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RESEARCH ARTICLE

Effect of heating of the gel at different temperatures on antioxidant activity in different accessions of aloe (*Aloe barbadensis* Miller.)

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SUMMARY

The experiment consisted of three accessions of aloe *viz.*, yellow flowering accession-1, yellow flowering accession-2 and orange flowering accession-3 and three temperatures *viz.*, 50° C, 75° C and 100° C temperatures. The antioxidant activity of aloe gel was studied in three accessions heated at different temperatures. The results of the study indicated that, the highest antioxidant activity was recorded by yellow flowering accession-1 at all heating temperatures during the 30 days of storage followed by yellow flowering accession-2 and orange flowering accession-3.

Key Words : Yellow flowering accession-1, Yellow flowering accession-2, Orange flowering accession-3, Antioxidant activity

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The herb aloe is as old as human civilization. It belongs to the family Liliaceae. aloe is mainly cultivated for its thick fleshy leaves from which the yellow resinous latex or yellow sap or anthraquinones (the bitter yellow liquid between the leaf rind and gel) exudes and can be used as a laxative or purgative. The inner most part of the leaf is a clean, soft, moist and slippery tissue where water is held in the form of viscous mucilage called gel (Newton, 2004). The gel is the rich source of polysaccharides, antioxidants, enzymes, minerals and vitamins (Chauhan *et al.*, 2007). aloe gel is highly susceptible to oxidation and when exposed to air, the gel rapidly oxidizes, decomposes and looses much of its biological activities (Coats, 1979). Heating of gel is an effective method of pasteurization and add better flavour (He *et al*., 2005). Gel heating may change the composition which also has effect on storage. aloe gel can be stored for more number of days (up to 30 days) at 5^{0}C without any deterioration in quality (Hemalatha *et al*., 2008). Hence, the present investigation was carried out to study the effect of heating of the gel on antioxidant activity of aloe.

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MATERIALS AND METHODS

The present investigation was carried out during 2010 at Herbal garden, College of Horticulture, Rajendranagar, Hyderabad, A.P. The experiment consisted of 9 treatment combinations laid out in Completely Randomized Design with factorial concept in three replications (Table A).

Table A: Details of treatments imposed

Treatment	Combination of treatments
T_1	$A_1 t_1$ (Yellow flowering accession-1+50°C)
T_2	$A_1 t_2$ (Yellow flowering accession-1+75°C)
T_3	$A_1 t_3$ (Yellow flowering accession-1+100°C)
T_4	$A_2 t_1$ (Yellow flowering accession-2+50°C)
T_5	$A_2 t_2$ (Yellow flowering accession-2+75°C)
T_6	$A_2 t_3$ (Yellow flowering accession-2+100°C)
T_7	$A_3 t_1$ (Orange flowering accession-3+50°C)
T_8	$A_3 t_2$ (Orange flowering accession-3+75°C)
T_9	$A_3 t_3$ (Orange flowering accession-3+100°C)

Healthy and matured leaves of different accessions with 14 months age were harvested manually. Thus, the extracted gel from the leaves was thoroughly homogenized in a mixer and gel of each accession was heated at 50°C, 75°C and 100°C for 15 minutes and stored at room temperature. Standard preservative (sodium benzoate 1000 ppm + citric acid 1%) was added to aloe gel. Then the treatments were analyzed for antioxidant activity. The antioxidant activity readings were recorded at 10 days intervals up to 30th day of storage of aloe gel.

