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Effect of Different Blanching Treatment on Coriander leaves

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ABSTRACT: Image Coriander is very highly perishable crop, to increase its shelf life three types of pretreatment were used hot water blanching, steam blanching and microwave blanching. The Coriander leaves were blanched followed by drying in thin layer, hot water blanching treatment, the temperature of 40, 45, 50, 55 and 60°C with corresponding time period of 60, 90, 120, 150 and 180 s were selected for experimentation. In steam blanching, the variation in time (30, 60, 90, 120 and 150 s) were taken for experimentation and in microwave blanching, the power level (360, 540, 720 and 900 w) with respect to time interval (30, 45, 60, 75, and 90 s) were selected for experimentation. All blanching experiments were performed in triplicates. The average ascorbic acid of Coriander leaves decreased from 90.96 to 78.99, 97.60 and 88.67 mg/100g in hot water, steam and microwave blanching respectively. The average pH of Coriander leaves increased from 5.14 to 6.99, 7.3 and 6.88 during hot water, steam and microwave blanching respectively. The average value of total soluble solid of Coriander increase from 1.2 to 1.4, 1.5 and 1.45 °Brix in hot water and steam blanching and microwave blanching respectively. The sensory score varied from 7.1 to 8.3 in all three blanching and maximum overall acceptability was obtained steam blanching at 150s. Blanched sample was optimized on the basis of maximum retention of ascorbic acid content, sensory evaluation. In steam blanching, 150s sample was selected due to maximum ascorbic acid, high sensory score.

KEYWORDS: Coriander leaves, blanching (Hot water blanching, Steam Blanching, microwave blanching).

I. INTRODUCTION

Coriander (*Coriander sativum* L.) a yearly spice crop, is an individual form of Apiaceae family. It is a local crop of Mediterranean area and is one of the most common flavours utilized by human. It is also known by different names in various countries i.e English (coriander), Urdu (Dhania), Arabic (Kuzbara), Hindi (Dhania), Chinese (Yuan Sui), Greek (Korion) (1). It is alluded to as "Kusthumbari" or "Dhanayaka" in the Sanskrit writing. In India coriander assumes key part in public economy in light of the fact that about 80% of world inventory of coriander is created in India. Coriander is utilized as a significant zest for its flavor, energizer and carminative properties while liquid - concentrate (and oil) is utilized therapeutically as antispasmodic, for ailment and as a tonic. (2)As per Statista Research Department (SRD) report of October 2021, Madhya Pradesh created the biggest volume of coriander seeds in financial year 2021 across India. This added up to more than 394 thousand metric tons, over a zone of 293 thousand hectares. The nation's yearly creation of coriander seeds that year was more than 755 thousand metric tons. The total annual production of coriander seeds was over 822 thousand metric tons. The Gujarat stood second in coriander seeds, it was cultivated over 1,41,004 hectares with yield of 1,507 kgs/ hectare and production of 2,12,507 tonnes. The major growers of coriander are Madhya Pradesh, Gujarat, Rajasthan, Assam, Haryana, Maharashtra, U.P, Bihar, Telangana, Chattisgarh. New coriander leaves are transitory in nature and an extensive measure of the produce is wasted because absence of postharvest technology. Practically all spices are short-lived plants, they should be processed and preserved to make them accessible to the industries and consumers throughout the entire year with extended shelf life, (3). Today spices like coriander are found in 40% of professionally prescribed medications. Culinary spices have been developed and utilized for a very long time, and they are turning out to be progressively in demand for their nutritional value to increase and supplement with a wide variety of nourishments (4). Blanching is an important unit operation for preserving green leafy vegetables. It is very much essential to optimize the conditions of blanching to enhance the utility of this nutritious economical source. Blanching consist of mild heat treatment of the vegetables in different

heating system (steam, hot water and microwave) at various time periods. It is influenced by various factor such as blanching media, temperature, time, physical and physiological characteristics of the vegetables, average size of the pieces and uniformity of heat distribution and penetration. These factors are highly specific for different leafy vegetables as the surface area exposed per unit mass varies from one to another (5). Reports have indicates that blanching for up to 20 min seriously affects the antioxidant content of vegetables (6)

II. RELATED WORK

The work in this paper is physical properties and physico-chemical properties. All the biochemical properties are used as per standard methods and physical properties as well as used according to standard methods.

