



First record of insect pest complex of willow tree plantations used for bat manufacturing in Kashmir Himalayas

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Willows also called sallow's and osiers, from the genus *Salix*, are around 400 species of deciduous trees and shrubs, found primarily on moist soils in cold and temperate regions of the Hemisphere. Most species are known as willow, but some narrow-leaved shrub species are called osier, and some broader-leaved species are referred to as sallow (from Old English *sealh*, related to the Latin word *salix*, willow). Some willows (particularly arctic and alpine species) are low-growing or creeping shrubs; for example, the dwarf willow (*Salix herbacea*) rarely exceeds 6 cm (2+¹D₂ in) in height, though it spreads widely across the ground.

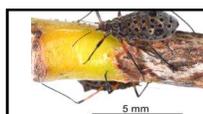
The willow has many uses in Kashmir. It is generally used in Cricket bat industry and the low grade willows are used in hut making and firewood. It is attacked by many insect pests and the details of the insect pests has been summarised below first time.

Giant willow aphid (*Tuberolachnus salignus*):

- Indian Gypsy Moth (*Lymantria obfuscate*)
- Sallow leaf-vein aphid (*Chaitophorus salicti*)
- Willow borer (*Cryptorhynchus lapathi*)

Giant willow aphid (*Tuberolachnus salignus*):

Phylum	:	Arthropoda
Class	:	Insecta
Order	:	Hemiptera
Family	:	Aphididae



Scientific Name: *Tuberolachnus (Tuberolachnus) salignus* (Gmelin, 1790).

Life cycle: This aphid is believed to overwinter as winged females. Trees are colonised in late winter or early spring, as early as August or even late July in Auckland where colonies of wingless aphids were found in early September. In mid-October winged aphids were found in colonies. Winged aphids disperse to other trees. There are several overlapping generations per year with high numbers being found in late summer and early autumn. In the autumn many winged aphids are produced. Female only populations are exhibit pathogeneses. The adult females are either winged and wingless. Adult giant willow aphids are one

of the largest aphids in the world, their body is 5.0-5.8 mm long. Wingless adults (Apterae) are mid to dark brown and have several rows of black patches. Their body is covered with fine hairs that gives the abdomen a greyish-golden sheen. On the centre of their back is a large dark brown 'thorn' or tubercle. Near the back of the abdomen are a pair of large low cones (siphunculi) that excrete honeydew. The winged adults (Alates) have two pairs of clear wings that are held above their body. The forewing has a dark brown front edge. They have three pairs of legs that are partly reddish, and a pair of antennae that are less than half the length of the body. The underside of the head has a short rostrum that holds the stylets used for feeding. Mature females give birth to live young, nymphs, that look like the wingless adults. An adult female may give birth to about 35 nymphs, but this can be up to 71 offspring. There are four nymphal instars (stages). The growing nymph goes to the next instar by moulting, changing its skin. The dorsal (top) side of the skin splits and the next stage pulls itself out. The fourth instar moults into the adult. Fourth instar nymphs that will become winged adults, have wing buds. In one study (Collins and Leather, 2001) the aphid requires about 196 degree days above 5.5°C to complete nymphal development. Winged females produced fewer nymphs than wingless females. Most young were produced at 20°C. Other research has shown that at temperatures above 25°C survival is very poor, though there is inconsistency between some of the research.

Aphid behaviour : When a colony of aphids is disturbed or they perceive danger such as waving a hand near them, the aphids lift and wave their hind legs.

While the aphids are seen in colonies of adults and nymphs, some wingless adults wander off and may found new colonies. In the warmer summer weather colonies of the aphid seem to be continually on the move.

Feeding and honeydew: Like other Hemiptera, the giant willow aphid has sucking mouth parts. The long stylets, special shaped rods, are held in the rostrum. When it

wishes to feed the aphid moves the tip of the rostrum to the surface of a branch or shoot. The stylets are then gradually pushed into the plant. The inner pair of stylets, form two tubes, one through which saliva is injected into the plant and a second through which plants juices are sucked up into the insect. The giant willow aphid inserts its stylets into the phloem, the plant vessels for transmitting sap from the leaves to other parts of the plant. The sap has a high volume of water and sugars, more than the insect needs. It excretes the excess water and sugar, which is called honeydew. Black fungi (sooty moulds) grow on the honeydew.

