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# Evaluation of the Sensory Qualities of Ready to Serve Blends of Aloe Vera (*Aloe barbadensis* Mill.)

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## Abstract

*Aloe vera* has been used for its medicinal worth for several thousand years. To reveal the medicinal value and create awareness among people about its uses a research was conducted at Department of Horticulture, Pir Mehr Ali Shah Arid Agriculture University Rawalpinid, Punjab, Pakistan in year 2013-14. The main objectives of this study are 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 feels. For each 200 ml of water, 14 g Aloe gel, 12.4 g Sugar, 3 Fresh mint leaves, 2 tbs of Fresh lemon juice and 0.37 g of Ginger was used. The panelists were asked to record their observations and give marks to each parameter of different blends out of 5 on the sensory sheet. The highest marks were 5 which were given to the most liked parameter. Number 5 on the sensory sheet represents the 'excellent' for the specific sensory quality similarly 4 for 'very good', 3 for 'good', 2 for 'fair' and 1 for 'poor'. The least liked Aloe blend included Aloe gel and water. It was due to the strong absence of sugar and any other ingredient that has some taste. The overall acceptability of a complete blend of *Aloe gel*, water, sugar, fresh lemon juice, fresh mint leaves and ginger was at the top. The potential of *Aloe vera* to be used in Food Industry and Pharmaceutical Industry has been increased. So, an effort was made to make Aloe drink using the available resources and to develop awareness about its importance among the people.

## INTRODUCTION

The botanical name of *Aloe vera* is *Aloe barbadensis* Miller, it 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, 2003). *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 mention in the Bible where it was taken as the plant of immortality (Saeed *et al.*, 2004). Rajeswari, 2012 reported that Aloe is native to Africa and Mediterranean regions, but now it is spread to West Indies, India, China,

Pakistan and other countries of Asia in 16th century (Ali and Qaiser, 2005). The name *Aloe vera* is normally considered that it comes from the Arabic word "Alloeh" meaning "Shining bitter substance" (Dandhof, 1987). There are about 350 different species of *Aloe vera* but generally all comes 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 plant moreover 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 help to store water and reduces the water loss and rate of evapo-transpiration (Sethi *et al*, 2012). Aloe is perennial which can reach up to the height of 30 cm. Leaves are fleshy, toothed at the margins and spirally arranged on the plant (Chaudhuri and Mukandan, 2001. The flower color of Aloe flower was described by Ali and Qaiser, 2005; they reported that in Pakistan and India its flowers are in reddish color while it has different color 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", c) the water storage area of the plant that is fillet. It has been revealed through research that the post harvest life of the *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 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 (Hamman, 2008). It has been proved through previous study and research that *Aloe vera* has more than 160 chemical compositions, from these 160 almost 70 chemical compositions are functional and active helps in maintaining the human health like anthraquinone compounds. *Aloe vera* contains 75 active constituents like enzymes, polysaccharides, essential and non-essential amino acids, beta-carotene, Vit C, E and B12, etc. and tannins together with their functional properties. Similarly, other compounds include polysaccharides, glucoside, lipids, organic acids, amino acids, enzymes, antibiotics and vitamins etc. fresh leaf of Aloe contain up to 96% biologically neutral water of the total weight of leaf (Yan, 2009).

Now a day's Aloe gel extraction 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, 2005). In whole leaf processing method, the tips and base is cut and then whole leaf is cut down in to pieces and treated with chemicals along with grinding to get the desirable constituents (Danhof, 2000). Roller squeezing method, *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 the preparation of health drinks, beverages like tea, ice creams, dried juice, dessert and milk etc (Seoshin *et al*, 1995). *Aloe vera* juice is the most commonly used and most of the 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 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 by 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 along with 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 is now become very common. As aloe drink have many medicinal uses and it is also used as energy drink so different industries 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 the economical Aloe drink using available resources.
- To evaluate the sensory properties of different blends of *Aloe vera* drink.
- To evaluate the most liked and the best blend of Aloe drink.

## MATERIALS AND METHODS

The research was conducted at Department of Horticulture, Pir Mehr Ali Shah Arid Agriculture University Rawalpinid, Punjab, Pakistan in year 2013-14.

