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DEVELOPMENT AND SENSORY EVALUATION OF READY TO SERVE BLENDS OF ALOE VERA (*ALOE BARBADENSIS MILL.*)

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ABSTRACT

This study was conducted at Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi during 2014 to develop the economical Aloe drink using available resources and to evaluate the sensory properties of different blends of Aloe vera drink. The sensory qualities that were evaluated include color, taste, smell, appearance and feelings. The most least liked Aloe blend was T4 that include Aloe gel, water, sugar and mint leaves. It was due to the strong smell and taste of mint leaves as mint leaves contain menthol. The overall acceptability of T8 was at the top as it contained complete blend of Aloe gel, mint leaves, fresh lemon juice and ginger. In this blend the strong taste of mint leaves was overcome by the lemon juice and ginger was only used to give little taste so this was most liked by the panel. Aloe vera gel have got much more attention as it is being used in the cosmetic industry for making creams, shampoos, lotions, in food industry for making different beverages and health drinks and in medical field for curing certain diseases. An effort was made to make Aloe drink using the available resources and to develop awareness about its importance among the people.

KEYWORDS: Aloe barbadensis Miller; Aloe vera; sensory; Aloe gel; industry; Pakistan.

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INTRODUCTION

Aloe vera (*Aloe barbadensis* Miller), belongs to family Liliaceae. The name Aloe vera barbadensis has been specified for the true aloe, while the other aloes are normally known as Curacao aloe (Choi and Chung, 2013). Aloe vera has been used for its medicinal worth for several thousand years (Vogelzang, 2001). Its applications have been recorded in earliest cultures of several countries like Egypt, Greece, Rome and China. Its use is also mentioned in the Bible where it was taken as the plant of immortality (Saeed *et al.,* 2004). Aloe is native to Africa and Mediterranean regions (Ragesware et al., 2012), but now it is spread to West Indies, India, China, Pakistan and other countries of Asia in 16th century (Ali and Qaisar 2005). The name Aloe vera is normally comes from the Arabic word "Alloeh" meaning "Shining bitter substance" (Dandhof, 1987). There are about 350 different species of Aloe vera but generally all come under the term "Aloe". The most commonly and abundantly used specie of Aloe vera is *Aloe barbadensis* (Yagi *et al.,* 2003).

Aloe vera is a perennial and evergreen plant. It is an evergreen herb which is mainly concentrated in the tropical and sub-tropical regions of the world. It is a cactus like plant having large amount of pulp in its leaves; it can easily survive in the hot and dry climates. The gel presents in the leaves helps to store water and reduces the water loss and rate of evapo-transpiration (Sethi *et al.,* 2012. Aloe is perennial which can reach upto the height of 30 cm. Leaves are fleshy, toothed at the margins and spirally arranged on the plant (Chaudhury and Mukundan 2001). The flower color of Aloe flower was described by Ali and Qaiser (2005), who reported that in Pakistan and India its flowers are in reddish color while it has different colors for the plants growing in Europe.

The leaves of Aloe vera consist of three important layers: a) the outer thick layer: b) a jelly like mucilage layer which is known as "aloes" and c) the water storage area of the plant that is fillet. The research revealed that post-harvest life of Aloe vera leaves depends upon the methods of harvesting, handling and transportation. The Aloe vera leaf contains active biological compounds and their activity rate depends upon the handling and processing of Aloe vera leaves Chandegara and Varshney, 2013.

Aloe vera gel have got greater attention as it is being used in the cosmetic industry for making creams, shampoos, lotions, in food industry for making different beverages and health drinks and in medical field for curing certain diseases (Hamman, 2008). It has been proved through previous research that Aloe vera has more than 160 chemical compositions, from these 160 almost 70 chemical compositions are functional

and active by help in maintaining the human health like anthraquinone compounds (Kong *et al.,* 2003). Similarly other compounds include polysaccharides, glucoside, lipids, organic acids, amino acids, enzymes, antibiotics, vitamins, etc. Fresh leaf of Aloe contains upto 96% biologically neutral water of total weight of leaf (Yan, 2009).

Now a day's Aloe gel extractions have got the research based and technical aspect as the gel is being used in different industries for variety of purposes. Chandegara and Varshney (2013) discussed the different methods of gel extraction by hand filleting method. Mechanical filleting method is very common method to extract the aloe gel; this process takes place on conveyer belt equipped with blades (O'brien and Chantal, 2005). In whole leaf processing method the tips and base are cut and then whole leaf is cut down in to pieces and treated with chemicals alongwith grinding to get the desirable constituents (Danhof, 2000). Roller squeezing method i.e. Aloe vera leaf splitting method is also some important mechanical methods used for the extraction of Aloe vera leaf gel.

