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**Emulsifying Properties of a Novel
Polysaccharide Extracted from the Seeds
Of Basil (*Ocimum basilicum L.*)**

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Abstract

The present study investigated the emulsifying properties of a novel polysaccharide extracted from the seeds of Basil (*Ocimum bacilicum*, L.). Emulsifying properties of basil seed gum (BSG) were evaluated in terms of emulsion droplet size distribution (d_{32} and d_{43}), rheological properties (apparent viscosity and viscoelasticity), droplet charge (zeta potential), visual phase separation (at 20°C for 1 month period), and adsorption properties (surface/interfacial tensions). Soya oil-in-water emulsions (30% wt/wt) were formulated and stabilised by BSG containing <1.2% (wt/wt) protein and a major glucomannan fraction. Different BSG concentrations (0.1-1% wt/wt) were tested, as well as the effect of pH (1-12), salt (5-70 mM NaCl), heating (80°C, 30 mins) and purification (removal of proteins from gum) on 0.3% (wt/wt) BSG-stabilised oil-in-water emulsions.

Emulsions with monomodal droplet distributions and with oil droplet size below 1.0 μm (d_{32}) were formed with as little as 0.3% (wt/wt) BSG. The emulsifying properties of BSG were sensitive to changes in pH and salt. Generally, small emulsion droplets were formed at pH above 6.0 and low ionic strength. However, larger droplets were formed and zeta potential values decreased at low pH and high ionic strength. Microstructures confirmed the occurrence of coalescence over time. BSG appeared to exhibit strong hydrophobic character as fluorescing dye (usually for proteins) was detected at the interface, as well as polysaccharide inclusions were trapped within coalescing droplets after homogenisation, suggesting its strong adsorption. Heating and purification reduced the emulsifying properties of BSG. Nevertheless, the emulsions remained stable against phase separation.

The rheological properties of BSG emulsions appeared to be dependent on gum concentration and purification, but independent on pH, salt, and heating, which suggests the resistance of BSG to processing conditions, and thereby it could provide strong emulsion stability. Surface/interfacial tension measurements confirmed the adsorption of BSG at the oil-water interfaces. All gum preparations (crude, purified and protein-free) exhibited an ability to lower the tensions at the interface. However, purification of the gum reduced its adsorption activity, indicating that (i) protein plays an important role in gum adsorption, but it is not an absolute driving force for adsorption and (ii) gum itself becomes altered by the purification process.

BSG (0.17 % wt/wt carbohydrate purity) demonstrated excellent emulsifying and stabilising properties when compared to some other polysaccharides. Protein-free BSG produced larger droplets than crude BSG, but still it produced stable emulsions, comparable to other gums, such as sugar beet pectin. This suggests that the emulsifying and stabilising mechanism of the gum is not only ascribed to the surface-active protein moiety, but could also be attributed to the hydrophobic character of the polysaccharide itself. Overall, BSG is a promising gum, which can be considered as a novel hydrocolloid emulsifier.

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Table of Contents

ABSTRACT.....	I
ACKNOWLEDGEMENTS.....	II
TABLE OF CONTENTS	IV
LIST OF FIGURES.....	VIII
LIST OF TABLES.....	XV
CHAPTER 1 GENERAL INTRODUCTION.....	16
CHAPTER 2 REVIEW OF LITERATURE	19
2.1 INTRODUCTION	19
2.2 FOOD EMULSIONS.....	19
2.2.1 <i>Emulsion instability</i>	20
2.2.1.1 <i>Creaming</i>	20
2.2.1.2 <i>Flocculation</i>	21
2.2.1.2.1 <i>Bridging flocculation</i>	23
2.2.1.2.2 <i>Depletion flocculation</i>	25
2.2.1.2.3 <i>Electrostatic flocculation</i>	27
2.2.1.3 <i>Coalescence</i>	29
2.2.1.4 <i>Partial coalescence</i>	30
2.2.1.5 <i>Ostwald ripening</i>	31
2.2.1.6 <i>Phase inversion</i>	31
2.2.2 <i>Steric and electrostatic stability</i>	32
2.2.2.1 <i>Steric stability</i>	32
2.2.2.2 <i>Electrostatic stability</i>	33
2.2.3 <i>Factors affecting emulsion properties and stability</i>	37
2.2.3.1 <i>Droplet size</i>	37
2.2.3.2 <i>Droplet charge</i>	38
2.2.3.3 <i>Rheology of the aqueous phase/dispersed phase</i>	39
2.2.3.4 <i>Types and properties of emulsifiers</i>	40
2.2.3.5 <i>Rheology of the interfacial layer</i>	41
2.2.3.6 <i>Ionic strength and pH</i>	42