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Indian Gypsy Moth (*Lymantria Obfuscata*) :

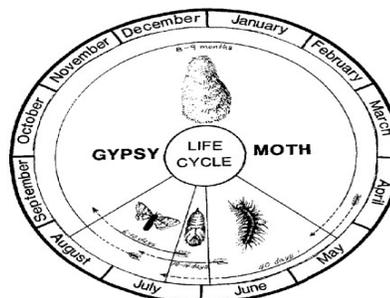
- Kingdom : Animalia
- Phylum : Arthropoda
- Class : Insecta
- Order : Lepidoptera
- Family : Noctuidae
- Genus : Lymantria
- Species : Obfuscata

Biology and life cycle : Gypsy moth undergoes four developmental life stages; these are the egg, larva (caterpillar), pupa, and adult. Gypsy moth females lay between 500 to 1,000 eggs in sheltered areas such as underneath the bark of trees. The eggs are covered with

a dense mass of tan or buff-colored hairs. The egg mass is approximately 1.5 inches long and 0.75 inches wide. The eggs are the overwintering stage of the insect. Eggs are attached to trees, houses, or any outdoor objects. The eggs hatch in spring (April) into caterpillars. In early summer (June to early July), Gypsy moth caterpillars enter a pupal or transitional stage. The pupae are dark brown, shell-like cases approximately two inches long and covered with hairs. They are primarily located in sheltered areas such as tree bark crevices or leaf litter. Adult Gypsy moths emerge from the pupae in 10 to 14 days. They are present from July into August. Females have white to cream-coloured wings, a tan body, and a two-inch wingspan. Female Gypsy moths cannot fly. Males, which are smaller than females, with a 1.5-inch wingspan, are dark-brown and have feathery antennae. Both the adult female and male can be identified by the inverted V-shape that points to a dot on the wings. Gypsy moth has only one generation per year. Gypsy moth populations will go through cycles in which the populations will increase for several years then decline, and then increase again. Area-wide outbreaks can occur for upto ten years, but generally population densities in localized areas remain high for two to three years.



Damage : The larva or caterpillar is the damaging stage as it eats the leaves of trees in the spring. They can consume tremendous amounts of leaf material. For example, Gypsy moth larvae can consume as much as one square foot of leaves per day. As a result, they produce a large amount of fecal (frass) material. When populations reach outbreak proportions, the caterpillars can completely defoliate host trees over a wide geographic area.



Aphids : The life cycle of aphids is a rather complicated process because they have two different methods of reproduction depending on climate, and develop two types of physiological features depending on circumstances. Wingless female aphids known as stem mothers have the ability to reproduce without fertilization, a process called parthenogenesis. This process is used for reproduction throughout the summer. These stem mothers give birth to female young called nymphs.

Damage: Direct damage. The removal of phloem sap for food weakens the plant and causes a metabolic imbalance, twisting of the...

Indirect damage. The honeydew secreted by the aphids is an ideal culture medium for various fungi,



Willow Borer (*Cryptorhynchus lapathi*):

Damage, symptoms and biology : These wood boring insects often go unnoticed in the trees they are attacking until severe damage has resulted. When attacked by one or more of these borer species, trees are usually weakened structurally and are susceptible to wind and snow breakage, especially if they are repeatedly attacked. Severe attack can place trees under stress, making them more susceptible to other damage agents such as drought and disease. If a tree is suspected of being attacked by a wood boring insect, careful examination will reveal small entry holes in the bark (often in and around old wounds) where the larvae of the developing moths or beetles extrude frass or debris. In many cases, small amounts of sap bleed from these entry holes. When a tree is severely attacked, large amounts of frass will accumulate at the base of the tree. Splitting the branches or stem of an attacked tree will reveal wood that is riddled with feeding tunnels.

The poplar-and-willow borer requires 2 years to complete its life cycle in the Prairie Provinces, and the adult borer is capable of surviving a third winter. Larvae pupate within wood chip-filled chambers of attacked shoots. Both male and female adults are rough-surfaced, snout-nosed beetles, about 8- to 10-mm long. They are mostly black except for the hind third of their hardened wings (elytra), which are initially gray-pink but turn light brown. These borers have functional wings but rarely fly. Adults feed on many young succulent shoots before mating. Oviposition takes place in the summer when females make small punctures in the shoots and deposit a single egg (sometimes as many as three) in each puncture. Once the eggs have hatched, the larvae feed at first by mining the bark and then later move into the wood. Larvae are creamy-white, C-shaped grubs and have a full-grown length of 13 mm.



Conclusion : The above mentioned pests mostly remain below Economic Threshold level (ETL) but occasionally their incidence make them serious.

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