

## TREE DIEBACK INCIDENCE IN NATHIAGALI AND SURROUNDING HILLS

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### ABSTRACT

Surveys of Nathiagali, Dongagali, Ayubia and Mukshpuri, conducted during July-August 2005, revealed the presence of tree dieback at these hill stations. The two most commonly occurring gymnospermic plant species viz., *Abies pindrow* Roxb. and *Pinus wallichiana* A. B. Jackson exhibited 5 and 2% dieback, respectively. The less frequently occurring species *Taxus baccata* Linn showed only 1% dieback while *Cedrus deodara* (Roxb.) Loud and rarely occurring species *Picea smithiana* (Wall.) Boiss did not show any signs of dieback. Among the broad-leaved angiospermic plant species, *Populus ciliata* Boenm, *Quercus incana* W. Bartram and *Aesculus indica* Colehr. showed the highest dieback incidence of 4% each followed by *Ulmus wallichiana* Planch. (2%) and *Acer pictum* Thunb. ex Murray (2%). Root infecting fungi, frost winds, aging and human activities could be the possible causes of dieback in these hill stations.

**Key-words:** Dieback, fungal disease, Nathiagali, Northern areas, Pakistan

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### INTRODUCTION

Nathiagali, clad in pine, walnut and oak maple trees, is one of the most picturesque hill stations in the Pakistan. It is situated in district Abbotabad, about 33 km away from Murree, at an altitude of 2501m from sea level. Dongagali is 3 km from Nathiagali on the road to Murree at an elevation of 2460 m. It is picturesquely situated on the slopes of Mukshpuri hill. One can also climb the 2813 m peak of Mukshpuri, which is the second highest point in Gallyat area. Dongagali is also the entry point of Ayubia National Park, which is spread over an area of 3312 hectares and is the natural habitat of numerous species of wild animals. Miran Jani is the highest point in the Gallyat range at about 2960 m. The track starts from Governor's House Nathiagali to the top of Miran Jani Hill that takes 6 to 7 h both ways. Khanspur, Khairagali, Changlagali and Ghora Dhaka, these four mini resorts spread over an area of 26 km, have been developed as a resort complex called Ayubia. The central place of Ghora Dhaka has a chairlift. This chairlift is the first recreation facility of its kind in Pakistan.

These areas fall under moist temperate forest of Himalayan range. The greater part of precipitation is derived from the South-west monsoon and falls during July to September. An appreciable amount is, however, brought in by westerly disturbances during the winter and spring months. Precipitation from this source falls largely as snow (Neelum, 1982). The chief character of vegetation is the extensive development of coniferous forest. *Pinus wallichiana* and *Abies pindrow* are the commonest and dominant tree species, followed by *Cedrus deodara* and *Taxus baccata*. *Picea smithiana* is a rarely occurring gymnospermic species in the area. Among the broad leaved trees, *Quercus incana*, *Q. dilatata*, *Populus ciliata*, *Aesculus indica*, *Ulmus wallichiana*, *Alnus rubra* and *Prunus padus* are met with fairly generally and form local consociations.

Dieback refers to the progressive death of twigs and branches, which generally starts at the tips. Trees and shrubs affected by dieback syndrome may die within a year or two after symptoms first appear or in some cases survive indefinitely. Dieback affected trees typically have poor crowns, with sparse foliage and a large proportion of dead branches. The root systems are similarly reduced. The exact symptoms depend on what is causing the dieback. Recently Javaid *et al.* (2004) have reported dieback in 21 tree species in plains of Punjab. This preliminary survey report presents the status of tree dieback on hills of Nathiagalli, Dongagali, Ayubia and Mukshpuri in NWFP of Pakistan.

### MATERIALS AND METHODS

Surveys of Nathiagali, Dongagali, Khairagali, Ayubia chairlift, Khanspur, Ayubia National Park and Mukshpuri were undertaken during July-August 2005 to study dieback incidence in gymnospermic and angiospermic tree species. Dieback incidence in different trees was calculated by applying the following formula:

$$\text{Dieback incidence (\%)} = \frac{\text{No. of infected tree of a species}}{\text{Total No. of trees of that species}} \times 100$$

## RESULTS AND DISCUSSION

Amongst two most frequently occurring gymnospermic species viz. *Abies pindrow* and *Pinus wallichiana*, the former exhibited the highest dieback incidence (5%) (Fig. 1). However, dieback incidence was not uniformly distributed. It was generally higher either in pure strands or in most frequently inhabited strands of *A. pindrow*. The highest *A. pindrow* dieback attack was observed along the tract from Nathigali to the Mukshpuri top followed by around Ayubia Chair Lift area. At places where *A. pindrow* frequency was comparatively low and it was growing in mixed culture with *P. wallichiana* as in Khanspur and Ayubia National Park, dieback incidence was low. Apparently the infected plants did not show any signs of insect attack on the above ground portions or any fungal or other pathogenic attack at the soil surface level. However, since the disease was more frequently occurring where plants were growing in close proximity in pure strands, the disease is likely to be due to some microbial pathogen that proliferates through soil (Fig. 2A). *P. wallichiana* exhibited about 2% dieback incidence (Fig. 1 & 2B). Similar to that of *A. pindrow*, the disease incidence in this species was not uniform through out the surveyed areas. At Khanspur, Ayubia National Park and in the area between Dongagali and Mukshpuri top, *P. wallichiana* was growing as dominant tree species. Dieback incidence was higher in residential areas of Khanspur as compared to other less disturbed localities indicating that human activities like construction, agriculture and pruning of trees for fuel and wood could be the main dieback causing factors in this area. Since, the *P. wallichiana* dieback was also observed in comparatively undisturbed areas like Ayubia National Park. The involvement of some pathogens especially soil-borne fungi can not be ruled out. The lightening and frost winds may be partially responsible for damaging of the tree tops. The under story and less frequently occurring gymnospermic tree species *Taxus baccata* showed dieback symptoms in about 1% tree (Fig. 1). Generally dieback in this species was found in older trees indicating aging as the main cause of dieback. *Cedrus deodara*, a tall but less frequently occurring and *Picea smithiana*, a rarely occurring tree species in the surveyed areas did not show any dieback signs. Recently, similar dieback incidence in Juniper Forests of Ziarat, Balochistan has been reported by Chaudhary and Aslam (2005). They attributed the Juniper dieback attack to the fungus *Pyroformes demidoffii*, mistletoe *Arcethobium oxycedri*, insects, human activities and low precipitation during the last few years.