### 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. *Aloe vera* juice 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 condition the healthy leaves with adequate amount of gel were harvested from the base of the plant using a sharp knife. The base of the leaf should remain intact and sealed while harvesting the leaf. Infestation of microorganisms increased if the leaves were harvested improperly. After harvesting of leaves, they were placed at suitable temperature and were processed within 4-5 hours in a room temperature. The leaves could be stored for about 3 weeks at 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 the dirt and other impurities from the leaf to get the 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 the leaves were properly washed. This process is repeated for several times until all the impurities were removed from the leaves. If the leaved were filled with the mud then it is suggested that they must be washed outside the laboratory before the final washing. The leaves were kept in a basket so that all the 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 allows having the best quality and the maximum quantity if the *Aloe vera* leaves gel.

After washing and drying of the Aloe leaves, the gel extraction procedure begun with the peeling of the outer rind/peel. The tapering edges and the top and bottom portions of leaves were removed as it contains anthraquinone which would 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 the rind was removed then gel was extracted by removing the lower layer of the rind. Another way to collect the gel was with the help of spoon. The extracted gel is collected and stored at proper temperature for later use. By hand filleting of the Aloe leaf, the leaf was used to get maximum quantity of gel and to make certain that the final product/blend contains all the nutrients that are present in the Aloe leaf.

### Preparation of Aloe Drink/Juice

- ***Constituents Used***

*Aloe vera* leaf gel, fresh leaves of mint, fresh lemon juice, ginger, sugar, water.

- ***Types of Blends:***

$T_0$= Aloe gel + water
$T_1$= Aloe gel+ water + sugar
$T_2$= Aloe gel + water + sugar + fresh lemon juice
$T_3$= Aloe gel+ water + sugar + fresh mint leaves
$T_4$= Aloe gel+ water + sugar + ginger
$T_5$= Aloe gel+ water + sugar + fresh lemon juice + fresh mint leaves
$T_6$= Aloe gel+ water + sugar + fresh lemon juice + ginger
$T_7$= Aloe gel+ water + sugar + fresh lemon juice + fresh mint leaves + ginger

- ***Quantities of Ingredients***

Water = 200 ml
Aloe gel = 14 g
Sugar = 12.4 g
Fresh mint leaves= 3 leaves
Fresh lemon juice= 2 tbs
Ginger = 0.37 g

## Preparation of Aloe Juice

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 in to smaller pieces with knife and the ginger was first peeled and then chopped into smaller pieces. For all the above parameters the weight of Aloe gel, sugar and ginger, the lemon juice per liter and mint leaves remained 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, the drink is poured in to the bottle of 1 liter and served to a group of individuals for the evaluation of sensory properties (Figure 1).