Total antioxidant activity was determined by following the TBARS method (Nickos *et al.*, 1994). Sample size of 1ml was homogenized with 10 ml of 0.1 M phosphate buffer (pH 7.8) one per cent of EDTA 0.05 M and centrifuged at 4000 rpm for 15 minutes at 5^{0}C. The clear supernatant extract was used for analysis. The reaction mixture contained 2-3 ml of aliquot of sample, coconut oil (0.24 ml) in phosphate buffer (0.26ml, 0.1 M, pH 7.8), ferrous sulphate (0.05 mM), ascorbic acid (0.4 mM), potassium hydrogen phosphate (100 mM, pH 6.0), BHT (25 mM in 5ml hexane) in a final volume of 2.4 ml. Contents of the tube were incubated for 30min at 37^{0}C. TCA (0.75 ml, 20%) was added and centrifuged at 10,000 rpm for 30 minutes at 4^{0}C, followed by addition of TBA (0.5% in 0.1 M NaOH). Distilled water was added to equalize the final volume to 3.24 ml. This was heated at 95^{0}C in water bath for 30 minutes followed by immediate cooling in ice pack for 5 minutes. Finally, the reaction mixture was submitted to read the absorbance at 532 nm against TBA (Thiobarbituric acid).

There is an inverse relationship between the per cent thiobarbituric acid reactive substances and antioxidant activity where as it is directly related with per cent inhibition of peroxidation (Amruta Pritam and Purushottam Kale, 2007). If the per cent inhibition of peroxidation is high, antioxidant activity is also high.

RESULTS AND DISCUSSION

Antioxidant activity is the termination of chain reaction by removing the free radical intermediates which are produced in chemical reaction due to oxidation. Free radicals can start chain reactions that damage cells. Fruits and vegetables in general found to be good sources of antioxidants. The total antioxidant activity in aloe was determined by per cent TBARS and per cent inhibition of peroxidation (Table 1).

Thiobarbituric acid reactive substances (% TBARS) :

The results indicated that maximum per cent TBARS on day1 (455.33%) was recorded with orange flowering accession-

Table 1: Effect of heating at different temperatures on antioxidant activity of gel in different accessions of aloe

Treatments	Days of storage (%TBARS)				Days of storage (% INHIBITION)			
	Fresh	10th day	20th day	30th day	Fresh	10th day	20th day	30th day
A_1	404.11	412.33	422.89	435.89	66.33	64.32	62.76	61.72
A_2	427.56	433.78	443.44	447.22	64.26	63.16	61.49	60.43
A_3	453.22	460.11	467.56	475.44	60.98	60.11	58.80	57.21
S.E. ±	4.1564	3.7963	3.6863	3.6840	0.5393	0.4051	0.2731	0.1776
C.D. (P=0.05)	8.7326	7.9759	7.7448	7.7401	1.1332	0.8511	0.5737	0.3731
t_1	427.89	435.22	444.78	452.89	63.78	62.47	60.99	59.77
t_2	426.56	432.56	441.89	450.00	64.30	62.80	61.26	60.08
t_3	430.44	438.44	447.22	455.67	63.49	62.32	60.80	59.52
S.E. ±	4.1564	3.7963	3.6863	3.6840	0.5393	0.4051	0.2731	0.1776
C.D. (P=0.05)	8.7326	7.9759	7.7448	7.7401	1.1332	0.8511	0.5737	0.3731
Accessions×Temperatures								
A_1 t_1	404.67	412.33	423.00	435.67	66.17	64.27	62.70	61.70
A_1 t_2	401.67	409.33	419.00	433.33	66.90	64.60	62.97	61.90
A_1 t_3	406.00	415.33	426.67	438.67	65.93	64.10	62.60	61.57
A_2 t_1	426.67	433.33	443.67	447.33	64.10	63.07	61.47	60.43
A_2 t_2	426.00	430.67	440.67	444.33	64.57	63.40	61.80	60.80
A_2 t_3	430.00	437.33	446.00	450.00	64.10	63.00	61.20	60.07
A_3 t_1	452.33	460.00	467.67	475.67	61.07	60.07	58.80	57.17
A_3 t_2	452.00	457.67	466.00	472.33	61.43	60.40	59.00	57.53
A_3 t_3	455.33	462.67	469.00	478.33	60.43	59.87	58.60	56.93
S.E. ±	7.1991	6.5753	6.3848	6.3809	0.9342	0.7016	0.4729	0.3076
C.D. (P=0.05)	15.1253	13.8147	13.4144	13.4063	1.9627	1.4751	0.9936	0.6463

