

## A NOTE ON THE DIE-BACK OF BLUE PINE (*PINUS WALLICHIANA*) DUE TO BEETLE ATTACK

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### Summary

Blue pine (*Pinus wallichiana*) is an important conifer in Pakistan. During the month of May, 2001 natural die-back of this specie was reported by the forest authorities from Gallies, Murree Hills and Azad State of Jammu & Kashmir areas. To investigate the reason for this die-back of blue pine, a survey was conducted in the affected localities. The results of this survey revealed that the twigs and bark of dead and dying trees were infested by the bark borer beetles i.e. *Ips longifolia* and *Scolytus major* belonging to the family Scolytidae, order Coleoptera. The main reason for the spread of these insect pests is due to stress caused by extremely dry conditions during winters of year 2000 and preceding springs.

The beetle population developed on the weak trees under moisture stress growing on warmer aspects and ridges with stony soil. The stressed trees had very little sap which made them prone to the attack of above beetles. The grubs of these beetles constructed concealed and irregular galleries in the twigs and branches, causing damage to conducting tissue by complete strangulation. Since the insect damage was mainly due to stress caused by drought and was also below the economic limit, therefore no conventional control measure were feasible, rather than to wait for improvement in the moisture conditions in coming monsoons and winters. Moisture availability in this way will reduce the stress and reset the health and vigor of the trees, thereby naturally eliminating the insect pests.

### Introduction

Blue pine (*Pinus willichiana*) is very important commercially because of its timber that stands next to deodar in use and value. It grows naturally in pure and mixed with other conifers through out the temperate regions of Pakistan. The natural die-back of this specie was noticed by the forest authorities of Gallies and Murree Forest Divisions and adjoining territories of Azad State of Jammu and Kashmir. As a result they made a reference to the Pakistan Forest Institute, Peshawar directly as well as through the Ministry of Environment, Local Government and Rural Development, Islamabad to undertake an

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investigation on the causes of this die-back and also to suggest necessary control measures. Pakistan Forest Institute (PFI) showed an immediate response and the Forest Entomologist and Forest Pathologist of PFI, visited the affected areas and conducted a thorough study and survey to identify the pathogen causing this problem, intensity of damage to the blue pine trees and to suggest necessary control measures.

## The Area

The forests of Gallies and Murree Forest Divisions and adjoining areas of the Azad State of Jammu and Kashmir are the moist temperate forest types dominated by a rich growth of conifers and scattered broad leaves. Blue pine is one of the important conifers growing in these areas. The main sources of moisture in these forests are heavy snow in winters and spring and monsoon rains. The topography of these forests is very rugged and steep. Normally the moisture availability throughout the year is very good. However, occasional outbreaks of pest epidemics have been reported mostly when the forest trees are under stress due to one reason or the other.

## Field Survey

The study team conducted detailed surveys of the infected areas in all the localities. Information and data were recorded from primary and secondary data sources like locality, compartment number, intensity of insect infestation and number of affected trees (The data so recorded are given in Appendix from Table 1 to 5). The findings of this survey are reported as under:

## Findings

The main reason for the die-back of blue pine trees was the physiological stress caused by continued drought of about a year in all the localities. This made the trees weak with very low contents of sap in the living bark. The stressed and weak trees invited the attack of beetles like *Ips longifolia* and *Scolytus major* belonging to family Scolytidae, order Coleoptera. The adults and grubs of these beetles make concealed galleries under the bark causing complete strangulation and death of the infected trees. The attack of these beetles was more pronounced on the trees growing on warmer aspects and ridges with stony soils which further confirmed that this problem was surely under water stress conditions. During these investigations a rust causing fungus was also noticed on the dead and dying trees. However, the attack of this rust fungus was very mild so as to have any serious impact on the health of trees.



## Life history

The emergence holes of beetles on the infected blue pine trees were traced and grubs of the beetles from these holes were recovered. Different stages of the insects i.e. larvae, pupae and adult beetles were found on the twigs of the infested trees.

The gallery system of these beetles comprised oblique entrance tunnel starting concealed under the bark, leading to the lower end of a single axial mother gallery, which is strongly sinuous over 2-3 inches of length and is deep about 1/3rd an inch in the sapwood. About 50-80 eggs are laid in marginal egg niches. The larval galleries run contiguously at first but are more sinuous in their later parts and in pupal cell pitted in the wood. The whole gallery pattern is clearly impressed on the sap wood surface as well as on the inner surface of the bark. There are 4 generations in a year and the shortest life cycle is of about 2½ months.

The pest *Scolytus major* can breed in tree trunks of large dimensions, small branches and twigs. In branches or twigs the mother gallery is a short spiral or a ring which almost severs the twig. It normally breeds on killed or fallen trees and readily attacks, sickly or injured standing trees, but when it establishes itself in the latter, the insect population depends on the individual tree resistance and the abundance of attacking swarm.

Since the dry weather conditions were conducive for the insect population and there was no natural predation through parasitoids, birds or other predators due to concealed feeding, therefore, the pest multiplied in geometrical progression and attained a pest status.

## Control measures

Keeping in view the situation of blue pine forests, difficult terrain and extent of spread of beetles the application of chemical control is not economically feasible at this stage and is also not environment friendly.

