(III)

ESTIMATION OF LOSSES DUE TO LEAF SPOT AND TWIG BLIGHT IN NEEM*

Introduction

Neem (*Azadirachta indica* A. Juss) is an attractive evergreen tree native to Indian sub-continent but cultivated throughout South-East Asia. It is estimated that India has about 18 million trees (Amritalingam, 2001). The tree is considered to be very valuable and its non-wood products are used for varied purposes that meet basic needs of rural people like medicines, pesticides, mosquito repellents, fertilizers, tooth paste and tooth brush sticks etc. apart from these it also serves as anti-allergic, anti-fungal, anti-viral material. About 1,600 species of plants are reported to possess insecticidal properties and neem is by far the most promising one with wide ranging potential of neem derivatives against 198 species of insect pests created a high demand (Singh *et al.*, 1995). Though neem has fungicidal ability, at nursery stage it is known to be affected by several foliar diseases, leaf spot and twig blight caused by *Colletotrichum gloeosporioides* (Bakshi, 1976) is one such disease which is causing severe losses in nurseries raised in dry tracts of Karnataka. The important symptoms of the disease are premature defoliation besides making seedlings weak and affecting apical growth. In severe cases it may lead to seedling mortality. As not much work has been done on occurrence of disease and extent of losses caused. Hence in this paper an effort has been made to find out the extent of growth and monetary losses caused by the disease which is highly endemic to Gadag Forest Division, Karnataka.

Material and Methods

Experimental site : The present field investigation work was carried out in Gadag District, which comes under northern dry zone (zone no. 3). Experimental site is situated at 15° 15' N lat. and 75° 35' E long. The area receives annual rainfall between 550-800 mm, the soil type consisted of shallow and black soil.

Estimation of extent of losses due to disease : Intensive survey work was taken up during 2002-2003 to know the per cent disease incidence and severity of leaf spot and twig blight of neem in five nurseries of Gadag District distributed across four ranges *viz*., Gadag, Ron, Shirahatti and Mundaragi.

All these nurseries were visited twice, once in September-October, 2002 and the second time in January-February, 2003. The mortality percentage of seedlings was worked out for each range during both stages.

In each nursery, observations were made on total number of seedlings raised

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and seedlings affected by disease. Disease severity was calculated using 0-3-category scale, considering extent of foliage of the seedlings covered by disease (Mohanan and Sharma, 1985).

Estimation of growth losses due to the disease : The extent of growth losses due to the disease was assessed by taking into account of the observations on collar diameter and height collected during second survey (February) and the observations were compared with collar diameter and height of seedlings on which fungicide was sprayed.

Per cent growth loss in Collar diameter (cd) =

$$\frac{\text{Avg. cd/ht of seedlings treated with fungicide} - \text{Avg. cd/ht of infected seedlings}}{\text{Avg. cd/ht of fungicide treated seedlings or Height (ht)}} \times 100$$

Estimation of Monetary losses : Extent of monetary losses due to the disease was assessed by directly multiplying the number of seedlings dead due to disease in different nurseries with selling price of each seedling.

Amount lost (Rs.) = No. of seedlings died due to disease x price of (Seedling + potting mixture + polythene bags + labour + maintenance of seedling)

For every 1000 seeds/seedlings :

Seed	-	Rs. 160
Polythene bags	-	Rs. 500
Potting mixture	-	Rs. 1120
Labour + maintenance	-	Rs. 970
Total	-	Rs. 2750

Price of each seedling: Rs 2.75/-

Seedlings raised

Nursery	Total No. of seedlings raised
Nellore nursery	9,030
Binkadakatte nursery	20,000
Shirahatti nursery	13,050
Haripur nursery	13,100
Korlahalli nursery	20,000

Recording of observations : The observations were recorded on disease incidence and disease severity, height, collar diameter and number of branches in all the seedlings. Data on disease incidence was recorded using formula :

Disease incidence (%) =

$$\frac{\text{Number of affected seedlings}}{\text{Total number of seedlings observed}} \times 100$$

The disease severity was estimated by visual method per cent foliage affected was noted down and categorized into (0-3) scale as suggested by (Mohanan and Sharma, 1985) with some modifications (Table 1).

Using the scale so devised, disease severity index for each nursery was calculated by using the formula given by Mohanan and Sharma (1985) :

Disease severity index (DSI) =

$$\frac{nLx1+nMx2+nSx3}{N}$$

where :

nL, nM and nS represent total number of plants with low, medium and severe disease.

1, 2, 3 - Disease severity index (DSI) for Low, Medium and Severe

N --Total number of plants assessed in all the observations.

Table 1

Estimation of disease severity

Description	Foliage Infection	Disease Severity Grade
No symptom expression	Healthy	0
Low (L)	Upto 25per cent of the foliage infected	1 (0.1-1.0)
Medium (M)	26-50 per cent of the foliage infected, more than 10 per cent defoliated prematurely	2 (1.1-2.0)
Severe (S)	More than 50 per cent foliage infected, more than 10 per cent defoliated prematurely. Seedling death noticed.	3 (2.1-3.0)

Results and Discussion

Scenario of disease incidence and disease severity index (DSI) : The results of the surveys conducted during September-October, 2002 and January-February, 2003 are presented in Tables 2 and 3, respectively.

