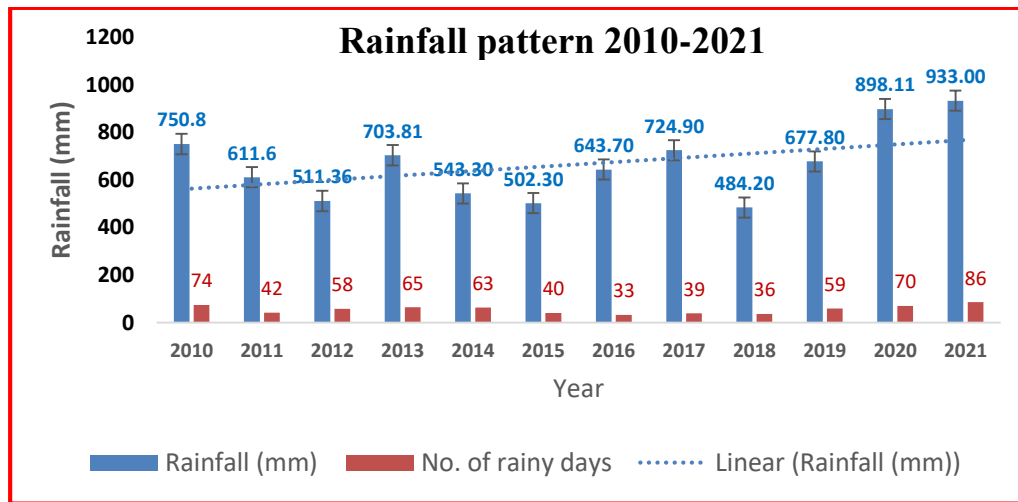


## Advisory on Current Status, Diagnosis and Management of Pomegranate Shot Hole Borer (October-2022)

**Mallikarjun M. H., Manjunatha N., Jyotsana Sharma and Somnath S. P and Marathe R.A.**

Pomegranate is a crop of semi-arid and arid regions, hence performing best during hot dry climates with an average annual rainfall of 300-500mm, and a maximum of 700mm. The total area of pomegranate in India is 2.88 lakh ha, out of which 1.71 lakh ha is in Maharashtra and out of this 0.47 lakh ha is in Solapur.

Solapur (Maharashtra) is known for quality pomegranate cultivation and has a GI tag also. Under changing climate scenario during the last 3 years (2019-20 to 2021-22) the annual rainfall in Solapur was more than 700 mm (Av.500 mm normal) (Fig. 1); further, the rainfall during these years extended from February to November (normal July to September). This was the situation in Dist. Solapur with 11 talukas (Malshiras, Pandharpur, Barshi, Madha, Sangola, Akkalkot, Mohol, Solapur North, Solapur South, Karmala and Mangalveda). This resulted in continuous soil wetness and high atmospheric humidity as a result intercultural and field operations could not be taken or were delayed and effective monitoring of orchards for pests like shot hole borer was not possible. This resulted in insect pests, diseases, weed infestation and severity of the problem. Earlier to 2020-21 shot hole borer (pinhole borer) infestation was not a major problem; due to the above conditions infestation increased considerably. Shot hole borer (SHB) *Euw Wallacea fornicatus* Eichh. is a small beetle that has become a major pest and needs effective monitoring, preventive and timely protection measures to protect the crop from irreversible losses.



**Fig. 1: Rainfall pattern in Solapur during the last 12 years**

## **I. Diagnosis of shot hole borer:**

(a) Dripping fluid from the beetle entrance holes in the young plant below 2 years of age.

(b) Pin holes on the outer surface/inner wood of stems and branches in plants above 2 years old, with yellow colour fine dust around the collar region of the plants.

**II. Symptoms and Nature of damage:** Shot hole borer (SHB) infests the collar (basal) region of the plant stems by making numerous pin or shot holes. Infestations are easily detected by the presence of entry holes made by the attacking beetles and the presence of frass produced during gallery construction. This causes discontinuity in the conducting vessels and disrupts the conduction of water and nutrients to the upper portion of the plant. The drying progresses from the tip towards the base and in severe cases, the entire plant dries. The symbiotic fungus invades the vascular tissue of the plants, causing cambial necrosis; sugar or gum exudes from these holes and dieback of branches is observed, gradually the entire host plant dies (Fig 2 to 5).

