

SOME IMPORTANT BARK BEETLES OF *PINUS WALLICHIANA* IN PAKISTAN

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ABSTRACT

Blue pine die-back is a very serious disease and apparently healthy looking trees collapse within few days. Four bark beetles species viz. *Pityogenes scitus* B., *Ips longifolia* Stebb., *Scolytus major* Stebb. and *Polygraphus major* Stebb. were present in blue pine tree infected with die-back disease. However, it was observed that the bark beetle, *Pityogenes scitus* B was most frequently found in infected trees while *Ips longifolia* Stebb., *Scolytus major* Stebb. and *Polygraphus major* Stebb. were less in number. All the species were found to attack on weakened and severely stressed, wind blown or wind broken trees or logs. Attacked is followed by rust causing fungus on the dead and dying trees. All the bark beetles species made the holes of various sizes in twigs, branches and tree trunk and made galleries of different shapes and sizes beneath the bark which made longitudinal tunnels in affected part.

INTRODUCTION

Blue pine (*Pinus wallichiana*) is one of the most important coniferous trees of Pakistan. It has an extensive range of distribution in Pakistan. *P. wallichiana* grows all along the Himalayas in an almost continuous range, extending to eastern Afghanistan, northeastern part of Pakistan, northern Burma and Yunnan in China (Critchfield and Little, 1966). In Pakistan, a geographic distribution more or less continuous distribution occur in the northwestern part within about 33° 33' N. to 36° 45' N. latitude and 70° 0' E. to 75° 30' E. longitude, covering Murree, Hazara, Swat, Dir, Chitral, Skardu, Gilgit and southern part of Azad Kashmir. Altitudinal range of blue pine is from an elevation of 5000 feet to

10, 000 feet (Ahsan and Khan, 1969). Moderately hard, pink heartwood of good quality and easy workability render it a multipurpose species. In Pakistan it is mainly used in building construction, furniture manufacture, general carpentry and railroad ties. It also yields an oleoresin of a better quality than that of *Pinus roxburgii* the other important pine of this region. Unfortunately *P. wallichiana* has been attacked by a number of insect pests and diseases.

Blue pine die-back is a very serious disease and the infected trees start dying from top to downward and collapse within few days. Bark beetles are found to be responsible for this disease. Bark beetles (Coleoptera: Scolytidae) also known as scolytids, are among the most economically important pests of the world forests. Although bark beetles are generally considered as harmful, only a small portion of the approximately 5800 known species are considered as aggressive insect that can attack and kill living trees (Kirisits *et al*, 2002). The majority of the bark beetles species infests weakened and severely stressed, wind blown or wind broken trees or logs. Worldwide attacks of bark beetles on pines have been recorded. During 2000-2001, severe southern pine beetles (Scolytidae) outbreak have occurred throughout much of central America killing over 60,000 hectares of mature and developing pine stands in Belize, Nicaragua and Honduras alone (Billings and Schmidtke, 2002). In Europe, the spruce bark beetle

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Ips typographus is the most destructive pest of Norway spruce. Out break of this insect are well documented in central and northern Europe (Engesser *et al.*, 2002; SchrÖter, 2002). During the year 2000 Scolytid beetles severely damaged huge number of blue pine trees in the forests of Gallies and Murree in Pakistan and adjoining areas of the Azad State of Jammu and Kashmir and causes die-back (Gul and Khan, 2001). Records of decline and death of spruce and blue pine in western and central Bhutan have been made since about 1981 and widespread mortality started in 1984 (Schmutzenhofer, 1988; Tshering and Chhetri, 2000). Losses caused by these insects are not confined to feeding activities alone but also intensified by disseminating disease pathogens. These bark beetles are frequently associated with specific fungi that are carried in specialized structures on their body. Both the fungi and the bark beetles have acquired mutualistic relationship (Paine *et al.*, 1997).

Keeping in view the economic importance of bark beetles, it is order of the day to expose those bark beetles responsible for die-back disease in Blue pine (*Pinus wallichiana*) of Pakistan.

MATERIALS AND METHODS

Study area

The study area was Murree Forest Division located in Tehsil Murree of Punjab Province, Pakistan. Murree Forest Division consists of four (4) sub-divisions i.e. Ghoragali sub-division, Lower Topa sub-division, Sehrbagla sub-division and Municipal Forests sub-division. In the Murree Hills the total forest area is about 47,000 acres in which the pine area is about 31,100 acres.

Collection and identification of bark beetles

The bark beetles were collected from infested blue pine trees. The incidence of bark beetles attack was recorded simply by observing small holes on twigs, branches and dried top shoot. The infested parts were cut into small pieces and beetles were collected by manually peeling the bark. The collected specimens were preserved in 80 percent solution of absolute Ethanol for later identification. Identification of beetles specimens up to species level was done with the help of insect collection present in Insect Museum of Pakistan Forest Institute, Peshawar. We also discussed some distinguishing characters of the beetles species with insect taxonomist (acknowledgements).