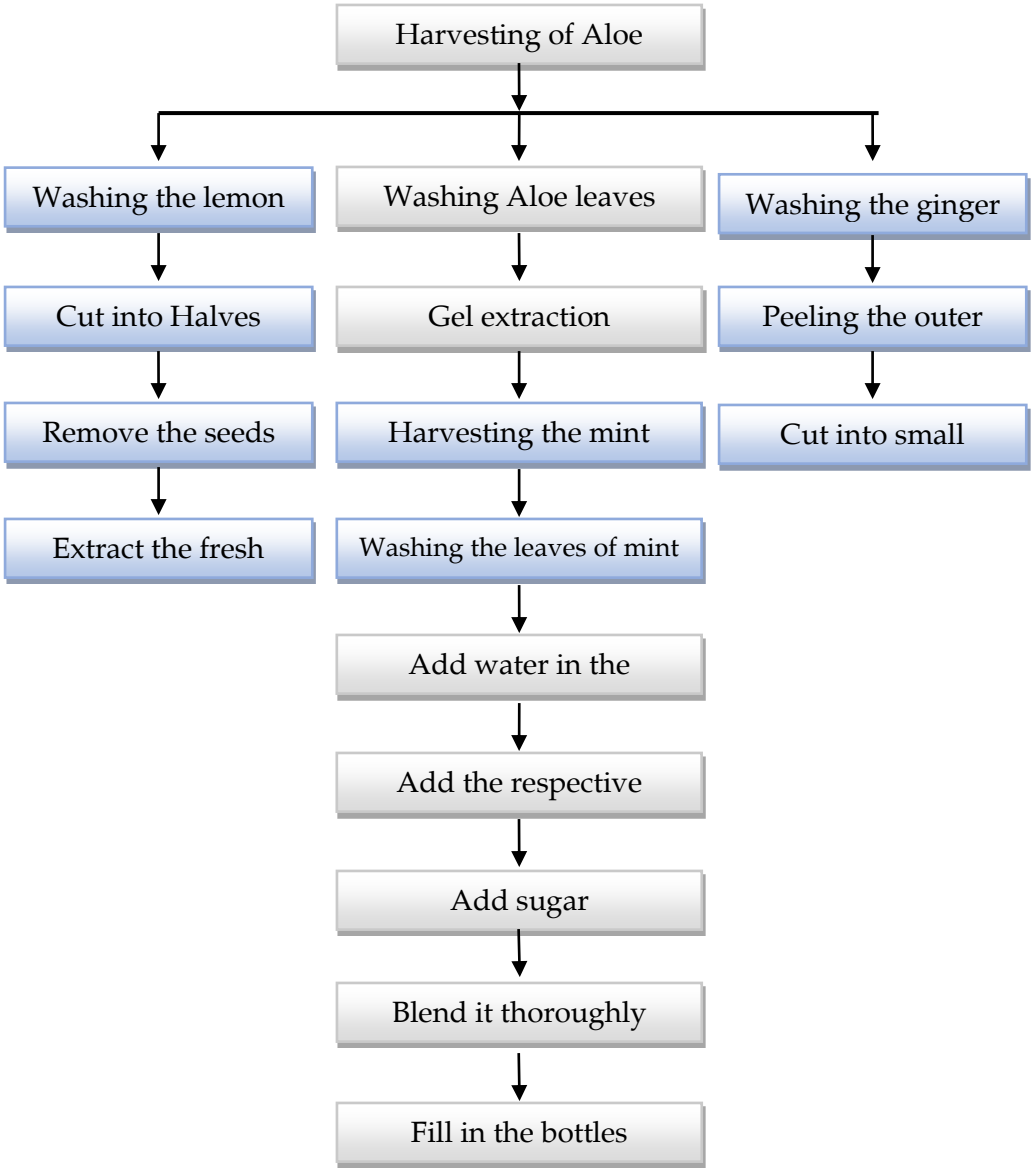


**Figure 1:** Flow chart showing the various steps involved in making Aloe drink.

**Sensory Quality Evaluation**

To evaluate the sensory properties of Aloe drink a group of nine individuals were made including graduate students and some faculty members of the department. The sensory qualities that were evaluated include color, taste, smell, appearance and feelings. The panelists were asked to record their observations and give marks to each parameter of different blends out of 5 on the sensory sheet. The maximum likeness was shown by the number 5 and number 1 represents the minimum likeness. Number 5 on the sensory sheet represents the 'excellent' for the specific sensory quality similarly 4 for 'very good', 3 for 'good', 2 for 'fair' and 1 for 'poor'.

### Comparative Analysis

For comparative analysis data was modified separately for each treatment and simple average means were used to find out the difference between various blends related to likeness or unlikeness.

## RESUTS AND DISCUSSION

As far as the parameter color is concerned different blends were of different colors ranging from transparent for $T_1$ and $T_2$ to greenish for T3 because of mint leaves and light-yellow color for T4 as it contained lemon juice. The taste of different blends was also different according to various ingredients used. The marks given to the appearance parameter was on the basis of overall look, transparency and reflection properties of the drink.

The comparative result of different parameters for various blends was presented in figure 2. Color of $T_7$ was found best as it contains all constituent so blend of green from mint and yellow from lemon gave the highest score to $T_7$ for color. The color of $T_3$ was least liked it was the blend containing mint leaves. Leaves of mint give the dark green color to the blend and the panel least liked the color of $T_3$. Similarly, the taste of T0 was least liked as it was without sugar so it did not have any taste, $T_7$ had the best taste; it was the blend containing both lemon juice and mint leaves. It also contained ginger and sugar that makes $T_7$ best blend of Taste. Smell of T0 was not liked by most of the members of penal. $T_2$ was second most liked blend when evaluated for the smell it was because of the smell of lemon juice and highest average was of $T_7$ as it contained all ingredients and had the best smell of all treatments. $T_0$ and $T_1$ was least liked by the appearance while the best blend by the appearance was $T_7$. Feel is the overall level of satisfaction after having the blend; $T_0$ had the minimum likeness in feel while $T_7$ and $T_5$ with equal level of feel were at the top among all the parameters.

Sensory qualities of different blends of *Aloe vera* beverage were determined and presented in table 1. It could be observed that appearance, color, taste, smell, appearance, feeling and overall acceptability of beverage varied among different blends. The most least liked Aloe blend was $T_3$ that include Aloe gel, water, sugar and mint leaves. It may be due to the strong smell and taste of mint leaves. The overall acceptability of $T_7$ 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 $T_0$ was not much liked but it is best for the diabetic patients and could be use as a medicine. Mostly people don't like drinks without sugar and same is the case of $T_0$ blend. As far as medicinal value of *Aloe vera* is concerned the blend $T_0$ is most appropriate for the diabetic patients. But when aloe drink is used for energy purpose then $T_7$ blend is the most appropriate to relish and energize the body. The strong taste of $T_3$ was because of the presence of fresh mint leaves, mint leaves contain menthol up to 50% which gave strong taste to Aloe drink. It was because of menthol that mint was used as mouth freshner and for soothing effects. (Alvi *et al*, 2001). The results of $T_7$ 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 has been 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 (Majeed and Prakash, 2007).