**III. Seasonal incidence and life cycle:** The complete life cycle is given in Fig 7. Shot hole borer *Euwallacea fornicatus* will be active throughout the year with higher activity during the monsoon period. The adult emerges after the receipt of the unseasonal rains in May-June. The gravid female beetles attack plants under stress, freshly dead or dying plants and also colonize healthy trees and cause damage through mass accumulation. Adult females will usually disperse during the day and females tend to colonize stems, and branches, resulting in localized branch dieback. In pomegranates, the initial infestation is characterized by white dripping fluid from the beetle entrance holes in the young plant below 2 years age (Fig. 2). In plants above 2 years old fine yellow colour specks of dust are visible around the collar region of the plants (Fig. 3).

Females will typically make a divided or simple gallery encircling the stem, with a few longitudinal tunnels in small branches. Eggs are laid in small clusters after the entrance tunnel has been completed. The grubs, with typically three instars, feed entirely on symbiotic ambrosia fungi which is cultivated in longitudinal galleries of twigs. Pupation takes place inside the same communal gallery. Newly emerged females stay in the galleries for several days. Once mating occurs, females leave the gallery through the original entrance hole. Beetles feed on the fungus cultivated within the xylem of woody hosts.

The single life cycle of the beetle will be completed in 35-45 days. Depending on the local climatic conditions and the host plant's suitability, beetles have overlapping generations and the haplodiploidy method of reproduction.

Beetles have a specialized pocket-like structure called mycangia where they transport (Vector) fungi to newly colonized trees. The fungi are obligate symbionts of the beetles and serve as their source of nutrition. The symbiotic fungus invades the tree's vascular tissue (Fig. 6) causing cambial necrosis, sugar or gum exudates, branch dieback, and mortality of the host plant. Hence, shot hole borer management is very essential for the effective management of pomegranate wilt.

**IV. Alternate hosts:** Castor, tea, coffee, avocado, guava, teak, etc. serve as alternate hosts for this shot hole borer and hence should be avoided in and around the plot.



