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Documentary and Disease Calendar for Diseases of *Jatropha curcas* in Northern Dry Zone and Northern Transition Zone of Karnataka

L. TIPPESHI[1], CHAVHAN, V. M. POLICE PATIL[1], C. NAGARAJAIAH[2]
L. VENKTESH[2] AND V. SURYANARAYANA[1]

[1]*College of Forestry, Sirsi, University of Agricultural Sciences, Dharwad, India*
[2]*UAS, GKVK, Bangalore 560065, India*

Abstract

Survey for diseases in different plantations and hedge rows falling under northern-dry zone and northern-transition zone of Karnataka revealed the occurrence of white mold, leaf spot, root rot, stem canker, mosaic and different leaf blights. Disease calendar of *J. curcas* conducted at fortnight interval in Hunumanmatti plantation from July 2006 to June 2007 revealed occurrence of six diseases. By the onset of monsoon *Colletotrichum* leaf spot appeared from July to September. *Pestalotiopsis* leaf blight was found with high severity from August to September end and with low intensity during October end. *Colletotrichum* leaf blight and fruit rot appeared from September to November. *Cylindrocladium* white mold occurred during October with gradually increased intensities till January and extended up-to February with gradual reduction. In addition mosaic was found from January to March. Among these *Colletotrichum* leaf blight and *Cylindrocladium* white mold were categorized as threatening by considering their damage to fruits.

Key words : Disease occurrence, Leaf spot, Jatropha, Plantation, Agroclimatic zones.

Jatropha (*Jatropha curcas* L.)belonging to Euphorbiaceae is an important species of biofuel and medicinal importance (1). Its potential to grow in degraded lands, field boundaries, waste lands can be well utilized in successful afforestation network. Till date collar rot, stem canker, mosaic and leaf spot have been recorded. Detailed study is restricted to mosaic and canker diseases (2, 3). But its growth and yield potential are affected by blight in northern parts of Karnataka by causing mortality ; excessive abnormal defoliation and fruit rot inductions. By considering domestication under plantation networks by private organizations in Karnataka and disease pressure, the present investigation was carried out and the valuable information has been generated in the interest of farming community.

Methods

Survey

Survey for documenting blight status on *Jatropha curcas* was conducted in plantations and hedgerows raised in northern dry and transition zones of Karnataka during August—December, 2006. In northern dry zone, districts of Bijapur, Bellary, Gadag, Raichur Koppal and Belgaum were selected on the basis of crop prevalence. Similarly in northern transition zone Dharwad, Haveri and parts of Belgaum district were chosen.

Disease Incidence

It was calculated by using the following formula and was expressed in percentage.

$$\text{Disease incidence} = \frac{\text{No. of seedlings affected}}{\text{No. of seedlings observed}} \times 100$$

Disease Severity Index (DSI)

By visual method, recorded per cent leaf area affected was categorized into 0—3 scale as suggested by Mohanan and Sharma (4) with some modifications as given below.

Grade	Per cent foliage infected
0	Healthy
1	Up to 25% foliage infected
2	Up to 26—50% foliage infected
3	More than 50% foliage infected

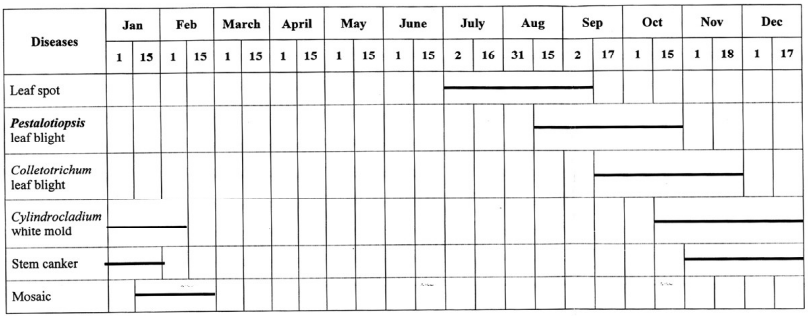

Figure 1. Jatropha diseases and there prevalence period in different months.

DSI was calculated by using the formula described by Mohanan and Sharma (4).

$$DSI = \frac{(nL \times 1) + (nM \times 2) + (nS \times 3)}{N}$$

Where nL, nM and nS represent number of plants with low, medium and severe disease status, respectively. 1, 2, 3 indicate disease severity grade for low, medium and severe infection. 'N' represents total number of plants assessed.

Disease Calendar of Jatropha curcas

For preparing the disease calendar, four sample plots of 20 × 20 m were laid randomly in $1^1/_2$ year old Jatropha plantation. Disease incidence and severity recorded at fortnight interval from 2 July 2006 to 1 June 2007 was pooled and were presented in tabular form.

Results and Discussion

Documentary on Diseases

The results on the diseases of Jatropha carried out in the plantations are presented in Table 1. Six diseases caused by fungi and one caused by virus were noticed. From among them leaf blight was recorded in all the plants. Survey for diseases of Jatropha in plantations raised under northern-dry zone and northern-transition zone of Karnataka during August-September 2006, indicated that different types of fungal white mold, leaf blights, leaf spot, root rot, stem

Table 1. Documentary on diseases of *Jatropha curcas*. + Indicates disease present. – Indicates disease is not present.

Location	Diseases *Colleto-trichum* leaf spot	*Colleto-trichum* leaf blight	*Pestalo-tiopsisl* leaf blight	*Cylindro-cladium* white mold	Stem canker	Mosaic
AC Bijapur	+	+	+	–	–	–
Hyrada	+	+	+	–	–	–
Hanvasi	+	+	+	–	–	–
Bellary	+	+	+	–	–	–
Mundaragi	+	+	+	–	–	+
AC Raichur	+	+	+	–	–	–
Savadatti	+	+	+	+	–	–
Arabhavi	+	+	+	+	–	–
AC Dharwad	+	+	+	+	–	–
KVK Hunumanmatti	+	+	+	+	+	+
Banvasi	+	+	–	+	–	+
Sirsi	+	+	–	+	–	+
Hanagal	+	+	+	–	–	+

Table 2. Disease calendar of *Jatropha curcas*.