III. METHODOLOGY

The blanching study was aimed to inactivate the enzymatic activity and influence of three blanching methods namely hot-water blanching, steam blanching and microwave blanching at various levels on physico-chemical properties of coriander leaves. They were purchased from local market the leaves were separated from the stem and roots and then the coriander leaves were blanched. In hot water blanching treatment, the temperature of 70, 75, 80, 85 and 90°C with corresponding time period of 60, 90, 120, 150 and 180s were taken for experimentation. In steam blanching, the variation in time 30, 60, 90, 120, and 150 s at boiling temperature 100°C were taken for experimentation. In microwave blanching, the power levels of 360, 540, 720 and 900 W with respect to time interval of 30, 45, 60, 75 and 90 s were selected for experimentation.

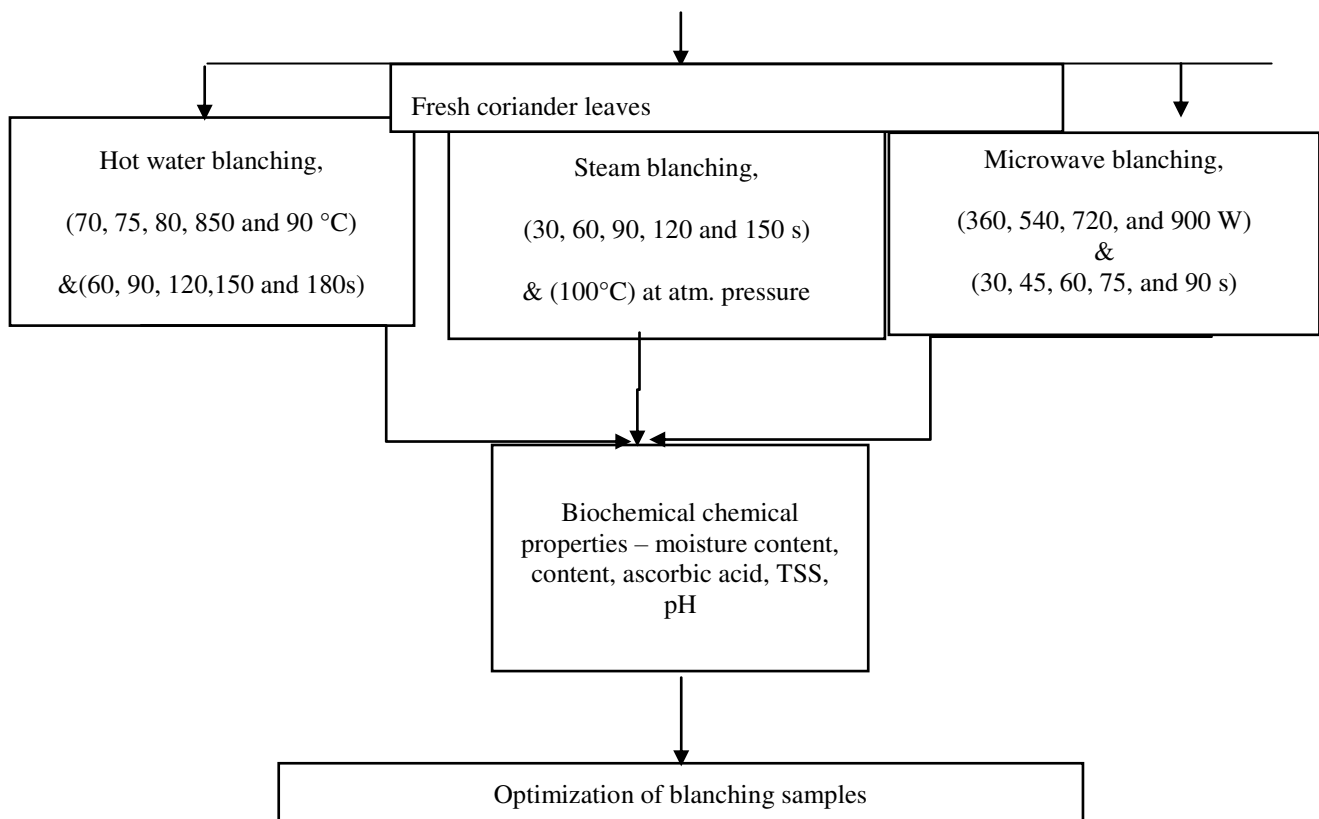


Fig 1: Overall Blanching process of coriander leaves

Samples of 30g coriander leaves were soaked in water at different temperature 70, 75, 80, 85, 90 °C with sample to water ratio of 1:10 w/w and blanched for 60, 90, 120, 150 and 180 s followed by draining of water and placing the samples on a blotting paper to absorb free surface moisture. In steam blanching samples of 30g Coriander leaves were kept on a stainless steel perforated bowl (diameter 16.0 cm) and placed into vessel containing water for steam generation and blanched in steam for 30, 60, 90, 120 and 150 s at 100°C and ambient pressure followed by draining of water and placing it on a blotting paper to remove free surface moisture. In Microwave blanching Samples of 30g coriander leaves were put in a plate and microwaved by an oven (M/S LG MC2841SPS, India) working at 50 MHz–900W. The samples were placed for blanching in microwave for 360, 540, 720, and 900W power with the different time interval 30, 45, 60, 75 and 90s followed by placing it on a blotting paper.

