● RESEARCH ARTICLE ●

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Effects of stabilizers on rheological properties of Aloe vera (*Aloe barbadensis* Miller) gel

S. MOHAN KUMAR, AND G.D. VASANTHA KUMAR

ABSTRACT

The rheological properties of Aloe vera gel stabilized with different stabilizing agents *viz.,* phosphoric acid (0.1%, 0.30%, 0.50%), methyl paraben (0.25%, 0.50%, 1.0%), propyl paraben (0.25%, 0.50%, 1.0%), ascorbic acid (0.05%, 0.08%, 1.0%), citric acid (0.01%, 0.03%, 0.05%) and sodium benzoate (0.05%, 0.25%, 0.50%) was studied at constant temperature of 25°C using PVS Brookfield model Rheometer. The shear rate ranged between 8.52 to 34.06 s^{-1}. The results indicated that the stabilization of Aloe vera gel causes increase in viscosity and shear stress. The four rheological models *viz.,* Power law, Bingham, Casson and Herschel-Bulkley models were studied for rheogram fitness. The Power law model provided good fit with R^2 value varied from 0.968 to 0.998, P (0.015 to 0.067), RMSE (0.019 to 0.089), SSE (0.013 to 0.083) and $\div^2$ (0.019 to 0.054). The value of flow behavoiur index,' n' varied from 0.42 to 0.86 indicating Aloe vera gel is shear-thinning (Pseudoplastic) behavior.

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Key words : Aloe vera, Rheology, Shear stress, Stabilization, Viscosity

INTRODUCTION

Aloe barbadensis Miller is popularly known as Indian Aloe or Barbados Aloe is a perennial herb with fleshy leaves. The Aloe plants considered to be of *Liliaceae* and *Aloeaceae* family, which has numerous different species (Reynolds, 2004 and Danhof, 2006). Aloe vera is endemic to the Arabian Peninsula of Africa. The plant is xerophylous, being well adapted to dry land areas, and has tissue highly modified for water retention and storage. The gel of the plant has traditionally been employed by man for its content of substance known for healing, and other properties (Max, 1982). In recent years, it gained reputation in food industry as a major ingredient for many products for providing essential nutrients to human body. There are many industries now concentrated only on processing of Aloe vera and earning profit to a remarkable level. In addition due its therapeutic properties, it is used as a neutraceutical food. Aloe vera gel can also be potentially utilized as a coating material for enhancing shelf-life of table grapes and other fruits (Juan *et al.,* 2005; Walter and Patrick, 2005).

Aloe vera gel is mucilaginous jelly consisting of 98.5 per cent of water. Because of high moisture content, gel is rapidly oxidizes, decomposes and putrefies. Putrefaction of gel leads to the loss of many important constituents of gel, and make it useless for food purpose. Hence, proper shelf-life enhancing process is essential. Different researchers described different processing techniques of gel regarding its sterilization and stabilization, *i.e.*, cold process or heat treatment. However, the fundamental principle underlying these processing techniques remains almost same. Regardless of the quality of the plant, the best results are obtained, when leaves are processed immediately after harvesting. This is because the degradative decomposition of the gel matrix begins due to natural enzymatic reactions, as well as the growth of bacteria, due to the presence of oxygen.

Stabilization is a process involving neither heat nor

Address for correspondence :
S. MOHAN KUMAR, College of Horticulture, MUDIGERE (KARNATAKA) INDIA

Authors' affiliations:
G.D.VASANTH KUMAR, College of Horticulture, MUDIGERE (KARNATAKA) INDIA
E-mail. : vasant.tech@gmail.com