Date of observation	Disease								
	Colleto-trichum Leaf spot Disease inci-dence	*Pestalotiopsisi* leaf blight Disease inci-dence	DSI	*Colletotrichum* leaf blight Disease inci-dence	DSI	*Cylindrocladium* white mold Disease inci-dence	DSI	Stem canker Disease inci-dence	Mosaic Disease inci-dence
2 Jul 06	61.87	–	–	–	–	–	–	–	–
16 Jul 06	65.33	–	–	–	–	–	–	–	–
31 Jul 06	70.21	–	–	–	–	–	–	–	–
15 Aug 06	20.78	79.73	1.53	–	–	–	–	–	–
2 Sep 06	4.53	95.58	1.78	–	–	–	–	–	–
17 Sep 06	–	97.23	1.98	2.32	0.03	–	–	–	–
1 Oct 06	–	13.28	0.22	78.35	1.43	–	–	–	–
21 Oct 06	–	9.09	0.36	80.21	1.56	5.28	0.13	–	–
1 Nov 06	–	–	–	35.82	0.38	38.52	0.24	3.59	–
18 Nov 06	–	–	–	8.85	0.08	32.88	0.28	4.83	–
1 Dec 06	–	–	–	–	–	45.48	0.29	4.22	–
17 Dec 06	–	–	–	–	–	55.92	0.33	5.26	–
1 Jan 07	–	–	–	–	–	20.85	0.12	7.95	–
15 Jan 07	–	–	–	–	–	12.33	0.21	8.83	3.82
1 Feb 07	–	–	–	–	–	5.83	0.14	–	6.58
15 Feb 07	–	–	–	–	–	–	–	–	5.88
1 Mar 07	–	–	–	–	–	–	–		5.88
16 Mar 07	–	–	–	–	–	–	–	–	–
1 Apr 07	–	–	–	–	–	–	–	–	–
15 Apr 07	–	–	–	–	–	–	–	–	–
1 May 07	–	–	–	–	–	–	–	–	–
15 May 07	–	–	–	–	–	–	–	–	–
1 Jun 07	–	–	–	–	–	–	–	–	–

canker and mosaic were recorded. Till now a mention of damping-off, root rot, leaf spot, leaf blight, anthracnose and mosaic has been cited (2, 5).

Disease Calendar of Jatropha curcas

The fortnight observations taken from second July 2006 to first June 2007 on the occurrence and prevalence of different diseases are presented in Table 2. It indicated the prevalence of six diseases in different periods of the year, either solely or in combinations. By the onset of monsoon only *Colletotrichum* leaf spot appeared first with a (61 to 70%) and extended till September. *Pestalotipsis* leaf blight from appear from August onwards with highest incidence upto September end and got reduced October onwards. Higher incidence resulted in higher DSI, further *Pestalotipsis* blight was over taken by *Colletotrichum* leaf blight as evidenced by high incidence and DSI during October and reduced in November. *Cylindrocladium* white mold appeared during October and it gradually increased upto January but reduced during February. However, the stem canker and mosaic started in November continued upto February. Over all high destruction in a short period was by *Pestalotipsis* leaf blight followed by *Colletotrichum* leaf blight with respect to prolonged occurrence of the disease *Cylindrocladium* white mold stood first. The similar tabular observation has been depicted with line sketch in Table 2 and Figure 1.

By September end *Colletotrichum* blight started appearing with peak severity during October followed by gradual reduction then onwards and remained till November end. Wind blown conidia from the accumulated debris with the favorable factors like heavy rainfall resulting dew deposits on foliage, a temperature of 26—27 C, poor sanitation and unchecked weeds might have attributed for high severity. A close

dependency of pathogen on optimum temperature (28 to 32 C) for conidial germination, its field survival in plant debris and spread through wind have been reported as contributing factors in other crops (6). In similar line, Sharma et al . (7) reported high severity of leaf spot of *Tectona grandis* caused by *Collentotrichum gleosporoides* during October and onwards. Such *Colletotrichum* leaf spot and leaf/twig blight were observed to occur on *Azadirachta indica* and *Ficus religiosa* (8, 9). During October, along with the above disease, *Cylindrocladium* white mold appeared with low intensities reaching moderate levels during November and a peak in December second fortnight followed by gradual decrease. It retained till middle of February and disappeared due to coincidence with normal defoliation. Emergence of young flush due to complete defoliation by *Colletotrichum* blight, Humidity build up > 70% due to heavy rains resulting dew deposits on leaf lamina and a temperature range of 28—34 C might have favored the disease to occur during October. During November heavy slash of rain might have not allowed the disease to high level, rather restricted it at moderate level. But December had dry spell and was found to coincide with high wind velocity and blister beetle population which might have a major role in active dispersal of inoculum. Dew deposits and high level infestations of blister beetle may happen to aid successful multisite penetrations and infections. By all these favorable conditions disease might have appeared with peak severity. The results are on par with the report of Mehrotra and Mehrotra (10) who opined that dry spell followed by rain and high temperature (30—34 C) in the epidemiological studies on leaf spot and blight of *Syzygium cumuni* caused by *Cylindrocladium* sp. Along with *Cylindrocladium* white mold, stem canker also appeared from October to February, but with very low incidence and damage. Mosaic disease was found to appear during January and found till the last month. As such it might have appeared through insect transmission and for unchanged disease incidence can be attributed to lack of presence of insect vector.

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