Determination of moisture content

Gravimetric method was used for determination of moisture content (7) (AOAC, 2012). Moisture was estimated by drying the samples were oven at 105°C for 24 h in uncovered pre-weighed petri dishes. The coriander samples were taken in the petri dishes and kept into the hot air oven (Make: NOVA Instruments Pvt. Ltd., Ahmedabad). Sample was then cooled to room temperature in a desiccator prior to weighing. The percent moisture content was calculated as follows:

$$\text{Moisture content (\% w. b.)} = \frac{W_1 - W_2}{W_1} \times 100$$

Where,

W1= Initial mass of sample (g)

W2 = Mass of sample after drying (g)

Determination of ascorbic acid content.

The ascorbic acid content of the sample was determined by 2, 6 dichlorophenol indophenol visual titration method (8). The standard ascorbic acid solution (5 ml) was prepared out into 100 ml conical flask and 5 ml of 3% HPO₃ solution was added. The dye solution was filled in micro burette ascorbic acid solution was titrated with the dye solution to a pink colour, which should persist for 15 s. Dye factor was determined as mg of ascorbic add per ml of the dye using following equation.

$$\text{Dye factor (mg ascorbic acid per ml dye)} = \frac{0.5}{\text{Titre}} = \frac{0.5}{V}$$

pH

It was determined using a digital pH meter. The pH meter was standardized with double distilled water of 7.0 pH and standard buffer solution of 4.0 and 9.0 pH before analysis. The homogenate prepared by diluting 20 g of sample in 20 ml of glass distilled water was subjected to pH measurement.