**Fig. 2. Symptoms of damage (gummosis) plants below 2 years of age**



**Fig. 3. Shot hole borer damage symptoms on plants above 2 years of age**





**Fig. 4. Initial and progressive yellowing of plants**

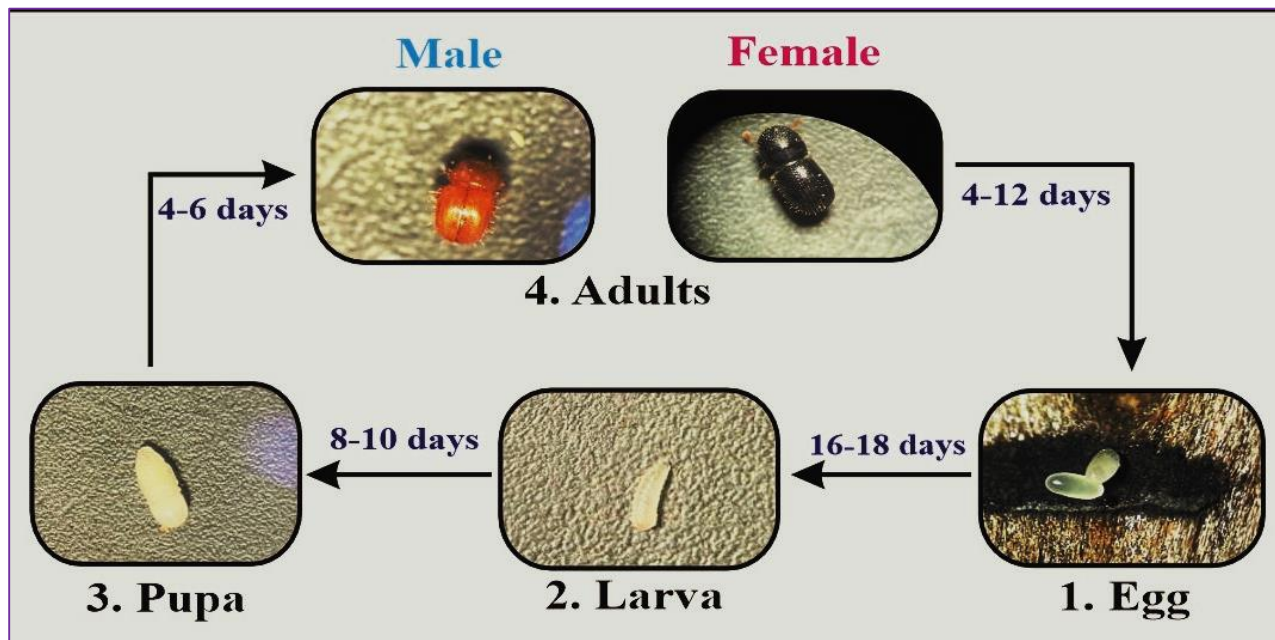


**Fig. 5. Partial and complete wilting of plants**



**Fig. 6. Galleries of shot hole borer and colonization of associated fungi**





**Fig. 7. Life cycle of shot hole borer *Euwallacea fornicatus* Eichh.**

## V. Management:

### A. Preventive measures:

#### I. Cultural and Orchard Sanitation:

1. Follow proper horticultural practices and give balanced nutrition to plants right from planting.
2. Keep fields weed-free to reduce nutrient competition
3. Avoid waterlogging and detect early infestation by periodical monitoring for any signs or symptoms, especially after rains.
4. Infested branches should be pruned and destroyed by burning to prevent the further spread of these beetles.
5. Heavily infested trees need to be uprooted and destroyed by burning.
6. Never bury the uprooted plants/plant parts in the soil fungi associated with shot hole borer will survive in plant parts/soil for several years through dormant spores.
7. Remove alternate host crops from the vicinity of pomegranate orchards to check beetle populations.
8. Avoid the movement and piling of uprooted wood/dead plants within or near orchards as beetles breed on it and attack nearby pomegranate orchards as well as serve source for the survival of wilt pathogens.

## II. Mechanical:

1. Install the solar electronic light trap @ 1trap/ha (auto switch on and off with short-circuit) after receipt of the first unseasonal rain in May-June. Keep the sticky trap/card below the light and replace it as and when fully covered.

## III. Chemical:

**1. Stem pasting:** Apply the paste on the stem and branches twice a year one after the receipt of the first rain and the second after the harvest. From the 2<sup>nd</sup> year onwards pasting should be done before and after taking the crop and it needs to be applied up to 2 ft., from the base on the free area of the stem and branches (Fig 8).

Red Paste Preparation		
In 10 litres of water mix		Alternatively, can mix * chemicals in 10% Bordeaux paste and apply.
Red Soil	4kg	
*Emamectin Benzoate 5% SG 20g	20g	
*Copper Oxychloride (COC) 50WP 25g	25g	



**Fig. 8. Red soil and Bordeaux-based pasting on pomegranate stem and branches**

**2. Stem spray:** Spray on the free area of the stem and branches with Emamectin benzoate 5% SG @ 1g/l and followed by Azadirachtin 10000ppm @ 3ml/litre may be taken alternatively at 15-20 days intervals.

### A. Curative Measures:

**(a) Drenching:** Depending on plant age and growth use 5-10 litre solution per tree (Fig. 9).

(i) **First drenching** with Emamectin benzoate 5% SG + Propiconazole 25% EC (2g/L+ 2ml/L water)

(ii) **Second, drenching** 15-20 days after the first with Emamectin benzoate 5% SG + Carbendazim 50% WP (2g+1g/l) or Imidacloprid 17.8 % SL + Carbendazim 50% WP (2ml+2g/l) in a circular fashion.

(iii) **Third drenching** can be taken with chemicals of first drenching at 15-20 days after the second treatment based on the prevalence of the pest/severity of the problem.



**Fig. 9. Proper method of drenching in pomegranate**

**(b) Stem spray:** Spray on free parts of the stem and branches with Thiamethoxam 25% WG @ 1- 2 ml /l with 0.5 ml spreader sticker/l water, followed by Azadirachtin 10000ppm @ 3 ml/litre + 0.5 ml spreader sticker/L water.

**Note:**

1. Irrigate the plants well one day before treatment after chemical drenching irrigation should be stopped for 3-5 days and avoid the drenching during rainy days. If rain occurs on the same or the next day of the treatment, then repeat the treatment.
2. Second /third drenching may be taken based on the severity of the problem.
3. The sequence of treatment should be (Drenching followed by Stem spray followed by Stem pasting. The process needs to be completed in 1-2 days).