The results of the first survey (Table 2) revealed that the disease incidence and disease severity index were highest in Shirahatti nursery (53.50%) and (2.61) respectively. And the lowest disease incidence of 39.40 per cent and disease severity index of 1.83 were recorded in Korlahalli nursery. The results of the second survey (January-February, 2003), are indicated that disease incidence (Table 3) was highest in Nellore nursery (27.10 %) and the lowest disease incidence (18.20%) was recorded in Korlahalli nursery. A critical observation on disease severity index suggested that there is slight variation between different nurseries with highest being in Shirahatti nursery (1.97) and the lowest in Korlahalli nursery (1.22). Disease incidence and Disease Severity Index were high during Sept.-Oct., 2002 in all nurseries compared to January-February, 2003. From Tables 2 and 3 it is clear that the high disease incidence and disease severity index in all the nurseries may be attributed to the presence of favourable environmental conditions and dead plant debris. Sharma *et al.* (1985) also reported high incidence and severity of leaf spot of *Tectona grandis* caused by *Colletotrichum gloeosporioides* during August when there were heavy rains.

Table 2

Disease incidence and Disease Severity Index (DSI) of leaf spot and twig blight of Neem in different nurseries during Sept.-Oct., 2002.

Nursery	Taluk	Disease incidence (%)	Disease Severity Index (DSI)
Nellore	Ron	52.70	2.40
Binkadakatte	Gadag	42.20	2.00
Shirahatti	Shirahatti	53.50	2.61
Haripur	Shirahatti	52.90	2.57
Korlahalli	Mundaragi	39.40	1.83

Table 3

Disease incidence, Disease Severity Index (DSI) of Neem seedlings due to leaf spot and twig blight in different nurseries during Jan.-Feb., 2003.

Nursery	Taluk	Disease incidence (%)	Disease Severity Index (DSI)
Nellore	Ron	27.10	1.53
Binkadakatte	Gadag	19.60	1.41
Shirahatti	Shirahatti	26.80	1.97
Haripur	Shirahatti	26.30	1.91
Korlahalli	Mundaragi	18.20	1.22

Estimation of growth loss : The results on extent of growth losses (%) in collar diameter and height due to leaf spot and twig blight (Table 4) revealed that maximum growth loss in collar diameter and height were recorded in Shirahatti nursery (50.32 per cent and 88.15 per cent, respectively). As against a minimum growth loss in collar diameter and height of 23.82 and 31.41 per cent, respectively in Korlahalli nursery. This suggests that as the disease incidence and disease severity increase the per cent growth loss also increases. Negi (1996) is also of the same opinion that severity of disease may bring about reduction in plantable height.

Table 4

Per cent growth losses in Neem due to leaf spot and twig blight in different nurseries

Nursery	Taluk	Growth loss (%)	
		Collar diameter	Height
Nellore	Ron	29.21	60.10
Binkadakatte	Gadag	38.80	59.75
Shirahatti	Shirahatti	50.32	88.15
Haripur	Shirahatti	29.40	84.94
Korlahalli	Mundaragi	23.20	31.41

Regression equation for Collar diameter :
$Y = - 0.361 - 0.80\ x_1$

Regression equation for Height :
$Y = -15.103 - 1.31\ x_2$

Regression equation fit to show degree of relationship for collar diameter and height suggested that for every 1 per cent increase in disease severity index, there was 0.80 cm and 1.31 cm decrease in collar diameter and height, respectively in 150 days period.

Estimation of monetary losses due to the disease (Table 5) is an important step which accounts for direct losses incurred by the nursery manager. It is evident that the maximum monetary loss due to the disease of Rs. 23,450 was incurred in Binkadakatte nursery followed by Rs. 20,138, Rs. 20,000 and Rs. 19,586 in Korlahalli, Shirahatti and Haripur nursery, respectively. It was least in Nellore nursery (Rs. 13,381). This estimated monetary loss not only

Table 5

Extent of Monetary losses in Neem due to leaf spot and twig blight in different nurseries

Nursery	Taluk	Seedlings killed	Monetary loss (Rs.)
Nellore	Ron	4850	13,381
Binkadakatte	Gadag	8500	23,450
Shirahatti	Shirahatti	7250	20,000
Haripur	Shirahatti	7100	19,586
Korlahalli	Mundaragi	7300	20,138

depends on number of seedlings killed due to disease but also on the total number of seedling raised. Besides monetary losses, there is a delay of one year in production of required number of seedlings. Presently there is no such report on estimation of monetary losses by a nursery disease in forestry. Perhaps, this information would throw some light on the issue for nursery growers to keep themselves alert to take up supervisory control measures.

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