Determination Total soluble solid (TSS)

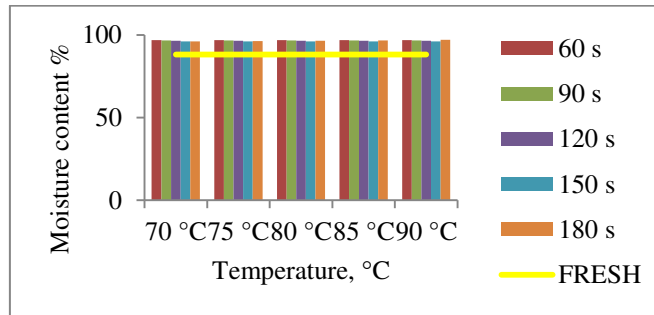
The soluble solid was measured using the method reported by Ranganna (1986) for fruits and vegetable. The 10 g sample was weighed into the beaker and 100 ml of distilled water was added. The content of beaker was boil gently for 2-3 min. along with stirring with a glass rod. The sample was allowed to cool followed by through mixing. After 20 min. it was weighed and passed through filter paper. The filtrate was kept for determination. About, 2-3 drops were kept on prism of refractometer and movable prism was adjusted. The reading was noted for determination of TSS. The dilution factor was (ml/m₀) multiplied in the observed value. Where, m₀ is mass g of the sample before dilution and m₁ is the mass in g of the sample after dilution.

IV. EXPERIMENTAL RESULTS

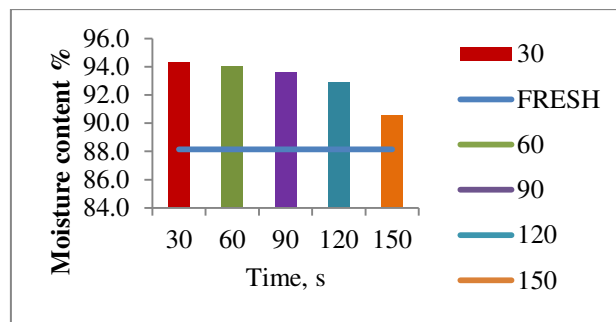
Moisture Content.

The moisture content of coriander leaves increased from 88.14 to 96.97% during hot water blanching at 90°C at 180 s. The increased in moisture content, hot water blanching is evident due to absorption of water during blanching. It was noticed from Fig. 4.8(b) that the moisture content of coriander leaves reduced initially from 94.34 to 91.56 %

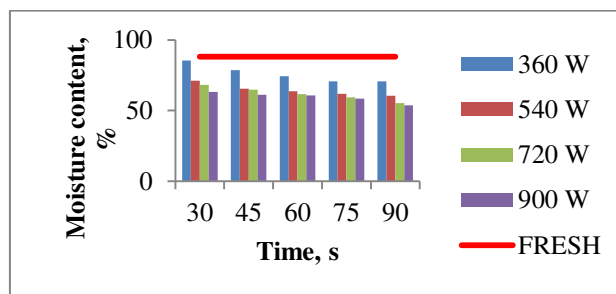
with increase in blanching time at 150 s. The decrease in moisture content in steam blanching is evident due to vaporisation of water. It was noticed from Fig. 4.8 (c) that the moisture content of coriander leaves reduced from 80.34 to 60.56 % with increased in power and blanching time. The decrease in moisture content in microwave blanching is due to the combination of increasing power and time from 360 – 900 W for 30 – 90 s



(a)



(b)



(c)

Fig. 1.1 : Variation of moisture content of Coriander leaves during blanching (A- Hotwater blanching, B- Steam blanching, C- Microwave blanching)

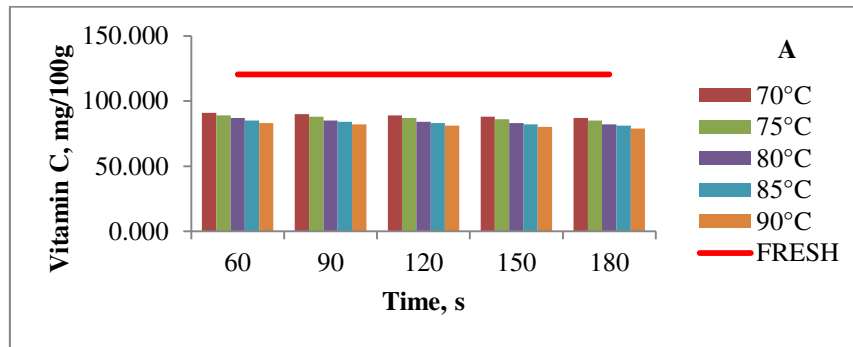
Effect of Blanching on Biochemical Characteristics