Aloe vera is now becoming an industrial crop as it is largely used in the food industry for to prepare health drinks, beverages like tea, ice creams, dried juice, dessert and milk a lot (Seoshin *et al.,* 1995). Aloe vera juice is the most commonly used and the most of Aloe gel is used to make Aloe drinks. All around the world different attempts have been done to make different recepies of Aloe drink which is good in taste, economical and also healthful. A blend of aloe vera, Anola and Ginger is being used to make Aloe drink in India (Sasi *et al.,* 2013). Similarly Aloe drink is prepared using different mixtures like Aloe vera gel, ginger and lemon juice extracts (Herlina, 2001). Now to increase the variety of tastes in the Aloe drinks different fruit juices are also used alongwith the Aloe gel to have the taste and medicinal value in one drink.

In the few recent years, ethno botanical uses of plant material in the treatment of various diseases and ailments have got much attention. Chemical, bio-chemical, physio-chemical and biological studies on the Aloe vera plant have opened the new ways in medical, clinical and cosmetic fields. Aloe drink preparation with different mixtures that may include ginger, mint, lemon, stevia, anola or any other fruit has now become very common. As aloe drink has many medicinal uses and it is also used as energy drink so different industries like food and beverages and pharmaceutical are trying to enhance their efficiency in making good and tasty juice with good shelf life. The main objectives of this study are as under:

To develop economical only the best Aloe drink using available resources.

MATERIALS AND METHODS

This study was conducted at Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi during the year 2014.

Harvesting of Aloe vera leaves

Harvesting of aloe vera leaves is an important factor as the activity of biological compounds largely depends upon the method of harvesting as it is used for treatment of several ailments along with the source of energy. So the biological activity of certain chemicals present in the leaf gel is very important. Micro-organisms infestation can reduce this activity if proper measurements are not adopted.

Under suitable environmental conditions the healthy leaves with adequate amount of gel were harvested from the base of plant using a sharp knife. The base of leaf should remain intact and sealed while harvesting the leaf. Infestation of microorganisms increased if the leaves were harvested improperly. After harvesting, leaves were placed at 4-5°C temperature and were processed within 4-5 hours at 23 °C temperature. The leaves could be stored for about three weeks if placed at appropriate temperature. Generally after every 7-8 weeks, 3-4 healthy leaves of Aloe vera could be harvested.

Washing of harvested Aloe leaves

Washing involved the removal of dirt and other impurities from the leaf to get pure gel with high level of active biological compounds. Harvested leaves were brought into the basin of the laboratory. Soft brushes were used to remove the adhered soil and dust particles from the harvested Aloe leaves. Then under the running tap water, leaves were properly washed. This process is repeated for several times until all the impurities were removed from the leaves. If the leaved are filled with the mud then it is suggested that these must be washed outside the laboratory before the final washing. The leaves were kept in a basket so that all water drained away. The extraction of gel was done after the leaves were dried properly.

Extraction of leaf gel

The gel extraction is the key step of Aloe leaves processing. The main constituent used for making Aloe drink is the Aloe gel, so the extraction method and leaf handling during the process is of supreme importance. Among various other gel extraction methods, the hand filleting method is commonly and frequently used. This method ensures the best quality and maximum quantity of the Aloe vera leaves gel.

After washing and drying of Aloe leaves, the gel extraction procedure begun with peeling of outer rind/ peel. The tapering edges and the top and bottom

portions of leaves were removed as it contained anthraquinone which could give bitter effect to the Aloe drink. The peel was removed from the upper surface of leaf in such a way that minimum gel is attached to the leaves. The gel must be free from the green portion/ rind of the leaves; extraction was done in a way to get the crystal clear gel. Once the upper layer of rind was removed, gel was extracted by removing the lower layer of rind. Another way to collect the gel was with the help of spoon. The extracted gel is collected and stored at 4-5°C temperature for later use. By hand filleting of the Aloe leaf, the leaf was used to get maximum quantity of gel and to ensure certain that the final product/blend contains all the nutrients that are present in the Aloe leaf. All this process is depicted the Fig. 1.