Biological control is time consuming and needs a lot of care the exotic parasites and predators species may cause new insect pest problems, if they did not accept the target insect pest. In case of borers, being concealed feeder, this control measures by predators and parasite is more difficult to manage.



However, the forest administration in the pest affected areas, right from the top executive to the lowest tier, were briefed about the insect damage pattern and their control measures in their respective forests during the field work.

### **Recommendations**

- Pruning and burning of the infested branches and twigs.
- Pruning should be carried with sharp implements and also the cut surfaces should be treated with coal tar or wax etc.

### **Acknowledgement**

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## APPENDIX

Table 1. Degree of infestation in Murree Cantonment Forest Area

S. No.	Locality	Comptt No.	Needles drying up intensity
1.	Kuldana Khanitaq	1	Sporadic infestation with 30-50 trees in each compartment
		2	
		3	
		4	
		6	
		9	Infestation was found on 150 trees 30-50 trees per compartment
2.	Kuldana Khanitaq	9	
3.	Kuldana Sandian	22	
		6	
		7	
		8	Sporadic and mild drying up of needles
		9	
4.	Barian	18	
		19	
5.	Upper Topa	11	
		10	
		15	
		17	

Table 2. Patriata block (Lower Topa Sub-division)

Compartment number		
27 RF	28 RF	32 RF
33 RF	34 RF	35 RF
22 RF	36 RF	36 RF



In the above compartments the affected trees were in the range of 20-300 per compartment.

41/RF 250 trees were found affected

**Table 3**            **Municipal Forest, Murree Forest Division**

Compartment number			
16 RF	17 RF	18 RF	19 RF
11 MF	12 MF	11 RF	12 RF
1 MF	2 MF	3 MF	20 MF
21 MF	22 MF	23 MF	24 MF
7 RF	8 RF	9 RF	

In these compartments the infested trees were in the range of 15-200 in each compartment.

**Table 4.**            **Galies Forest Division**

S.No.	Name of Range	Name of Forests Compartments
1	Donga Gali Range	Tajwal 1(iii)(iv) 2,3 Bangan 9(i)(ii)2 Seer RF 4(ii) Darwaza RF-2 Kao 1(i)(ii)(iii)(iv) Kao 2(iii)(iv) Kao 3(i)(ii)(iii) Kao 4(i)(ii) Bagan 8(i)(ii)(iii) Cantt. Ayubia Guzara Darwaza
2	Bagnotar Range	Bagnotar 1(i)(ii)2(i)(ii)(iii) Nagri RF 1,2(i)(ii) Namli Maira 1(i)(ii) Bara Gali Cantt.

In these compartment the trees in the range of 10-60 were found infested per compartment.



**Table 5      Azad Jammu and Kashmir**

S. No.	Locality	Compartment No.	No. of affected trees
<b>1.</b>	<b>Lower Haveli Hajira</b>		
	Rawalakot	8	50
	Bisari	8	35
	Bisari	9	40
	Bisari	10	35
	Bisari	11	50
	Haveli	12	40
	Haveli	13	45
<b>2.</b>	<b>Rawalakot</b>		
	Rawalakot	9	30
	Rawalakot	10	25
	Rawalakot	12	40
	Rawalakot	14	45
	Rawalakot	19	15
	Rawalakot	20	10
	Rawalakot	21	12
	Rawalakot	23	10
	Rawalakot	24	60
	Rawalakot	25	110
	Rawalakot	28	45
	Rawalakot	30	15
	Singola	1	10
	Singola	2	20
	Singola	3	25
	Pachhiot	26	10
	Pachhiot	28	8
	Pachhiot	29	10
	Pachhiot	30	50
<b>3.</b>	<b>Pallandri</b>		
	Pallandri	27	15
	Pallandri	28	5
	Pallandri	31	70
	Bisari	2	15
	Bisari	3	30
	Kahala	22	10
	Kahala	26	20
<b>4.</b>	<b>Private Forest Jandali</b>		
	Singola	13	10
	Singola	14	30



	Singola	15	20
	Nar	3	15
	Nar	4	20
	Nar	5	25
	Nar	6	30
	Nar	7	10
	Nar	8	15
	Nar	9	10
	Nar	23	30
	Bagh	4	15
	Bagh	6	12
	Bagh	7	10
	Bagh	8	15
	Bagh	9	15
	Bagh	17	10
	Bagh	19	5
	Bagh	20	6
	Bagh*	23	5
	Bagh	24	10
	Bagh	25	15
	Thub	8	15
	Thub	9	10
	Thub	15	14
6.	<b>Dhirkot Range</b>	<b>28</b>	<b>20</b>
	Mallot	35	8
	Dhirkot*	1	10
	Dhirkot	17	20
	Dhirkot	18	15
	Dhirkot	19	10
	Dhirkot	20	8
7	<b>Haveli Range Kahuta</b>		
	Haveli	21	50
	Haveli	22	50
	Haveli	23	60
	Haveli	30	50
	Haveli	31	60

\* = Observations were recorded at Bagh and Dhirkot during the visit. The data on other localities were provided by the DFO (Research), Muzaffarabad.