Ascorbic Acid

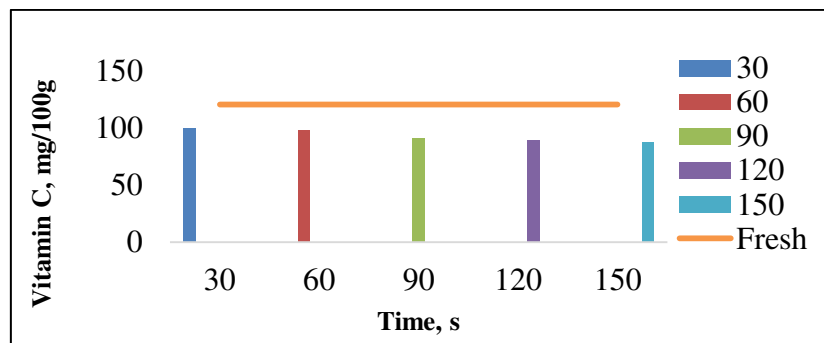
The Ascorbic acid of coriander leaves decreased from 90.96 to 78.99 mg/100g during hot water blanching at 90°C at 180 s. It was noticed from Fig. 1.2 (b) that the Ascorbic acid content of coriander leaves reduced initially from 90 to 97.67 mg/100g with increase in blanching time from at 150 s in steam blanching. It was noticed from Fig. 1.2 that the ascorbic acid content of coriander leaves reduced initially from 98.120 to 88.67 mg/100g with increase in power

and blanching time. The decrease in ascorbic acid in microwave blanching is due to the combination of increasing power and time from 360-900W for 30-90 s.

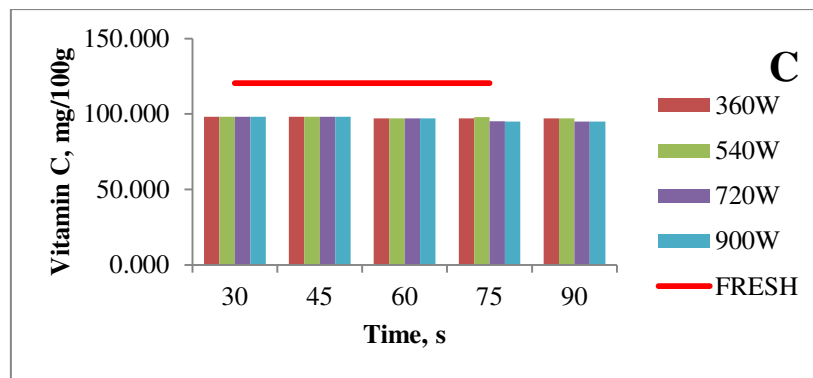
The loss of ascorbic acid is due to the heat application during blanching. The maximum reduction of ascorbic acid can be seen in microwave blanching due to high power and time combination.



(a)



(b)



(c)

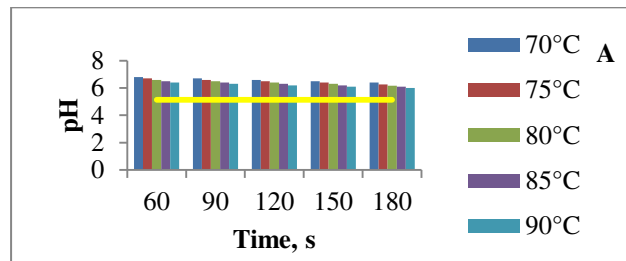
Fig. 1.2 : Variation of ascorbic acid of coriander leaves during blanching (A- Hot water blanching, B- Steam blanching, C- Microwave blanching)

