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Evaluation of germplasm of *Aloe vera* (*Aloe barbadensis*)

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Abstract

Aloe barbadensis (2n = 14) is important medicinal plants of India belong to the family *Liliaceae*. Because of its huge demand and vast utility, it is widely collected indiscriminately from the wild source and thus this species is becoming commercially threatened due to over and destructive harvesting from natural sources. The commercial cultivation is not popular among the farming community due to lack of technical knowledge on genuine type of *Aloe Vera* and its package of practices. Though there is much diversity in *Aloe Vera*, the cultivators unable to choose the best ecotype genetically differentiated sub-population that is restricted to a specific habitat for commercial cultivation. However, the main bottleneck faced by farmers is lack of quality planting material. Hence, the present study was carried out.

Keywords: *Aloe vera* (*Aloe barbadensis*), genotypes, evaluation, Maharashtra

Introduction

Aloe Vera is a perennial monocot plant belonging to the Asphodelaceae family. The name *Aloe Vera* was derived from the Arabic word 'alloe' which means 'shining bitter substance'. Although about 360 species of *A. vera* have been reported, *Aloe barbadensis* commonly known as "Ghrith Kumari" in Hindi [1]. It has a vast traditional use in ayurveda, siddha, Unani and homoeopathy [2]. The plant has sharp pointed, lance-shaped and jagged & edged leaves. They are joined to the stem in a rosette pattern [3]. *Aloe Vera* grows upto 60–100 cm (24–39 in) tall. The leaves are fleshy, thick and green or grey-green. Some varieties show white flecks on their upper and lower stem surfaces. The plant leaves consist of a thick epidermis which is covered by the mesophyll that cells contain a transparent mucilaginous jelly called *Aloe Vera* gel [4].

It is generally cultivation in many parts of India like - Maharashtra, Tamil Nadu, Gujarat, etc. [5]. *Aloe Vera* can grow in a variety of climates including grassland, desert and coastal [6]. Rather than *Aloe Vera*, there are many economically important species of *Aloe* i.e. *A. perryi* Back., *A. Africana* Mill., *A. arborescence* Mill., *A. ferox* Mill., *A. zeylanicum*, etc.

Aloe Vera mainly used as a medicine food and preservative. Commercially, *Aloe Vera* can be found in liquids, drinks, jellies, pills, ointments, lotions, soaps, powders, sprays, shampoos, facial cleansers, oils and creams [7, 8, 9]. Aloe juice regulates the metabolism and it purifies the toxins from human body. Many aloe species are used for conditions ranging from dermatitis to cancer [10]. In India *Aloe Vera* is used as tonic for poor digestive function, anemia and liver disorders. *Aloe Vera* is being used mainly in the development of health drinks and beverages like tea, juices etc. [11]. Due to its unique therapeutic properties and its beneficial effects to humans, the use of *Aloe Vera* in the formulation of food products has rapidly increased.

Other important pharmacological activities of *Aloe Vera* are anti diabetic [12], antiseptic [13], anti-tumor [14], antioxidant [15], antiulcer [16], hepatoprotective [17], immunomodulatory [18] and wound and burn healing effect [19]. A recent study indicates that aloin and aloe-emodin may be a main constituent responsible for the anti-inflammatory effect of aloe [20]. Aloin used for many years as a laxative and purgative ingredient [21]. Acemannan is the major carbohydrate fraction in the *Aloe Vera* gel which shows antiviral and antineoplastic effects [22]. The gel also contained salicylic acid and other antiprostaglandin compounds that relieve inflammation and bradykininase, which prevents itching [23]. The mucilage i.e. gelatinous polysaccharides mainly has a local effect on the skin and mucous membranes at direct contact, because they can form a barrier that protects against mechanical and chemical irritation.

Barbaloin resembles the anthraquinone glycosides in Senna and have a strongly irritating effect on the intestine, increasing peristalsis and having a strong laxative effect. The main feature of the *A. vera* plant is that it content high amount of water, i.e. 99-99.5% [24]. Fresh aloe juice/gel from the inner leaf parenchyma contains polysaccharides (mucilage) consisting mainly of D-glucose and D-mannose, tannins, steroids, enzymes, plant hormones, amino acids, vitamins and minerals. The dried latex from the superficial pericycle cells contains at least 28% hydroxyanthracene, calculated as anhydrous barbaloin, which is a mixture of aloin A and aloin B, resin and saponins [25]. The gel contains an emollient polysaccharide, glucomannan, which is a good moisturizer utilized in many cosmetics [26].