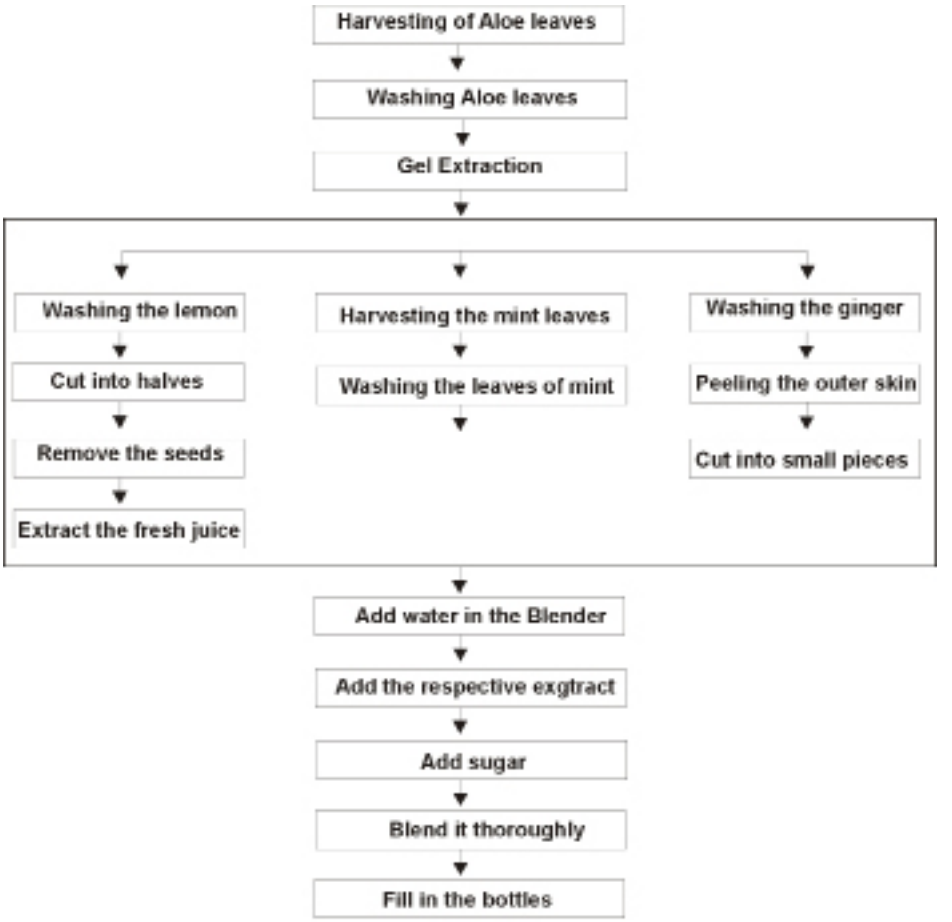

Fig. 1. Flow chart showing various steps involved in making Aloe dring

Preparation of Aloe drink/juice

Following ingredients were used for Aloe vera drink while Aloe vera drink was prepared using eight treatments.

Ingredients

Water = 200 ml, Aloe gel = 14 g sugar = 12.4 g, Fresh mint leaves= 3 leaves, Fresh lemon juice= 2 table spoons, Ginger = 0.37g

Treatments

T1= Aloe gel + water, T2= Aloe gel+ water + sugar, T3= Aloe gel + water + sugar + fresh lemon juice, T4= Aloe gel+ water + sugar + fresh mint leaves, T5= Aloe gel+ water + sugar + ginger, T6= Aloe gel+ water + sugar + fresh lemon juice + fresh mint leaves, T7= Aloe gel+ water + sugar + fresh lemon juice + ginger, T8= Aloe gel+ water + sugar + fresh lemon juice + fresh mint leaves + ginger

Preparation of Aloe juice and sensory evaluation

Freshly extracted gel of aloe, fresh lemon juice, fresh mint leaves and ginger were used to make Aloe drink. The lemon juice was obtained by removing seeds and squeezing the lemon, the mint leaves were chopped into smaller pieces with knife and the ginger was first peeled and then chopped into smaller pieces. For all treatments, weight of Aloe gel, sugar and ginger, lemon juice and mint leaves were kept constant while the ingredients were different for various blends of Aloe. For different blends the ingredients were blended in a

laboratory blender. After the preparation of each blend, drink was poured into the bottle of one liter and served to a group of individuals for sensory evaluation.

Sensory Qualities Evaluation

For this purpose a group of nine individuals was made including graduate students and some faculty members of the department. The sensory qualities that were evaluated included colour, taste, smell, appearance and feelings.

The panelists were asked to record their observations and give marks to each parameter of different blends out of 10 on the sensory sheet. Maximum likeness was shown by the number10 and number 1 represents the minimum likeness.

Statistical analysis

Layout of experiment was completely randomized design (CRD) with nine replications per treatment. Data were statistically analyzed by the analysis of variance (ANOVA) technique and the differences between different blends of Aloe vera were compared.

Table 1. Sensory qualities of different blends of Aloe.