pH

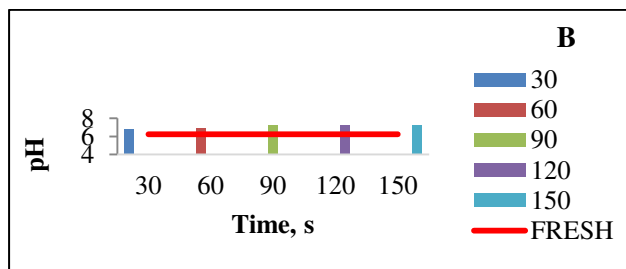
It was observed from Fig. 1.3 (a) that the pH of coriander leaves increased from 5.14 to 6.99 during hot water blanching at 90°C at 180 s. The increase in pH with increase in time and temperature are significant ($P < 0.05$). It was noticed from Fig. 1.3 (b) that the pH of Coriander leaves increased initially from 6.78 to 7.3 with increase in blanching time at 150 s. The pH of coriander leaves increase initially from 6.17 to 6.88 with increase in power and blanching

time.. The decrease in pH in microwave blanching is due to the combination of increasing power and time from 360 – 900 W for 30 – 90 s.

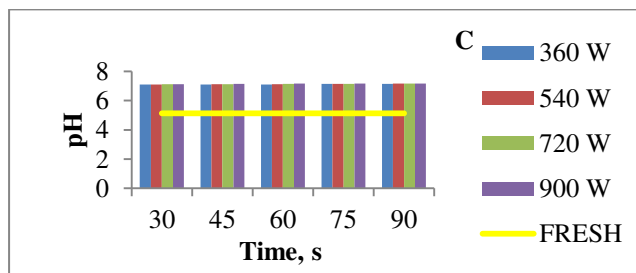
The variation in pH may be attributed to decrease in water content in leaves during blanching as well as destruction of other organic acids by application of heat. similar results are found for leafy vegetables by Quarcoo and manu (2016).



(a)



(b)



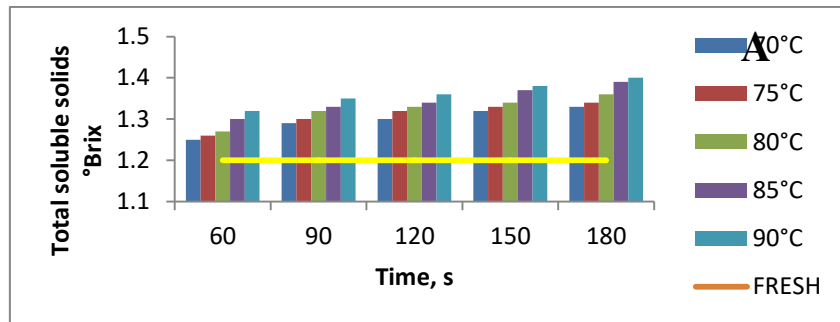
(c)

Fig.1.3 : Variation of pH of coriander leaves during blanching (A- Hot waterblanching,B-Steamblanching, C-Microwaveblanching)