3 heated at 100^{0}C has increased to 462.67, 469.00 and 478.33 at 10th, 20th and 30th day of storage, respectively and it was at par with orange flowering accession-3 at 50^0 C (452.33, 460.0, 467.67 and 475.67per cent at day1, 10th, 20th and 30th day of storage , respectively). Minimum per cent TBARS on day 1 (401.67%) was recorded with yellow flowering accession-1 heated at 75^{0}C has increased to 409.33, 419.0 and 433.33 per cent at 10th, 20th and 30th day of storage, respectively.

Maximum per cent TBARS was recorded by orange flowering accession-3 at all heating temperatures during all storage intervals followed by yellow flowering accession-2 while the minimum per cent TBARS was recorded with yellow flowering accession-1.

Per cent inhibition of peroxidation (%) :

Highest per cent inhibition on day 1 (66.90) was recorded by yellow flowering accession-1 heated at 75^{0}C which has decreased (64.60, 62.97 and 61.90 at 10th, 20th and 30th day of storage, respectively) and was at par with yellow flowering accession-1 heated at 50°C (66.17, 64.27, 62.70 and 61.70 per cent at all storage intervals). The lowest per cent inhibition on day 1 (60.43) was recorded with orange flowering accession-3 heated at 100^{0}C which has decreased to 59.87, 58.60 and 56.93 at 10th, 20th and 30th day of storage, respectively.

Measurement of bioactivity such as antioxidant capacity becomes more useful for assessing the healthiness of foods than measurement of specific micronutrients (Van Beckel and Jongen, 1997). All the aloe extracts showed significant antioxidant activity. Miranda *et al*. (2009) reported that the antioxidant capacity of the gel was decreased at drying temperatures of 80^0 C and 90^0 C but aloe gel produced at drying temperature of 60-70^0 C, resulted in the production of high quality gel. It is concluded from the investigation, yellow flowering accession-1 heated at 75^0 C has showed maximum antioxidant activity (61.9%) during the storage period followed by the same accession at 50^0 C and 100^{0}C. The antioxidant activity was decreased gradually with increase in storage period up to 30th day. Irrespective of the temperatures, yellow flowering accession-1 has recorded the highest antioxidant activity when compared to yellow flowering accession-2 and orange flowering accession-3.

REFERENCES

Amruta Pritam and Purushottam, Kale, G. (2007). Alteration in the antioxidant potential of aloe vera due to fungal infection. *Plant Pathol. J.*, **6** (2) : 169-173,2007

Chauhan, O. P., Raju, P. S., Farhat Khanum and Bawa, A. S. (2007). *aloe vera* - Therapeutic and food applications. *Indian Food Industry*, **26**(3):43-51.

Coats, B. C. (1979). Hypoallergenic stabilized *aloe vera* gel: United States Patent. 4178372.

Hemalatha, P., Vadivel, E., Saraswathi, T. and Rajamani, K. (2008). Role of preservatives and storage temperature on the post harvest quality of *aloe vera* gel. *Acad. Plant Sci.*, **21**(2): 471-473. 5 ref.

He, Q., Changhong, L., Koje, E. and Tian, Z. (2005). Quality and safety assurance in the processing of aloe vera gel juice. *Food Control*, **16**:95-104.

Newton, L.E. (2004). aloes in habitat at In: *aloes the genus aloe;* Reynolds T Ed CRS Press Boca Raton pp:3- 36.

Nickos, Y., Anwar, Farooq and Ashraf, Muhammad (1994). Effect of extraction solvent technique on the antioxidant activity of selected medicinal plant extracts. *Molecules*, **14** (6) : 2167-2180.

Van Beckel and Jongen, N. (1997). High-performance liquid chromatographic determination of phenolic compounds in aloe species. *J. Chromatography*,**746**(3): 225-231.

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