**Table 1:** Comparative analysis of the data for sensory qualities of different blends of *Aloe vera*.

| Treatment | Color | Taste | Smell | Appearance | Feelings | Average |
|---|---|---|---|---|---|---|
| $T_0$ | 3.78 | 2.11 | 2.33 | 3.22 | 2.78 | 2.84 |
| $T_1$ | 3.67 | 3.78 | 3.33 | 3.22 | 3.56 | 3.51 |
| $T_2$ | 3.67 | 4.22 | 4.0 | 3.11 | 4.0 | 3.80 |
| $T_3$ | 1.78 | 2.33 | 3.22 | 3.44 | 2.0 | 2.56 |
| $T_4$ | 3.11 | 3.33 | 3.0 | 3.56 | 3.33 | 3.27 |
| $T_5$ | 3.22 | 4.11 | 3.67 | 3.44 | 4.44 | 3.78 |
| $T_6$ | 3.33 | 3.75 | 3.56 | 3.33 | 3.78 | 3.55 |
| $T_7$ | 3.89 | 4.33 | 4.11 | 4.11 | 4.44 | 4.18 |
| **Average** | 3.31 | 3.50 | 3.40 | 3.43 | 3.54 | |

## Comparison of All Parameters of Aloe Blends

A comparison was made to access that which selected parameter (Color, Taste, Smell, Feeling, and Appearance) of Aloe blend was liked the most. This study can be used by certain manufacturing companies to access that what is most liked by the community regarding Aloe Blend. The parameter of feeling had the highest average of all panelists that is 3.52; it is a good sign and depicts the potential of use of Aloe drink as refreshing and energy drinks. Color got the least average of 3.29, though certain blends were made with various colors to access that which is most liked but overall among all parameters color need to be improved either by adding some colored natural ingredient or by using artificial flavors.

