DEVELOPMENT OF FRUIT BASED SYNBIOTIC SMOOTHIE

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MTM 14009 (FT)

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CERTIFICATE

This is to certify that the thesis entitled **"DEVELOPMENT OF FRUIT BASED SYNBIOTIC SMOOTHIE"** submitted in partial fulfillment of the requirements for the degree of **Master of Technology** in **Food Technology** to the **Tamil Nadu Veterinary and Animal Sciences University,** Chennai - 51, is a record of bonafide research work carried out by **Ms. SARANYAMBIGA.D, (MTM 14009),** under my guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes.

Date : 27.7.2016
Place : Chennai -52

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EXTERNAL EXAMINER

ABSTRACT

DEVELOPMENT OF FRUIT BASED SYNBIOTIC SMOOTHIE

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In the present study smoothies were prepared using yoghurt and fruit juices with the incorporation of microencapsulated probiotic beads to make it synbiotic. The optimum inclusion level of pomegranate and jamun juice into yoghurt for the preparation of respective smoothies was standardized by sensory evaluation using 9-point hedonic scale. The sensory parameters showed an overall acceptability at 40:60 per cent of pomegranate:yoghurt ratio in the preparation of pomegranate synbiotic smoothie (PS_3) and 20:80 per cent of jamun:yoghurt ratio in the preparation of jamun synbiotic smoothie (JS_3).

Standard probiotic culture of *Lactobacillus plantarum* was screened for probiotic properties like tolerance to bile and acidity. In the present study the culture was subjected to varying levels of bile concentrations namely 0.2, 0.4 and 0.6 per cent w/v and exposure to acidity at pH 3 for 90 and 180 minutes. Interestingly the culture showed viable counts of 6.58±0.326 $\log_{10}$cfu/ml up to 0.6 per cent w/v of bile and 6.03±0.357$\log_{10}$cfu/ml for 90 minutes at pH 3.

Fruit juices of pomegranate and jamun exerted maximum prebiotic effect on *L.plantarum*. The present study adopted microencapsulation of bacteria to enhance its

viability. Microencapsulation of probiotic beads in the respective juices were prepared and added to the two varieties of smoothies.

The mean ± SE values of proximate composition like moisture, protein, fat, ash and NFE in control yoghurt was 76.53±0.003, 20.65±0.003, 0.30±0.003, 3.02±0.003, 76.03±0.010 per cent respectively. The moisture, protein, fat, ash and NFE content in PS_3 were 79.50±0.002, 13.58±0.003, 0.31±0.002, 3.08±0.002, 83.03±0.007 and in JS_3 were 77.44±0.002, 16.66±0.004, 0.34±0.002, 3.11±0.002, 79.89±0.031 per cent respectively.

Shelf life studies (7days) of the two synbiotic smoothies included analysis of physicochemical, functional and sensory attributes. The mean pH value for control, PS_3 and JS_3 during storage at refrigerated temperature from 0 to 7 days ranged from 4.34±0.015 to 4.27±0.021; 4.32±0.008 to 4.28±0.024 and 4.29±0.009 to 4.17±0.028 respectively. Acidity for control, PS_3 and JS_3 during storage (from 0 to 7 days) ranged from 0.79±0.003 to 0.83±0.004 per cent; 0.79±0.002 to 0.83±0.004 per cent and 0.80±0.003 to 0.84±0.001per cent respectively. Viscosity (cp) for control, PS_3 and JS_3 during storage ranged between 16.65±0.050 and 17.08±0.016; 16.34±0.105 and16.96±0.016 and 16.40±0.002 and 16.98±0.040 respectively.

The range of total phenolic content (TPC) was from 38.51±0.011 to 39.00±0.002µg/mg from 0 to 7 days of storage at refrigerated temperature for PS_3 containing pasteurized pomegranate juice and from 19.23±0.013µg/mg to 19.80±0.001 respectively during the same period of storage for JS_3 containing pasteurized jamun juice. Antioxidant capacity of the synbiotic smoothies was quantified using FRAP assay at 590nm which ranged from 62.79±0.002 to 62.81±0.004mg Fe^{2+}/100ml during storage (0 to 7 days) for PS_3 containing pasteurized pomegranate juice and from 56.06±0.002 to 56.07±0.003mg Fe^{2+}/100ml respectively during the same period of storage for JS_3 containing pasteurized jamun juice. The vitamin C content was found to be present in the level of 1.15±0.022 on the initial day which declined to 0.90±0.004mg/100ml after 7 days of storage in PS_3 containing pasteurized pomegranate juice. The initial value of vitamin C during preparation was 0.80±0.003 which declined to 0.74±0.003mg/100ml after 7 days of storage in JS_3 containing pasteurized jamun juice.

There was a significant increase in total viable count upto 3rd day of storage in PS_3 and JS_3 than control. A significant decrease was observed in all the treatment after 3rd day of storage. Coliform and yeast and mould count were not detected during storage at refrigerated temperature for control PS_3 and JS_3.

Sensory evaluation of the synbiotic smoothies at different storage days were analysed and it was found that there was no significant difference upto 3rd day of storage. A significant difference was noticed in control, PS_3 and JS_3 after 3rd day of storage with respect to sensory attributes. PS_3 had pronounced score in overall acceptability followed by JS_3 and control. The respective cost of production of control, PS_3 and that of JS_3 was Rs. 8.00/-, Rs. 21.95/- and Rs. 20.23/- per 100gm.

Key words: Synbiotic Smoothie, functional smoothie, pomegranate, jamun, probiotic, microencapsulation, fruit based smoothies.