2.2.3.7	<i>Temperature</i>	43
2.3	MACROMOLECULAR EMULSIFIERS (PROTEINS AND POLYSACCHARIDES).....	44
2.3.1	<i>Proteins and polysaccharides at emulsion formation</i>	44
2.3.2	<i>Adsorption of proteins and polysaccharides and emulsion stabilisation</i>	45
2.4	PLANT POLYSACCHARIDES WITH SURFACE ACTIVITY AND EMULSIFYING PROPERTIES.....	47
2.4.1	<i>Naturally-occurring polysaccharides</i>	48
2.4.1.1	<i>Gum Arabic</i>	48
2.4.1.2	<i>Fenugreek gum</i>	49
2.4.2	<i>Chemically modified polysaccharides</i>	50
2.4.2.1	<i>Acetylated sugar beet pectin</i>	50
2.4.2.2	<i>Modified starches</i>	51
2.5	BASIL SEED GUM (BSG).....	52
2.5.1	<i>Introduction</i>	52
2.5.2	<i>Basil</i>	52
2.5.2	<i>Chemical structure and proximate composition</i>	53
2.5.3	<i>Functional properties</i>	54
CHAPTER 3 MATERIALS AND METHODS		56
3.1	INTRODUCTION	56
3.2	MATERIALS.....	56
3.3	EMULSION PREPARATION	56
3.4	DROPLET SIZE MEASUREMENTS.....	57
3.5	RHEOLOGICAL MEASUREMENTS	59
3.6	SURFACE/INTERFACIAL TENSION MEASUREMENTS	61
3.7	VISUAL PHASE SEPARATION	63
3.8	ZETA POTENTIAL MEASUREMENTS	63
3.9	PREPARATION OF PROTEIN-FREE BSG.....	64
3.10	CHEMICAL COMPOSITION ANALYSIS.....	65
3.11	CONFOCAL SCANNING LASER MICROSCOPY (CSLM) AND LIGHT MICROSCOPY.....	65

CHAPTER 4 BSG-EMULSIFYING PROPERTIES.....	67
4.1 INTRODUCTION	67
4.2 EFFECT OF GUM CONCENTRATION ON THE EMULSIFYING PROPERTIES OF BSG	67
4.2.1 <i>Results</i>	67
4.2.2 <i>Discussion</i>	71
4.3 EFFECT OF PH ON THE EMULSIFYING PROPERTIES OF BSG.....	73
4.3.1 <i>Results</i>	74
4.3.2 <i>Discussion</i>	81
4.4 EFFECT OF SALT ON THE EMULSIFYING PROPERTIES OF BSG.....	83
4.4.1 <i>Results</i>	84
4.4.2 <i>Discussion</i>	89
4.5 THERMOSTABILITY OF BSG-STABILISED O/W EMULSIONS	91
4.5.1 <i>Results</i>	91
4.5.2 <i>Discussion</i>	94
4.6 EFFECT OF PROTEIN CONTENT ON THE EMULSIFYING PROPERTIES OF BSG.....	96
4.6.1 <i>Results</i>	97
4.6.2 <i>Discussion</i>	101
4.7 SUMMARY AND CONCLUSION	103
CHAPTER 5 ADSORPTION PROPERTIES OF BSG.....	105
5.1 INTRODUCTION	105
5.2 RESULTS AND DISCUSSION	105
5.2.1 <i>Surface tension of BSG</i>	106
5.2.2 <i>Interfacial tension of BSG</i>	108
5.3 CONCLUSION.....	110
CHAPTER 6 COMPARISON OF THE EMULSIFYING PROPERTIES OF BSG, FENUGREEK GUM, GUM ARABIC, AND SUGAR BEET PECTIN	111
6.1 INTRODUCTION	111
6.2 RESULTS	112
6.2.1 <i>Protein and carbohydrate composition of various gums</i>	112
6.2.2 <i>Particle size distribution</i>	112
6.2.3 <i>Apparent viscosity</i>	114

