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SHORT COMMUNICATION

Evaluation of *Aloe vera* genotypes against leaf rot disease under field condition

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Abstract

Aloe vera (*Aloe barbadensis*) is a perennial, succulent plant belongs to the family Liliaceae. *Aloe vera* leaf rot is one of the major limiting factors in *Aloe vera* production, which decreases leaf, gel quantity and quality significantly. The experiment was conducted to evaluate the genotypes of *Aloe vera* against leaf rot disease Out of 26 genotypes, none of genotypes was found the free from disease, three genotypes viz, IC-111280, IC-112531 and IC-112513 were highly resistant, four genotypes viz., IC-111279,IC-112518, IC-285626 and IC-283655 were resistant, nine genotypes viz, IC-310618, IC-471886, IC-310904, IC-112569, IC-112519, IC-112532, IC-310611, IC-310617 and IC-310596 were moderately resistant and rest of the genotype were moderately susceptible to highly susceptible against the disease.

Keywords *Fusarium oxysporum* · Genotypes · Leaf rot · Screening

Aloe vera (*Aloe barbadensis* Miller) is a perennial, drought resisting succulent plant belong to the family Liliaceae which its believed to have originated in African continent specifically in Egypt (Daodu 2000). There are over 250 species of *A. vera* growing around the world however, only *A. barbadensis*, *A. ferox* and *A. arborescence* are used as herbal drugs. *Aloe vera* is grown largely in South America, Central America, Australia and Africa. *Aloe vera* is cultivated in fairly large area in many in parts of India. *A. barbadensis* which revealed three types of leaf spots and root rot disease (Sharma and Samota 2007). A stabilized product is incorporated in a wide variety of preparation, including juice, gel, ointments, cream, lotion and shampoos (Daodu 2000). The leaf yield varied from 0.599 to 2.922 kg per plant per year due to disease in different genotypes (Abhila and Jessyeutty 2010). The gel/juice is consumed directly and used in many preparations therefore it is necessary to raise plant without use of chemicals. Management of leaf rot disease of *Aloe vera* is mainly achieved through the use of chemicals. Use of fungicides has led to the emergence of several problems like enviremental pollution, residual effect, killing of benifecial organisms and devlopment of resistant in pathogen. Therefore, cultivation of resistant genotypes of *Aloe vera* is one of the desirable management options, but their long term stability virtue of true resistance are need for their confirmation under field condition because the role are mineral metabolism and total soluble phenol an imparting resistance/susceptibility against fungus diseases of plant has been also infested (Ashfaq et al. 2014a, b). The leaf rot resistant genotypes under open field condition have been reported by Kumar (2008). However, very limited information is available on the sources of resistance against leaf rot disease in *Aloe vera*. In view of the importance of *Aloe vera* in Indian agriculture, some *Aloe vera* genotypes were evaluated against leaf rot caused by *F. oxysporum.*

The experiment was conducted during *Kharif* season 2014 and 2015 at experimental farm of Medicinal and Aromatic Plant at N.D. University of Agriculture & Technology, Kumarganj, Faizabad. Twenty-six Aloe germplasm/cultivars were screened against *F. oxysporum*. The old suckers were transplanted in second week of July at a spacing of 50 × 40 cm in augmented design under field condition for evaluation of their resistance against leaf rot of *Aloe vera*. Three rows of Aloe leaf rot susceptible cultivar IC-471882 (Check) were planted. Recommended package of cultural practices was followed to raise the crop and to promote natural infection. Ten plants in each plot were randomly selected and tagged for visual observations on symptoms appearance

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at 30, 45, 60, 75 and 90 days after transplanting. The leaf rot disease severity noted on each genotypes was rated following a severity scale from 0 to 5 (Banerjee and Kalloo 1987) [where 0 = no disease; 1 = 1% disease (HR: highly resistant); 2 = 1–10% disease(R: resistant); 3 = 11–25% disease (MR: moderately resistant); 4 = 26–50% disease (S: susceptible) and 5 = more than 50% disease (HS: susceptible)]. Percent disease intensity (PDI) was calculated by formula as given below:

$$\text{Percent disease intensity (PDI)} = \frac{\text{Sum of total numerical ratings}}{\text{Total no. of leaves examined} \times \text{maximum disease grade}} \times 100.$$