Treatments	Color	Taste	Smell	Appearance	Feelings
T1	7.1111 a	4.1111 b	4.4444 c	5.8889 a	5.0000 cd
T2	7.0000 a	7.1111 a	5.7778 abc	6.1111 a	6.6667 ab
T3	6.5556 a	7.7778 a	7.5556 a	5.6667 a	7.3333 ab
T4	2.7778 b	4.3333 b	5.7778 abc	6.2222 a	3.7778 d
T5	5.6667 a	6.0000 ab	5.4444 bc	6.5556 a	6.3333 bc
T6	6.3333 a	7.8889 a	6.8889 ab	6.5556 a	8.2222 a
T7	6.2222 a	7.0000 a	6.6667 ab	6.1111 a	7.0000 ab
T8	6.3333 a	7.6667 a	7.5556 a	7.4444 a	8.2222 a

RESULTS AND DISCUSSION

Colours of different blends was different ranging from transparent (T1 and T2) to greenish (T3) because of mint leaves and light yellow colour for T4 as it contained lemon juice. The taste of different blends also differed according to various ingredients used. The marks for appearance were given on the basis of overall look, transparency and reflection properties of the drink.

The results indicated that colour of T1 was best as it did not contain any constituent not even the sugar so transparency made it as best in colour (Table 1). The color of T4 attained minimum likeness as it was the blend containing mint leaves. Similarly taste of T1 was least liked as it was without sugar so it did not have any taste. T6 containing both lemon juice and mint leaves had the best taste. Smell of T1 was not liked while T3 and T8 had equal level of likeness with regards to smell. T1 was least liked by the appearance while the best blend by the appearance was T8. The results further indicated that T4 had the minimum likeness in feelings while T8 was at the top. Which contained all the ingredients. The overall acceptability of T8 was also at the top.

Sensory qualities of different blends of Aloe vera beverage were determined. It was observed least liked Aloe blend was T4 that include Aloe gel, water, sugar and mint leaves (Table 2). It may be due to the strong smell and taste of mint leaves. The overall acceptability of T8 was at the top as it contained complete blend of Aloe gel, mint leaves, fresh lemon juice and ginger. In this blend the strong taste of mint leaves was overcome by the lemon juice and ginger was only used to give little taste so this was most liked by the panel. The blend without sugar was T1 which was not much liked but it is best for the diabetic to be used as a medicine. Mostly people don't like drinks without sugar and same is the case of T1 blend. As far as medicinal value of Aloe vera is concerned the blend T1 was found as the most appropriate for the sugar patients. The strong taste of T4 was due to the presence of fresh mint leaves as mint leaves contain menthol upto 50% which gave strong taste to Aloe drink. Because of menthol, mint was used as mouth freshner and for soothing effects (Ali *et al.,* 2001). The results of T6 showed that strong effect of mint leaves was reduced by the organic acids of lemon, mainly the citric acid. It also depends upon the quantity of lemon used but it was observed that citric acid of lemon lowers the effect of mint's menthol. Similarly, the pungent taste of ginger is because of gingerols and shogaols which made the Aloe blend slightly pungent (Mujeeb and Lakshni, 2007).

Table 2. Total numbers for each parameter of different blends of Aloe drink.

Types of Blends	Color	Taste	Smell	Appearance	Feeling
T1	64	32	40	53	45
T2	63	65	52	55	60
T3	59	70	68	51	65
T4	25	39	52	56	34
T5	51	54	49	59	57
T6	57	71	62	59	74
T7	56	63	60	55	63
T8	57	69	68	67	74

Overall acceptability

The overall acceptability of different Aloe blends was checked by adding the numbers given to different parameters of specific blend. T4 got the least marks in overall acceptability which was containing mint leaves. The second highest position was obtained by the blend T6 which contained lemon juice and mint leaves to make a tasty Aloe blend. The blend that got the highest position in overall likeness was T8, as it contained the taste of mint leaves, the citric acid of lemon juice made it slightly bitter and the minor taste of ginger made it overall a best blend.

Table 3. Total numbers given to specific parameters of different blends.

Type of Blend	Overall acceptability
T1	234
T2	295
T3	313
T4	206
T5	287
T6	323
T7	297
T8	335

CONCLUSION

Healthy and long leaves were suitable for the gel extraction as they contain large amount of leaf pulp. Care should be taken while extracting the gel, don't let the yellow substance that is anthraquinone to mix with the gel. Sensory qualities of all blends were carefully evaluated to find out the most favorite blend. An effort was made to make Aloe drink using the available resources and to develop awareness about its importance among the people.

RECOMMENDATIONS

Aloe Vera has added benefits when used daily. The daily dosage of Aloe juice is one ounce that is equal to 2 tablespoons. It gives better results when taken before meals to increase the absorption.

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