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Original Research Article

Epidemiology of Leaf Spot Disease of *Aloe vera*

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A B S T R A C T

The maximum disease severity was recorded in the month of July followed by June and minimum in the month of April. In the month of April the disease severity was in negative correlation with minimum temperature while the maximum temperature was significantly positive followed by month of May while in the month of June and July the disease severity was significant and positively correlated with temperature, whereas the disease severity was negatively correlated with rain fall, relative humidity in rest of the months, while May and June months were significantly positive towards rain fall and relative humidity.

Keywords

Aloe vera, Epidemiology, Disease severity

Introduction

Aloe vera plays vast traditional role in indigenous system of medicine like ayurveda, siddha, unani and homoeopathy. The Aloe vera crop comes under cultivation in fairly large areas in many parts of India viz; Tamil Nadu, Gujarat, Maharashtra etc. The total production of Aloe vera in India has been estimated to be 1, 00,000 tones (Dubey and Pandey, 2009). Aloe vera are often thought to only grow in hot and dry climates but they actually grow in a variety of climates including desert, grassland, and coastal or even alpine locations. Aloe vera contains 75 nutrients and 200 bioactive compounds including sugars, anthraquinones, saponins, vitamins, enzymes, minerals, salicylic acid and amino acids (Boudreau and Beland, 2006). These bioactive compounds are used astringent, haemostatic, anti-diabetic, antiulcer, anti-septic, anti-bacterial, anti-inflammatory, anti-oxidant and anti-cancer agents and are also effective in the treatment of stomach ailments, gastrointestinal problem, skin diseases, constipation, radiation injury, wound healing, burns, dysentery and diarrhoea (Yongchaiyudha *et al.*, 1996, Bunyapraphatsara *et al.*, 1996, Rabe and Staden, 1997; Gordon and David, 2001).

Aloe vera contains two classes of Aloins: (1) nataloins, which yield picric and oxalic acids with nitric acid and do not give a red coloration with nitric acid; and (2) barbaloins, which yield aloetic acid ($C_7H_2N_3O_5$), chrysammic acid ($C_7H_2N_2O_6$), picric and oxalic acids with nitric acid, being reddened by the acid (Rajeswari *et al.*, 2012).

Materials and Methods

The experimental site falls under sub-tropical climatic of eastern part of India. The District Faizabad comes under eastern region of Uttar Pradesh, distributed in three seasons viz., rainy, winter and summer. The rainy season occurs from mid June to mid of September. The winter months prevails from November to March with mild to severe cool temperature. The severe cold was recorded in the month of December and occasionally winter rains and frost was also noticed. The summer months occur from April to June. The dry and hot wind waves were also noticed in the months of mid May and June.

Weekly meteorological, data was recorded at the Meteorological observatory of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad.

The total rainfall received during the course of experimentation was 499.80 mm during 2015-16 and 739.30 mm during 2016-17. Meteorological conditions such as minimum and maximum temperature, rainfall, relative humidity were recorded during the crop period i.e. during 2015-16 and 2016-17 and correlated with disease development (Table 1 and 2).

Results and Discussions

Epidemiological studies

The weather parameters *viz.*, temperature, relative humidity and rainfall played an important role in disease development it was felt necessary to study the epidemiology of the leaf spot disease of *Aloe barbadensis* caused by *Alternaria alternata*. The techniques were described under materials and methods, the data on disease development were recorded at weekly intervals from the initiation of disease symptoms up to the harvesting stage. The prevailing atmospheric temperature, relative humidity, rainfall data were also recorded and correlated with disease severity. The data was recorded during April to August 2016 and presented in (Table-1) reveals that the maximum disease severity was recorded in the month of July (88.90) followed by June (84.50) and minimum in the month of April (50.50).

