ABSTRACT

Yogurt is generally recognized as a healthy and multifunctional food. It is a coagulated milk product obtained from the lactic acid fermentation by the action of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. In this present studies, dragon fruit *Hylocereus polyrhizus* and *Hylocereus undatus* extract was added in milk and their effects during yogurt fermentation were investigated. The changes in pH and Titratable Acidity (TA) were measured during fermentation and after 14 days of storage at 4°C. The yogurt extracts were subsequently analysed for their syneresis, proteolysis, peptide content, total phenolic content, antioxidant activities, inhibitory activities on α-amylase and α-glucosidase, presence of exopolysaccharides (EPS) and organoleptic properties. pH values for both dragon fruits yogurt showed significant reduction while TA showed higher percentages compared to plain-yogurts during fermentation and after 14 days of storage. Syneresis in yogurt (52.93%) also has been increased ($p>0.05$) with the addition of *H. polyrhizus* (57. 19-63.16%) and *H. undatus* (57.76-70.32%) compared to control (52.93%). The total phenolic content (TPC) in both dragon fruits yogurt (36.44-64.43ugGAE/ml) showed a greater increase ($p<0.05$) than plain yogurt (20.25ugGAE/ml). The addition of dragon fruits also increased (24.97-45.74%; $p<0.05$) antioxidant capacity compared to plain yogurt (19.16%). The peptides content in both dragon fruit yogurts were not different ($p>0.05$) from plain yogurt. Higher inhibitory activities ($p<0.05$) on α-amylase (17.30-52.20%), α-glucosidase (8.70-34.02%) and EPS production (214-738mg/L) in dragon fruit yogurts than in plain-yogurts were recorded (19.70%, 9.21%, and 181mg/L respectively). *H. polyrhizus* showed the highest score for visual appearance (7.77), aroma (5.9) and sweetness (4.22) while plain yogurt showed highest scores for body texture (6.81), sourness (7.13) and overall taste (5.45). In conclusion, the addition of *H. polyrhizus* and *H. undatus* in yogurt gave enhanced effects on physicochemical, therapeutic properties, production of EPS and organoleptic properties in yogurt.

ABSTRAK

Yogurt dikenali umum sebagai makanan yang berkhasiat yang mana ianya merupakan makanan yang terhasil daripada proses fermentasi susu oleh *Lactobacillus bulgaricus* dan *Streptococcus thermophilus*. Dalam kajian ini, ekstrak buah naga *Hylocereus polyrhizus* dan *Hylocereus undatus* telah dicampur semasa proses fermentasi susu dan kesan-kesanya turut dikaji. Perubahan daripada segi bacaan pH dan TA (titratble acid) telah diperhati dan diukur semasa proses fermentasi susu dan juga selepas 14 hari penyimpanan dibawah suhu 4°C. Selepas itu analisa berkaitan syneresis, proteolysis, kandungan peptida, jumlah kandungan sebatian berfenol, aktiviti antioksidan, penyekatan aktiviti α-amylase and α-glucosidase, penghasilan eksopolisakarida (EPS) dan ciri-ciri organoleptic dijalankan. Yogurt kedua-dua jenis buah naga mencatatkan peningkatan nilai pH dan penurunan nilai TA berbanding kawalan (plain yogurt). Syneresis yogurt (52.93%) bertambah ($p<0.05$) dengan penambahan kedua-dua buah naga (57.76-70.32%) berbanding kawalan (52.93%). Jumlah kandungan sebatian berfenol (36.44-64.43ugGAE/ml) juga menunjukkan peningkatan ($p<0.05$) berbanding kawalan (20.25ugGAE/ml). Peningkatan yang signifikan ($p<0.05$) juga dicatatkan untuk aktiviti antioksida dalam yogurt buah naga (24.97-45.74%) berbanding kawalan (19.16%). Walaubagaimanapun, kandungan peptida yogurt tidak berubah secara signifikan ($p>0.05$). Penambahan buah naga ke dalam yogurt memberikan peningkatan dalam peratus penyekatan ($p<0.05$) terhadap aktiviti enzim α-amylase (17.30-52.20%) dan α-glucosidase (8.70-34.02%) serta penghasilan EPS (214-738mg/L) berbanding kawalan (19.70%, 9.21%, and 181mg/L). yogurt buah naga merah (*H. polyrhizus*) mencatatkan nilai yang tinggi untuk ciri penampilan visual (7.77), aroma (5.9) dan tahap kemanisan (4.22) manakala control mencatatkan nilai tertinggi untuk ciri tekstur yogurt (6.81), tahap kemasaman (7.13) dan keseluruhan rasa (5.45). Kesimpulannnya, penambahan kedua-dua buah naga memberikan kesan yang positif dari segi fisikokemikal, ciri-ciri therapeutik, penghasilan eksopolisakarida dan juga ciri-ciri organoleptic dalam yogurt.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

LAB	Lactic acid bacteria
^{o}C	Degree Celcius
L. acidophilus	*Lactobacillus acidophilus*
S. thermophilus	*Streptococcus thermophiles*
L .delbrueckii ssp. *Bulgaricus*	*Lactobacillus delbrueckii* ssp *Bulgaricus*
L. casei	*Lactobacillus casei*
L. plantarum	*Lactobacillus plantarum*
B. bifidum	*Bifidobacteria bifidum*
B. infantis	*Bifidobacteria infantis*
cfu	Colony forming unit
ml	Millilitre
µl	Microliter
µg	Microgram
mg	Milligram
nm	Nanometer
mm	Millimeter
HCl	Hydrochloric acid
NaOH	Sodium hydroxide
DPPH	2,2-Diphenyl-1-Picrylhydrazyl
TA	Titratable acid
dH_2O	Distilled water
EPS	Exopolysaccharides

GRAS	Generally recognized as safe
TNBS	Trinitrobenzenesuphonic
OPA	O-phthaldehyde
NADH	Nicotinamide adenine dinucleotide
ATP	Adenosine triphosphate
GSH	Glutathione
FCR	Folin-Ciocalteau's reagent
DNSA	Dinitrosalicyclic acid
Da	Dalton unit