RESULTS AND DISCUSSIONS

A total of 2300 Kail trees were observed from four sub-divisions of Murree Forest Divisions. Out of these, 180 trees were found infested with bark beetle attack. Following bark beetles species were found from infested part of blue pine. The details of bark beetles are as under:

1) *Pityogenes scitus* Blandford

The beetles were raddish brown to black and 1.7 mm to 2.0 mm long. The forehead in female has three strong foveae with a central space raised, smooth and dull.

Elytra testaceous yellow, the rows of punctures not so distinct, the apical depression three-toothed. In the male the forehead is convex, rugulose-punctate, the elytra are testaceous, strongly infuscate along lateral margin and for the whole of the apical declivity they are slightly narrow and flatter, the apical depression is shorter and more vertical, and the teeth are close to each other and anterior pair point directly backward instead of obliquely upwards and their base is longer (Stebbing, 1914). *P. scitus* can bore into the thin green bark or living branchlets and stems of young and old trees. The beetle is able to resist moderate exudation of resin and to carry its tunnel through bark in which resin is abundant and fluid. The gallery pattern is polygamous, a pairing chamber about 3 mm wide, from which upto mother- galleries radiate to all sides. Normal breeding-material is small branch and stem-wood of young saplings and seedlings.

2) *Ips longifolia* Stebb.

Ips longifolia Stebb. are present more frequently and large in numbers than *Polygraphus major* Stebb. and *Scolytus major* Stebb. This insect species is distributed throughout chir pine forests of North West Himalaya on *Pinus wallichiana* and *Pinus roxburgii*. The larva is whitish-yellow, curved, corrugated and legless. Head well developed, first prothoracic segment with a dorsal horny plate to it. Size is 6 mm long. Adult is chestnut brown to almost black, with long brown hairs scattered over thorax and elytra; elytral declivity excavate, its side thickened and toothed, 4-5 teeth, 1st small and sharp, 2nd and 3rd close together usually the largest and knobbed, 4th smaller. Adult size is ranging from 4-5.5 mm long (Chaudhry, 1994). This beetle normally breeds in dead and felled trees and is not a regular primary pest of large standing trees. Usually the outbreaks originate from the felling areas where the insect multiplies on felled material and finding no more suitable food is forced to attack the healthy living trees in regeneration areas.

Duration of a life cycle varies according to the climate and elevation. In warmest localities at altitude of 750 meters there are four (4) generation of the pest in a year. The wintering over generation starting from oviposition in October-November matures in March April. The other generations give rise to adults in the end of May, end of July and end of September. At the highest elevations there is only one full or two overlapping generations (Beeson, 1941).

3) *Scolytus major* Stebb.

It is typical bark beetle and most dangerous pest of deodar stands. The grub is curved, white, 5 to 8mm long, head-end broader, tapering towards abdomen. The adult is shining black; front of head impressed over mouth with tubercles in the middle of forehead; prothorax constricted and impressed on anterior lateral margin, elytra red-brown or black impressed medially at base, abdomen with anterior margin of first segment prominent, size is 4.25 to 4.5 mm long (Chaudhry, 1994).

S. major can breed in tree-trunks of large dimensions, poles, small branches and twigs. It usually confines its attack to sickly trees and trees broken by snow or other causes in which vitality has been reduced and upward flow of sap decreased. The attack is not primary but it may hasten the death of the tree. Primary attacks by *S. major* can

take place when excessive multiplication has occurred in felling; the advance growth and young pole woods are particularly susceptible (Beeson, 1941). During the year 2000, *S. major* along with *Ips longifolia* Stebb. severely damaged huge number of blue pine trees in the forests of Gallies and Murree in Pakistan and adjoining areas of the Azad State of Jammu and Kashmir (Gul and Khan, 2001).

4) *Polygraphus major* Stebb.

This insect is primarily pest of *Cedrus deodara*, *Pinus wallichiana*, *Picea morinda*, ascending to 2740 meters in the Himalayas. The beetle, 2.8-3.8mm, has a covering of fine dusty scales; the front of female head is flattened and concealed by long dense yellow hairs (Beeson, 1941). The life cycle takes 7-10 weeks and allows a sequence of 4 generations a year. *P. major* breeds chiefly in small branches and stems, the bark of which is thin and unsuberised, it does not occur in large poles and trunks with thickened bark. At the time of attack the bark is usually quite green and full of resin and though resin may trickle from cracks in the bark and solidify in a ring round the entrance-hole, the interior of the gallery is not contaminate. This *Polygraphus* is able to establish its mother-galleries in young healthy living trees by localized mass-attacks; there must be a damaged or un-resistant plant present to attract the swarms of beetles in the first instance and to focus the mass attacks on closely adjacent plants (Beeson, 1941).



Fig 1. Adult of *Pityogenes scitus*



Fig 2. Adult of *Ips longifolia*



Fig 3. Adult of *Scolytus major*



Fig 4. Adult of *Polygraphus major*

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