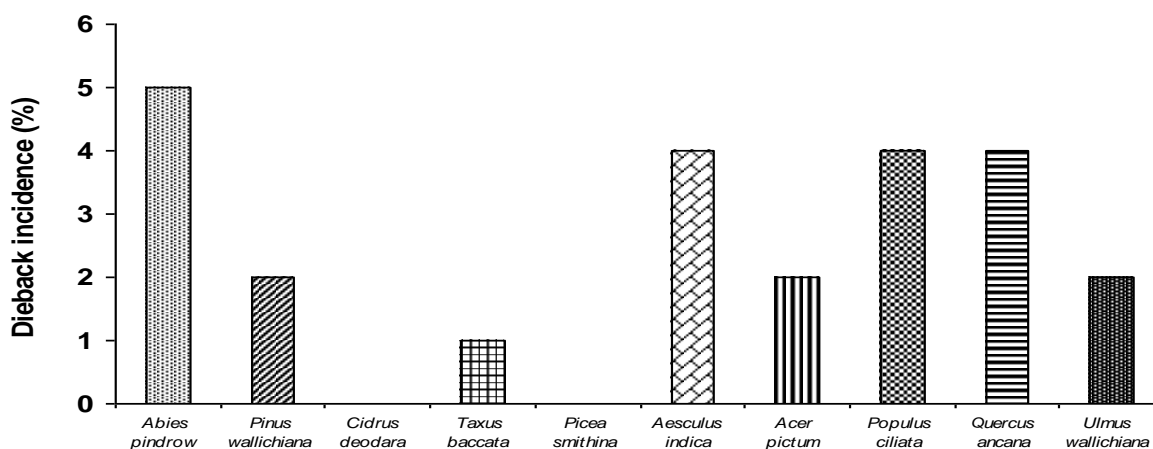


Fig. 1: Tree dieback incidence in Nathigali, Dungagali, Ayubia and Mukshpuri hills.

Among the broad-leaved angiospermic plant species which were fairly dominant, *Populus ciliata*, *Quercus incana* and *Aesculus indica* exhibited the highest dieback incidence (4%) each followed by *Ulmus wallichiana* (2%) and *Acer pictum* (2%) (Fig. 1 and 2 C-F). *Q. incana* dieback was uniformly distributed in the surveyed areas while dieback in *P. ciliate* was more frequent in Khanspur and in *U. wallichiana* was generally restricted to Dongagali only especially in residential areas. The exact cause of dieback in these broad-leaved trees is not known so far as there were not any apparent symptoms of termite or any other insect attack, damaging or rotting of stem or roots by fungi at soil surface level, and cutting of branches for fuel purposes. However, similar dieback symptoms in broad-leaved trees in plains of Punjab have been reported due to root infecting fungi (Javaid *et al.*, 2004). These fungi initially attack on tertiary roots then secondary and finally the main or the primary root. Generally there are a number of causes of dieback, which vary from region to region. Dieback is a complex phenomenon, with many

interrelated causes. It is difficult to attribute an outbreak of dieback to any one single cause. It consists of a combination of environmental stresses and biotic disease organisms that interact to weaken and eventually killing of the plants. It usually begins after the trees are predisposed by an environmental stress (Aslam, 2004). Factors that can contribute to dieback in particular localities can include insects especially termites, fungi especially *Phytophthora*, drought, salinity, herbicide spray drift or spillage in watercourses, girdling of trees by livestock, earthmoving, frost, hail, fire, wind and pruning (Gill *et al.*, 2001; Javaid and Afzal 2001; Khan 2001; Bajwa *et al.*, 2003).

A: *Abies pindrow*B: *Pinus wallichiana*C: *Populus ciliata*D: *Quercus incana*E: *Aesculus indica*F: *Acer pictum*G: *Ulmus wallichiana*

**Fig. 2.** Dieback in different gymnospermic and angiospermic tree species at Nathiagali, Doongagali, Ayubia and Mukshpuri hills.

Since at present the exact cause of tree dieback in the surveyed hilly areas of Pakistan is not known so far, further pathological studies are, therefore, required to investigate for the causal factors of the problem. In the plains of Punjab, dieback has attained an epidemic form especially in mango, *Dalbergia sissoo* and *Acacia nilotica*. By contrast, at the surveyed hill stations, the disease is at its initial stages. It is high time for the concerned authorities to look into the problem and take necessary actions so that the problem can not emerge as an epidemic in future. Once the symptoms of dieback are evident in a tree, it is difficult to stop or reverse the progress of the disease. The key to

control dieback is an early detection in an area and prevention (Javaid *et al.*, 2004). With proper care and management the rate of dieback can be reduced and further problem would be prevented.

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