Materials and Methods

The experiment was conducted at the experimental farm of Nagarjun Medicinal Plants Garden, Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS). Seven genotypes were collecting from throughout Maharashtra region and eight genotypes from National Research Centre, Boriavi (Anand), Gujrat. In all fifteen genotypes were planted in Kharif season for evaluation and data presented in table- 1 & 2. The experiment was plotted in RBD design with two replications. The plot size was 2.4 m x 2.4 m with 60 cm x 60 cm spacing. The crop was harvested after 7 months of sowing. The other agricultural practices were done as per the approved technologies by Dr PDKV, Akola.

Table 1: Morphological character of *Aloe Vera*

S. N	Genotype(s)	Leaf orientation	Leaf color	Blotches on young Leaves	Spine color
1	AKAv 09-01	Whorled	Pale	Medium	Light red
2	AKAv 09-03	Whorled	Pale	Heavy	Pale
3	AKAv 09-04	Whorled	Pale	Medium	Pale
4	AKAv 09-05	Whorled	Pale	Medium	Pale
5	AKAv 09-06	Whorled	Pale	Medium	Pale
6	AKAv 09-07	Whorled	Pale	Medium	Pale
7	AKAv 09-08	Whorled	Pale	Medium	Pale
8	IC 285626	Whorled	Pale	Medium	Pale
9	IC 285629	Whorled	Pale	Medium	Pale
10	IC 285630	Whorled	Pale	Medium	Pale
11	IC 310619	Whorled	Pale	Medium	Pale
12	IC 112521	Whorled	Pale	Medium	Pale
13	IC 112527	Whorled	Pale	Medium	Pale
14	IC 112531	Whorled	Pale	Medium	Pale
15	IC 112532	Whorled	Pale	Light	Pale

Table 2: Yield contributing characters

Accession	Plant height (cm)	No. of suckers Plant ⁻¹	No. of Leaves Plant ⁻¹	Leaf Length (cm)	Leaf width (cm)	Leaf thickness (mm)	Leaf weight (g)
AKAv 09-01	53.75	3.25	17.00	45.00	7.63	13.42	202.75
AKAv 09-03	48.63	3.00	13.50	42.63	7.63	18.22	288.50
AKAv 09-04	43.50	2.34	12.50	39.34	6.38	16.22	195.25
AKAv 09-05	39.68	4.00	11.50	38.00	6.38	15.45	193.00
AKAv 09-06	50.75	2.67	13.67	46.13	7.35	18.22	272.59
AKAv 09-07	54.75	5.25	13.75	48.13	6.68	16.57	300.00
AKAv 09-08	45.88	3.17	11.75	42.13	6.35	14.13	194.50
IC 285626	47.09	5.00	12.17	45.09	6.83	16.37	249.00
IC 285629	54.55	3.75	14.25	50.75	8.10	20.05	319.00
IC 285630	58.75	3.25	14.25	53.88	8.68	19.98	413.75
IC 310619	51.50	5.84	13.67	48.42	6.22	18.50	307.34
IC 112521	46.75	3.88	13.00	42.75	7.25	14.24	241.25
IC 112527	55.94	6.46	11.50	51.90	7.58	16.56	326.50
IC 112531	53.67	4.00	11.84	48.34	7.95	16.04	297.67
IC 112532	46.08	2.00	9.84	42.13	5.85	14.12	165.34
SE (M) _±	2.120	0.955	0.922	2.885	0.677	1.120	26.878
CD (0.5%)	6.430	NS	2.799	3.753	NS	3.398	81.522
CV %	5.986	35.01	10.083	8.942	13.451	9.581	14.375

Results and Discussion

Genotype IC 285630 recorded the highest plant height (58.75cm) and followed by the genotype IC 112527 (55.94 cm). The genotype AKAV-09-01 recorded significantly highest No. of leaves /plant (17.00) which was at par with IC- 285629 and IC-285630 (14.25). As regards the leaf weight genotype IC- 285630 recorded significantly highest value (413.75g). No significant differences were observed in respect of no. of suckers per plant and leaf width. No

variation in terms of qualitative attributes was observed except light red spine colour in AKAV – 09-01.

Conclusion

The genotype AKAv-09-01 recorded significantly highest No. of leaves /plant (17.00) which was at par with IC- 285629 and IC-285630 (14.25). However, the significantly highest leaf weight (413.75g/leaf) was recorded with genotype IC- 285630.

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