6.2.4	<i>Storage stability</i>	115
6.3	DISCUSSION	116
6.4	CONCLUSION.....	118
CHAPTER 7 CONCLUSIONS AND RECOMMENDATIONS		120
REFERENCES		123

List of Figures

Figure 1: Types of instabilities in O/W emulsions (McClements, 2005)	20
Figure 2: Different types of floc structures. The internal structure of the floc tends to be open when the attractive forces between the emulsion droplets are stronger (McClements, 2005)	22
Figure 3: Effect of shearing on flocculated emulsions. The viscosity of the emulsion decreases as shearing is increased due to deformation and disruption of droplets (McClements, 2005)	22
Figure 4: Bridging flocculation in an O/W emulsion. A biopolymer chain is shared by more than one droplet leading to bridging between droplets.....	23
Figure 5: Depletion flocculation in an O/W emulsion. As particles approach, unadsorbed or weakly adsorbed biopolymers between droplets are pushed out due to osmotic pressure gradient	26
Figure 6: Illustration of the influence of depletion flocculation on the aggregate structure of emulsions containing unadsorbed biopolymer. Micrographs of groundnut O/W emulsions stabilised by different concentrations of sodium caseinate (a) 1.6 wt%, (b) 2.0 wt%, (c) 2.4wt%, (d) 2.8 wt%, (e) 3.2wt% (Dickinson, Golding, & Povey, 1997)	27
Figure 7: Changes in the droplet size of O/W emulsions stabilised by whey protein isolate, at different pH conditions (McClements, 2005).....	28
Figure 8: Coalescence depends on (a) film thinning and (b) film rupture of emulsion droplets. (a) As the two droplets come close to each other, the liquid that separates them gets thinner (b) Droplets that are in close contact may fuse together due to thermal fluctuation of their interfacial membranes, resulting in the formation of a hole (McClements, 2005, 2007)	30

Figure 9: Schematic representation of the steric polymeric stabilisations.....	33
Figure 10: Schematic representation of the electrostatic stabilisation.....	34
Figure 11: A schematic representation showing the distribution of ions around a charged particle (Source: www.malvern.de/.../zeta_potential_LDE.htm).....	35
Figure 12: A schematic diagram of zeta potential versus pH showing the position of the isoelectric point and the pH values where the dispersion system is expected to be stable (Source: www.silver-colloids.com/.../Intro/pcs18A.html)	36
Figure 13: Effect of heating on the average particle size of emulsions stabilised by soybean soluble polysaccharides diluted to 0.01% (wt/wt) at pH 4 (○: 60°C, ▲: 70°C, □: 80°C, ■: 90°C). The original emulsion contained 20% oil and 4% SSPS-L (A) or SSPS- M (B). The SSPS types (L and M) varies in sugar and protein compositions..	44
Figure 14: Schematic diagram of the conformation of biopolymers at oil-water interface depending on their molecular structure (McClements, 2005)	46
Figure 15: The ‘wattle blossom’ model representing the active component of <i>Acacia senegal</i> gum in (a) aqueous solution and (b) adsorbed at the oil-water interface. Hydrophilic carbohydrate (C) blocks (ca. 2×10^5 Da) are attached to the backbone chain of hydrophobic protein (P) (Dickinson, 2003).....	47
Figure 16: Basil (<i>Ocimum basilicum</i> L) (A) plant (B) seeds (C and D) gelatinous mass after soaking with water.....	53
Figure 17: The structural representation of a typical glucomannan (B. Li, <i>et al.</i> , 2006)	54
Figure 18 : Shear-thinning behaviour of BSG at different concentrations (Hosseini-Parvar, <i>et al.</i> , 2009).....	55