Out of 26 genotypes, none, of the genotypes was free from infection against Aloe leaf rot disease (Table 1). The lowest leaf rot incidence was recorded in IC-112512 (2.27, 3.81%), IC-471882 (2.72, 3.77%), IC-285629 (10.55, 10.02%), IC-112532 (10.30, 11.37%), IC-111279 (10.63, 12.11%) and IC-112521 (10.54, 11.02%) in comparison to susceptible check IC-112513 (79.09, 81.35%) at 2014 and 2015 respectively. Kumar et al. (2006) reported the symptom less reaction against leaf rot disease for certain germplasm under artificial screening. Whereas, highest per cent disease incidence was recorded in IC-112513 (79.09, 81.35%), CI-112531 (78.56, 79.76%), IC-310618 (77.56, 79.37%), IC-283655 (79.25, 77.55%), IC-112513 (73.56, 69.47%), and IC-111280 (73.56, 69.47%). The finding revealed no significant difference between in the year 2014 and 2015 were observed. The Leaf rot and leaf spot symptoms were showed all the germplasm tested in the field. The rotting symptoms was showed by IC-111279, IC-112518, IC-285626, IC-283655, IC-310618, IC-471886, IC-310904,

Table 1 Incidence of Aloe vera leaf rot (*Fusarium oxysporum*) on *Aloe vera* cultivars

Genotypes	2014			2015			Types of symptoms
	Total no. of plants	No. of infected plants	Percent disease intensity	Total no. of plants	No. of infected plants	Percent disease intensity	
IC-285629	10	4	10.55	10	3	10.02	LS,LR
IC-310611	10	6	17.10	10	6	15.42	LS, LR
IC-310596	10	6	20.36	10	6	22.85	LS, LR
IC-310904	10	7	29.75	10	8	32.70	LS, LR
IC-310609	10	8	55.65	10	7	53.76	LS, LR
IC-283610	10	8	57.26	10	9	66.23	LS, LR
IC-310618	10	10	77.56	10	10	79.37	LS, LR
IC-112532	10	2	10.30	10	3	11.37	LS, LR
IC-112519	10	4	26.99	10	5	27.14	LS, LR
IC-310517	10	6	37.12	10	5	34.62	LS, LR
IC-112569	10	8	52.32	10	7	53.18	LS, LR
IC-471886	10	8	56.85	10	9	58.10	LS, LR
IC-112513	10	10	79.09	10	10	81.35	LS, LR
IC-112527	10	10	77.03	10	10	76.55	LS, LR
IC-112531	10	10	78.56	10	10	79.76	LS, LR
IC-310617	10	10	71.51	10	10	70.63	LS, LR
IC-112521	10	2	10.54	10	2	11.01	LS, LR
IC-283945	10	4	21.25	10	3	18.53	LS, LR
IC-285626	10	10	62.34	10	10	60.74	LS, LR
IC-283655	10	10	79.25	10	7	77.55	LS, LR
IC-283943	10	6	51.57	10	5	54.06	LS, LR
IC-111279	10	47	10.63	10	3	12.11	LS, LR
IC-112512	10	2	2.27	10	3	3.81	LS, LR
IC-471882	10	2	2.72	10	2	3.77	LS, LR
IC-112518	10	4	28.73	10	4	26.74	LS, LR
IC-111280	10	10	73.56	10	10	69.47	LS, LR

LR = leaf rot, LS = leaf spot

Table 2 Reaction of Aloe germplasm against leaf rot fungus (*Fusarium oxysporum*) under field conditions during 2014–2015

S. no.	Germplasm	PDI	Reaction
1	IC-111280	0.56	HR
2	IC-112531	0.77	HR
3	IC-112513	0.78	HR
4	IC-111279	3.56	R
5	IC-112518	4.23	R
6	IC-285626	7.95	R
7	IC-283655	8.56	R
8	IC-310618	13.65	MR
9	IC-471886	14.21	MR
10	IC-310904	15.24	MR
11	IC-112569	19.23	MR
12	IC-112519	20.57	MR
13	IC-112532	22.56	MR
14	IC-310611	23.21	MR
15	IC-310617	24.24	MR
16	IC-310596	24.54	MR
17	IC-283610	29.56	S
18	IC-283945	34.23	S
19	IC-112512	37.46	S
20	IC-112527	39.43	S
21	IC-283943	40.56	S
22	IC-310517	44.53	S
23	IC-310609	52.74	HS
24	IC-112521	57.29	HS
25	IC-285629	66.56	HS
26	IC-471882 (check)	79.23	HS

HR highly resistant, *R* resistant, *MR* moderately resistant, *S* susceptible, *HS* highly susceptible

IC-112569, IC-112519, IC-112532, IC-310611, IC-310617, IC-310596, IC-283610, IC-283945, IC-112512, IC-112527, IC-283943 and IC-310517 were showed rotting symptoms. These types of symptoms were observed brown to blackish and deep pit symptoms (Table 1).

Field screening of 26 germplasms revealed that three cultivars namely; IC-111280, IC-112531 and IC-112513 showed highly resistant reaction and four germplasms viz., IC-111279, IC-112518, IC-285626 and IC-283655 were resistant to leaf rot, whereas other cultivars showed susceptible to highly susceptible reaction against leaf rot. However, highly resistant and resistant cultivar based on artificial screening has not been done (Table 2). Thus, this study showed the field resistant, artificial screening under challenged condition is necessary in order to develop true resistant cultivars.

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