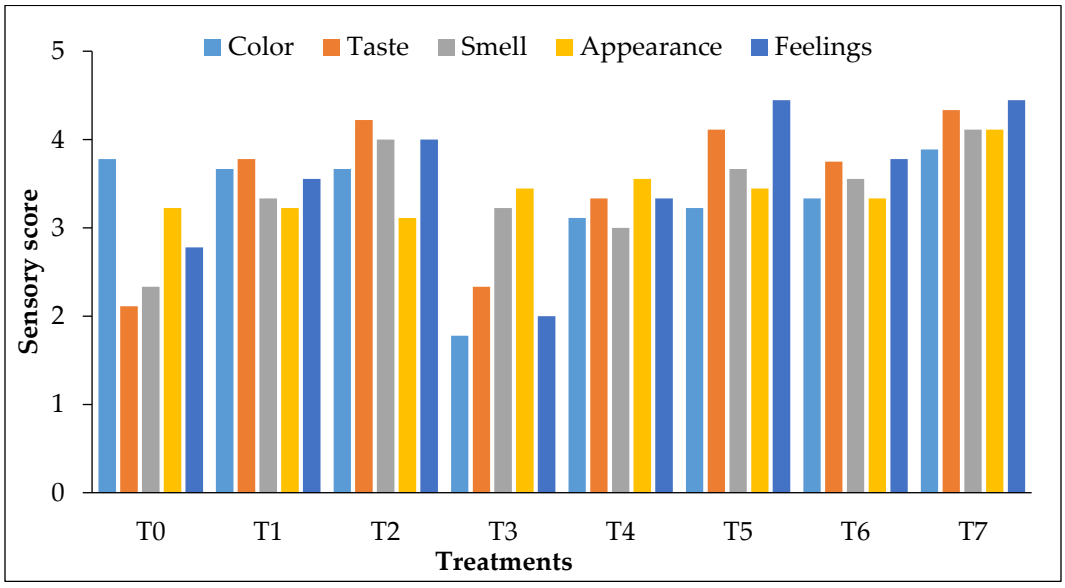


**Figure 2:** Comparative analysis of the data for sensory qualities of different blends of *Aloe vera*.

### Overall Acceptability

The overall acceptability of different Aloe blends was checked by adding the numbers given to different parameters of specific blend (Figure 3). For example, all the numbers for the parameters of blend $T_0$ that was color, taste, smell, appearance and feel judged by all members of the panel were added to know that how much $T_0$ was liked by the panel as compared to other blends. $T_0$ got the least marks in over all acceptability it was the blend containing only aloe gel and water. Most of the members like the blend with sugar and other ingredients. The second highest position got by the blend $T_2$ it contained lemon juice and made the Aloe blend more delicious. The blend that got the highest position in overall likeness was $T_7$, as it contained the taste of min leaves, the citric acid of lemon juice made it slightly bitter and the minor taste of ginger made it overall a best blend.

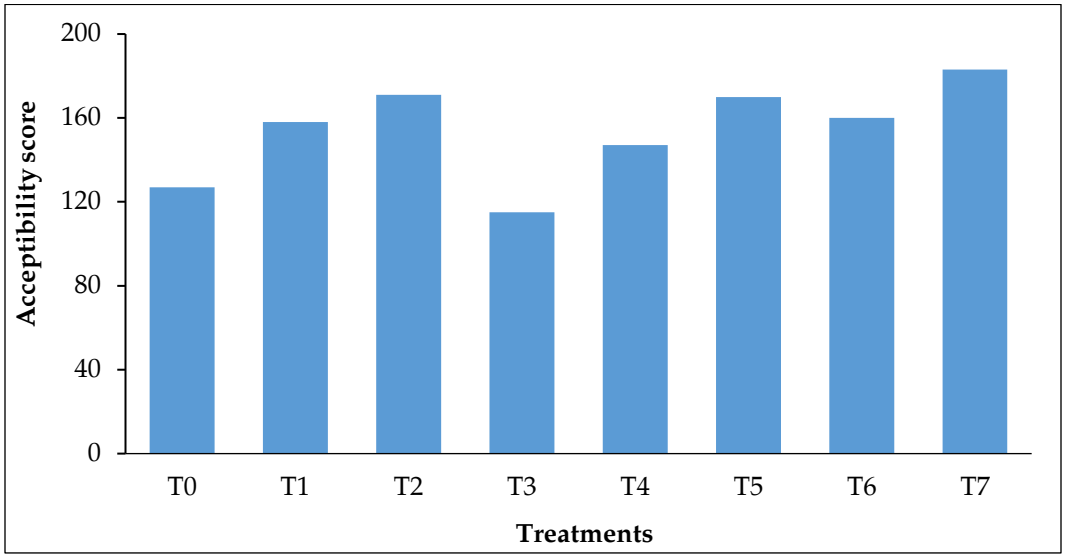


**Figure 3:** Overall acceptability of Aloe blends.

## SUMMARY AND CONCLUSION

The present study was conducted at Post Harvest Laboratory, Department of Horticulture, PMAS-Arid Agriculture University, Rawalpindi in year 2014 with the aim to make different blends of *Aloe vera* using available resources because of its medicinal importance. *Aloe vera* has many antibacterial, antifungal and antiviral active biological compounds which make it best for many disorders.

*Aloe vera* has a long history as an herbal plant and is most popular for the treatment of various ailments. The historical application of *Aloe vera* gel for the treatment of wounds has been evaluated in surgical wounds and the randomized study concluded that there was a significant delay in complete wound healing for the *Aloe vera* gel compared to standard treatment. Aloe drink can also play an important role in healing of wounds and other ailments as it become the part of our body and will be more effective as compared to direct application of gel. *Aloe vera* increases the availability of Vitamin C and E in the human body. It has also been proven that with the increase absorption of Vitamin C, Iron concentration in the body also been increased thus improving the health

of people with iron deficiency. Similarly, *Aloe vera* is also found helpful in wound healing, lowering blood sugar level and to cure the cardiovascular disorders. *Aloe vera* is famous for proper digestion, blood circulation, for proper kidney functioning and maintaining the liver and colon function. It also has the ability to alkalize the digestive juices thus preventing the acidity of stomach. Researchers are going on to find out the effectiveness of *Aloe vera* in the curing and treatment of cancer and AIDS. *Aloe vera* is helpful in promoting the growth of non-cancerous cells.

In present investigation, efforts were made to develop different blends of Aloe drink and tried to evaluate the best one. 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

Different doses of *Aloe vera* gel can be used to evaluate its acceptability among different people. The storage life of different blends of Aloe drink can also be determined by using certain organic and chemical means. Clinical studies can be done using Aloe drink with diabetic patients.

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