Figure 19: Laser diffraction technique (A) Main components of the instrument, (B) Mastersizer 2000 Hydro MU (Malvern Instruments, UK)	58
Figure 20: MCR 301 rheometer (Paar Physica, Germany).....	59
Figure 21: Comparison of the flow behaviour of Newtonian and non-Newtonian (shear-thinning or shear-thickening) liquids.....	60
Figure 22: The pendant drop method can determine the surface tension or interfacial tension of a fluid (Source: reference.findtarget.com/search/goniometer/)	62
Figure 23: KSV CAM 200 (KSV Instruments, Finland)	62
Figure 24: Zetasizer Nano ZS, Model ZEN 3600 (Malvern Instruments, UK).....	64
Figure 25: Confocal scanning laser microscope, Model Leica SP5 DM6000B (Leica Microsystems, Germany).....	65
Figure 26: Microscope slide with BSG emulsion sample.....	66
Figure 27: Effect of BSG concentration on the particle size distribution of 30% (wt/wt) soya oil-in-water emulsions	68
Figure 28: Effect of BSG concentration on the apparent viscosity of 30 % (wt/wt) soya oil-in-water emulsions	69
Figure 29: Effect of BSG concentration on: (a) the storage modulus (G') and (b) the loss modulus (G'') of 30% (wt/wt) soya oil-in-water emulsion	69
Figure 30: Effect of BSG concentration on the average particle size (d_{43}) of 30% (wt/wt) soya oil-in-water emulsions during 1 month of storage at 20°C.....	70
Figure 31: BSG-stabilised soya oil-in-water emulsions stored for 1 month at 20°C..	70

Figure 32: Effect of pH adjustment (before vs. after emulsification) on the particle size distribution of 0.3% (wt/wt) BSG-stabilised 30 % (wt/wt)-soya oil-in-water emulsions (BE=before emulsification; AE=after emulsification)	74
Figure 33: Effect of pH on the particle size distribution of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions.....	75
Figure 34: Effect of SDS addition (1-2% v/v) on the droplet size distribution of fresh 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) soya oil-in-water emulsions at pH 2, day 176	
Figure 35: Effect of pH on the apparent viscosity of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions.....	76
Figure 36: Effect of pH on: (a) the storage modulus (G') and (b) the loss modulus (G'') of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) -soya oil-in-water emulsions	77
Figure 37: Effect of pH on the zeta potential of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions	77
Figure 38: Effect of pH on the average particle size (d_{43}) of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) - soya oil-in-water emulsions stored for 1 month at 20°C	78
Figure 39: Effect of SDS addition (1-2% v/v) on the particle size distribution of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions at varying pH (2-4) at 1 month storage.....	79
Figure 40: Microstructures of fresh 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions at pH 2. (A) control emulsion (pH ~7) at 40 x magnification CLSM, (B) pH 2 emulsion at 40 x magnification CLSM, and (C) pH 2 emulsion at 40 x magnification light microscopy	79
Figure 41: 3D images of the emulsion droplets stabilised by 0.3% (wt/wt) BSG at pH 2. (A) An oil droplet with the fluorescent Nile Red in the Nile Blue dye, (B) An oil	

droplet with the fluorescent Fast Green dye, (C) An oil droplet with the combination of two fluorescent dyes , and (D) vertical cross-sectioning of the emulsion droplets (right hand side and bottom)	80
Figure 42: Effect of the addition of NaCl (before vs after emulsification) on the particle size distribution of 0.3% (wt/wt) BSG –stabilised 30% (wt/wt)-soya oil-in-water emulsions (BE = before emulsification; AE= after emulsification)	84
Figure 43: Effect of salt (5-70 mM NaCl) on the particle size distribution of 0.3% (wt/wt) BSG-stabilized 30% (wt/wt)-soya oil-in-water emulsions	85
Figure 44: Effect of salt (5-70 mM NaCl) on the apparent viscosity of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions	86
Figure 45: Effect of salt (5-70mM NaCl) on: (a) the storage modulus (G') and (b) the loss modulus (G'') of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions	86
Figure 46: Effect of salt (5-70mM NaCl) on the zeta potential of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions.....	87
Figure 47: Effect of salt (5-70 mM NaCl) on the average particle size (d_{43}) of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) - soya oil-in-water emulsions stored for 1 month at 20°C.....	88
Figure 48: Effect of SDS addition (1-2% v/v) on the particle size distribution of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions at varying concentrations of salt (35-70mM NaCl) at 1 month storage.....	88
Figure 49: Microstructures of fresh 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) –soya oil-in-water emulsions in the presence of salt (25mM NaCl) (A) control emulsion at 40x magnification CLSM (B) emulsion with 25mM NaCl at 10x magnification CLSM, and (C) emulsions with 25mM NaCl at 40x magnification CLSM	89