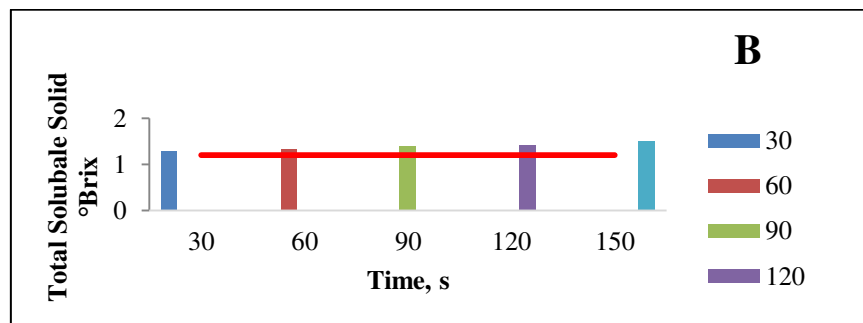
Total soluble solids

The total soluble solids of coriander leaves increased from 1.2 to 1.4 °Brix during hot water blanching at 90°C at 180 s. It was noticed from Fig 1.4 (b) that the total soluble solids of coriander leaves increase initially from 1.2 to 1.5 with increase in blanching time at 150 s. It was noticed from Fig. 1.4 (c) that the total soluble solids of coriander leaves increase from 1.2 to 1.45 with increase in power and blanching time. The increase in total soluble solids in microwaveblanching is due to the combination of increasing power and time from 360 – 900 W for 30 – 90 s.

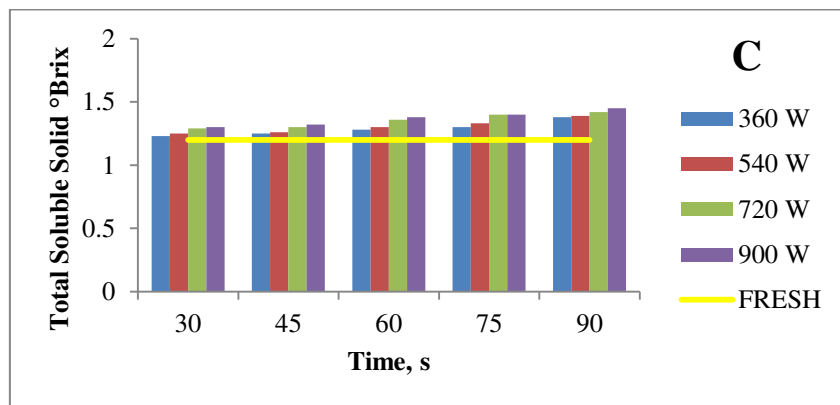
The increase in total soluble solid is evident due to evaporation of water from theleaves during blanching which might increase the concentration of soluble solids in theleaves, similar results are found for leafy vegetables (9).



(a)



(b)



(c)

Fig 1.4: Variation of total soluble solids of coriander leaves during blanching (A-Hot water blanching, B-Steam blanching, C-Microwave blanching)

Effect of blanching on sensor evaluation

The overall acceptability of coriander leaves is varied from 7.0 to 7.5 in during hot water blanching at 70-90°C from 60-180 s. The overall acceptability of coriander leaves varied from 8.1 to 8.6 with increase in blanching time from 60-150s. The overall acceptability of coriander leaves reduced from 7.1 to 7.9 with the variation of power and blanching time.

V. CONCLUSION

The coriander leaves were blanched followed by drying in thin layer. In hot water blanching treatment, the temperature of 70, 75, 80, 85 and 90°C with corresponding time period of 60, 90, 120, 150 and 180 s were selected for experimentation. In steam blanching, the variation in time 30, 60, 90, 120 and 150 s were taken for experimentation and in microwave blanching, the power level 360, 540, 720 and 900 W with respect to time interval 30, 45, 60, 75, and 90 s were selected for experimentation. All blanching experiments were performed in triplicates. The average ascorbic acid of coriander leaves decreased from 98.12 to 78.99, 88.60 and 97.67 mg/100g in hot water, microwave blanching and steam blanching respectively. The average pH of coriander leaves increased from 5.84 to 6.99, 6.88 and 7.3 during hot water, microwave blanching and steam blanching respectively. The average value of total soluble solid of coriander leaves increase from 1.2 to 1.4, 1.5 and 1.45 °Brix during hot water, microwave blanching and steam blanching respectively. The sensory score varied from 7.1 to 8.3 in all three blanching and maximum overall acceptability was obtained steam blanching at 150 s. Blended sample was optimized on the basis of maximum retention of ascorbic acid content, sensory evaluation. In steam blanching, 150 s sample was selected due to maximum ascorbic acid, high sensory score.

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