Correlation co-efficient of disease severity in relation to meteorological data

The relationship of disease severity with meteorological data was studied by employing simple correlation. In the month of April the disease severity was in negative correlation (-0.818) with minimum temperature while the maximum temperature was significantly positive (0.048) in relation to disease severity followed by month of May where disease severity was significantly positive (0.775) and correlated with the minimum temperature but maximum temperature was negatively correlated (-0.880) to disease severity while in the month of June and July the disease severity was significant and positively correlated (0.033), (0.727), (0.398) and (0.818), respectively with minimum and maximum temperature, whereas the disease severity was negatively correlated with rain fall, relative humidity (RH) in rest of the months, while May and June month were significantly positive towards rain fall and relative humidity (RH).

During the course of this study, the disease appeared in the month of April and reached at its peak in the month of July. In view of the economic importance of the disease and limited information available on status, variability and disease management, studies were carried out on present scenario of the disease effect of different weather parameters on disease development and effective

management of the disease through chemical fungicides and botanicals.

Table.1 Effect of meteorological data on development of disease on *Aloe barbadensis*

Date of sowing	Months in which data was recorded	Standard week	Rainfall	Temperature ^{0}C		R.H.	Diseases severity
				Min.	Max.		
15 August 2015	**April, 2016**	14	0.0	20.3	30.4	44.0	53.33
		16	0.0	23.5	41.4	43.5	50.50
		17	0.0	20.5	41.6	38.1	56.50
	May, 2016	18	12.1	22.4	38.9	44.0	66.66
		19	0.0	24.2	38.0	48.7	68.55
		21	2.4	24.6	37.5	53.3	76.00
	June, 2016	23	87.7	25.5	83.0	60.9	82.95
		25	1.2	27.0	34.6	75.2	80.56
		26	0.0	27.3	36.8	68.9	84.50
	July, 2016	28	5.0	27.2	31.5	70.7	86.36
		29	114.8	24.9	31.3	86.1	84.50
		30	27.6	26.0	31.5	84.2	88.90
	August, 2016	32	21.8	25.9	32.7	82.6	65.71
		33	21.8	35.9	32.2	82.6	67.71
		34	3.2	26.3	32.8	70.9	63.39

Table.2 Correlation co-efficient of disease severity in relation to meteorological data

Months	Rain fall	Temperature ^{0}C		Relative Humidity	Disease severity
		Min.	Max.		
April, 2016	0.00	-0.818	0.048	-0.843	53.44
May, 2016	-0.50358	0.775	-0.880	0.9436	70.40
June, 2016	0.110	0.033	0.727	-0.545	82.67
July, 2016	-0.690	0.398	0.818	-0.024	86.58
August, 2016	0.886	0.824	-0.917	0.886	65.60

The development of disease was recorded at 10 days interval starting from the first initiation of disease symptoms up to leaf cutting stage. The meteorological data on temperature, relative humidity and rainfall was recorded. The *Aloe barbadensis* crop suffers from many diseases among which the leaf spot holds the lions share. The Percent disease intensity (PDI) was recorded at ten days interval starting from the start of first disease symptom up to harvesting. The percent disease intensity (PDI) was recorded during April to August 2016.

In the month of April the disease severity was in negative correlation (-0.818) with minimum temperature while the maximum temperature was positive (0.048) followed by May where disease severity was significantly positive (0.775) and correlated with the minimum temperature but maximum temperature was negatively correlated (-0.880) while in the month of June and July it was significant and positively correlated (0.033), (0.727), (0.398) and (0.818), respectively with minimum and maximum temperature,

whereas the disease severity was negatively correlated with rain fall, relative humidity in rest of the months, while May and June month were significantly positive towards rain fall and relative humidity.

In conclusion**,** the maximum disease severity was recorded in the month of July followed by June and minimum in the month of April. In the month of April the disease severity was in negative correlation with minimum temperature while the maximum temperature was significantly positive in relation to disease severity followed by month of May where disease severity was significantly positive and correlated with the minimum temperature but maximum temperature was negatively correlated to disease severity while in the month of June and July the disease severity was significant and positively correlated with minimum and maximum temperature, whereas the disease severity was negatively correlated with rain fall, relative humidity in rest of the months, while May and June month were significantly positive towards rain fall and relative humidity.

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