Figure 50: Effect of heating on the particle size distribution of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) - soya oil-in-water emulsions (BH - before heating; AH – after heating)	92
Figure 51: Effect of heating on the apparent viscosity of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) -soya oil-in-water emulsions.....	93
Figure 52: Effect of heating on: (a) the storage modulus (G') and (b) the loss modulus (G'') of 0.3% (wt/wt) BSG-stabilized 30% (wt/wt) - soya oil-in-water emulsions	93
Figure 53: Effect of heating on the average particle size (d_{43}) of 0.3% (wt/wt) BSG-stabilised 30 % (wt/wt) -soya oil-in-water emulsions stored for 1 month at 20°C	94
Figure 54: Effect of protein content on the particle size distribution of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions	98
Figure 55: Effect of protein content on the apparent viscosity of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) - soya oil-in-water emulsions.....	98
Figure 56: Effect of protein content on the storage (G') and loss (G'') modulus of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt) - soya oil-in-water emulsions	99
Figure 57: Effect of protein content on the average particle size (d_{43}) of 0.3% (wt/wt) BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions	100
Figure 58: Effect of SDS addition (1-2% v/v) on the particle size distribution of 0.3% (wt/wt) protein-free BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions during one week of storage at 20°C.....	100
Figure 59: Microstructures of fresh (A) 0.3% (wt/wt) crude BSG-stabilised 30% (wt/wt)-soya oil-in-water emulsions and (B) 0.3% (wt/wt) protein-free BSG-stabilised 30%(wt/wt)-soya oil-in-water emulsions.....	101

Figure 60: Changes of the surface tensions of crude, purified, and protein-free BSG as a function of gum concentration at 20°C, 30 min.....	107
Figure 61: Changes of the surface tensions of 0.5% (wt/wt) crude, purified, and protein-free BSG as a function of time at 20°C	107
Figure 62: Changes of the interfacial tensions of crude, purified, and protein-free BSG as a function of gum concentration at 20°C, 30 min.....	109
Figure 63: Changes of the interfacial tensions of 0.5% (gum purity) of crude, purified, and protein-free BSG as a function of time at 20°C	109
Figure 64: Comparison of the particle size distributions of the different gum emulsions at 0.17% gum purity	113
Figure 65: Comparison of the apparent viscosity of the different gum emulsions at 0.17% gum purity.....	114
Figure 66: Comparison of the average particle sizes (d_{43}) of the different gum emulsions at 0.17% gum purity during 1 month storage at 20°C	115
Figure 67: Phase separation profile of emulsions stabilized by (a) protein-free BSG, (b) Fenugreek gum, and (c) Sugar beet pectin during storage of 1 month at 20°C	117

List of Tables

Table 1: Protein composition of crude, purified and, protein-free BSG.....	97
Table 2: Surface tensions of crude, purified, and protein-free BSG at various gum concentrations (20°C, 30 min)	106
Table 3: Interfacial tensions of crude, purified, and protein-free BSG at various concentrations (20°C, 30 min)	108
Table 4: The protein and carbohydrate contents of different gums	112
Table 5: The average particle sizes of 30% (wt/wt) soya oil-in-water emulsions in the presence of various gums at 0.17% wt/wt gum (based on similar carbohydrate content)	113