

Effect of addition of cocoa bean shell in hazelnut spread



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- Hazelnut spread – addition of cocoa shell;
- Replacement of different amounts of cocoa powder, sugar and addition of different amounts of emulsifiers;
- Determination of colloidal stability, texture and color

18 November 2020 (11am - 2 pm CET) & 19 November 2020 (4pm - 7pm CET)



Acknowledgment

This work has been supported by Croatian Science Foundation under the project „Application of cocoa husk in production of chocolate and chocolate-like products” (UIP-2017-05-8709)



Table 1. Color of hazelnut spreads with added cocoa shell

Sample	L*	a*	b*	C	h°	ΔE
S0	16.39 ± 0.06	4.10 ± 0.12	7.30 ± 0.13	8.37 ± 0.07	60.68 ± 1.09	
SC6	15.74 ± 0.04	2.73 ± 0.16	6.13 ± 0.10	6.71 ± 0.07	65.99 ± 1.50	1.92 ± 0.09
SC4	15.95 ± 0.11	2.99 ± 0.19	6.26 ± 0.07	6.94 ± 0.09	64.44 ± 1.50	1.59 ± 0.10
SC5	14.12 ± 0.15	3.23 ± 0.12	5.27 ± 0.09	6.18 ± 0.05	59.06 ± 0.97	3.17 ± 0.08
SC10	13.21 ± 0.12	2.42 ± 0.21	4.46 ± 0.12	5.08 ± 0.11	61.50 ± 2.41	4.58 ± 0.04
SC15	11.15 ± 0.12	2.27 ± 0.18	3.55 ± 0.20	4.22 ± 0.15	58.22 ± 1.62	6.70 ± 0.09
SC10-0.5 LEC	12.67 ± 0.14	2.86 ± 0.10	4.53 ± 0.16	5.36 ± 0.14	57.72 ± 1.31	4.80 ± 0.07
SC10-0.6 LEC	13.09 ± 0.04	2.73 ± 0.09	4.44 ± 0.05	5.21 ± 0.05	58.37 ± 0.98	4.57 ± 0.03
SC10-PGPR+LEC	12.53 ± 0.08	2.87 ± 0.35	4.39 ± 0.13	5.25 ± 0.14	56.95 ± 3.78	4.99 ± 0.07

*S0-spread without cocoa shell, SC6-spread with 6.3% of cocoa powder replaced, SC4-spread with 4.2% of cocoa powder replaced, SC5-spread with 5% of sugar replaced, SC10-spread with 10% of sugar replaced, SC15-spread with 15% of sugar replaced, SC10-0.5 LEC-10% of sugar replaced and 0.5% lecithin added, SC10-0.6 LEC-10% of sugar replaced and 0.6% lecithin added, SC10-PGPR+LEC-10% of sugar replaced and 0.2% polyglycerol polyricinoleate and 0.3% lecithin added

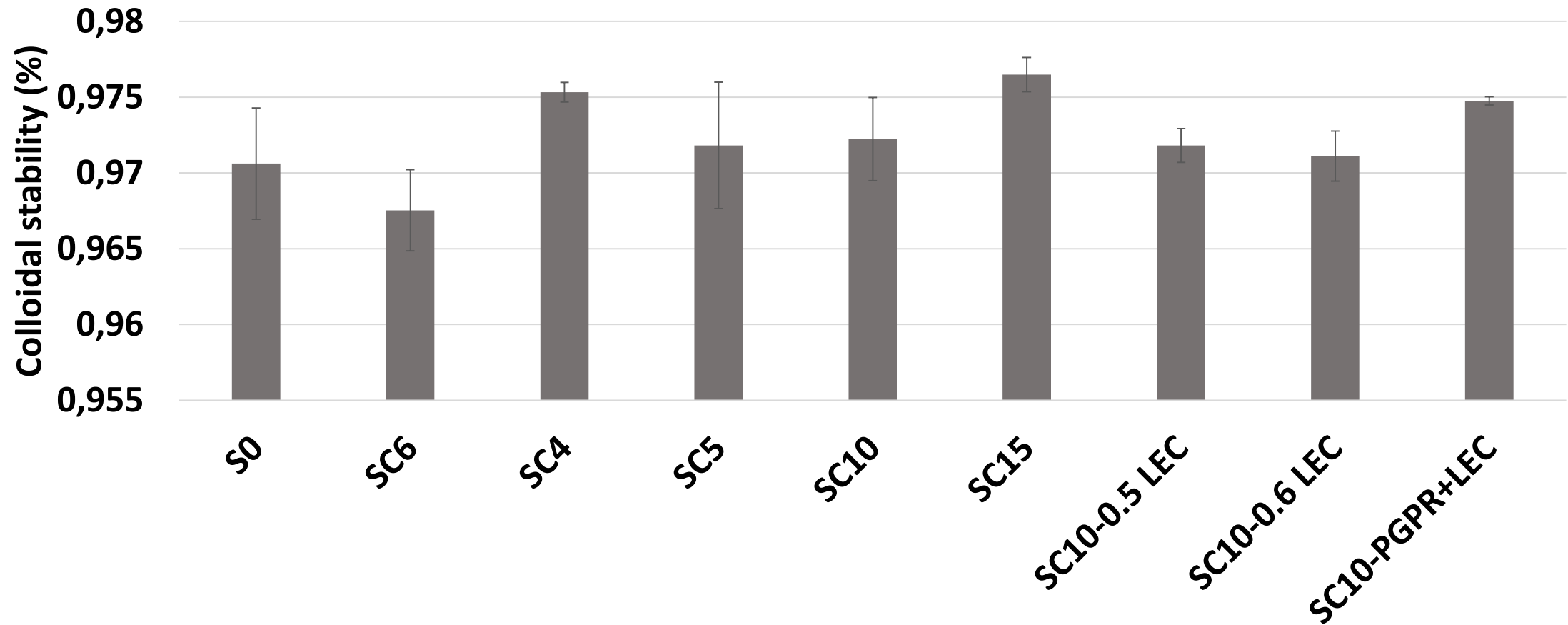
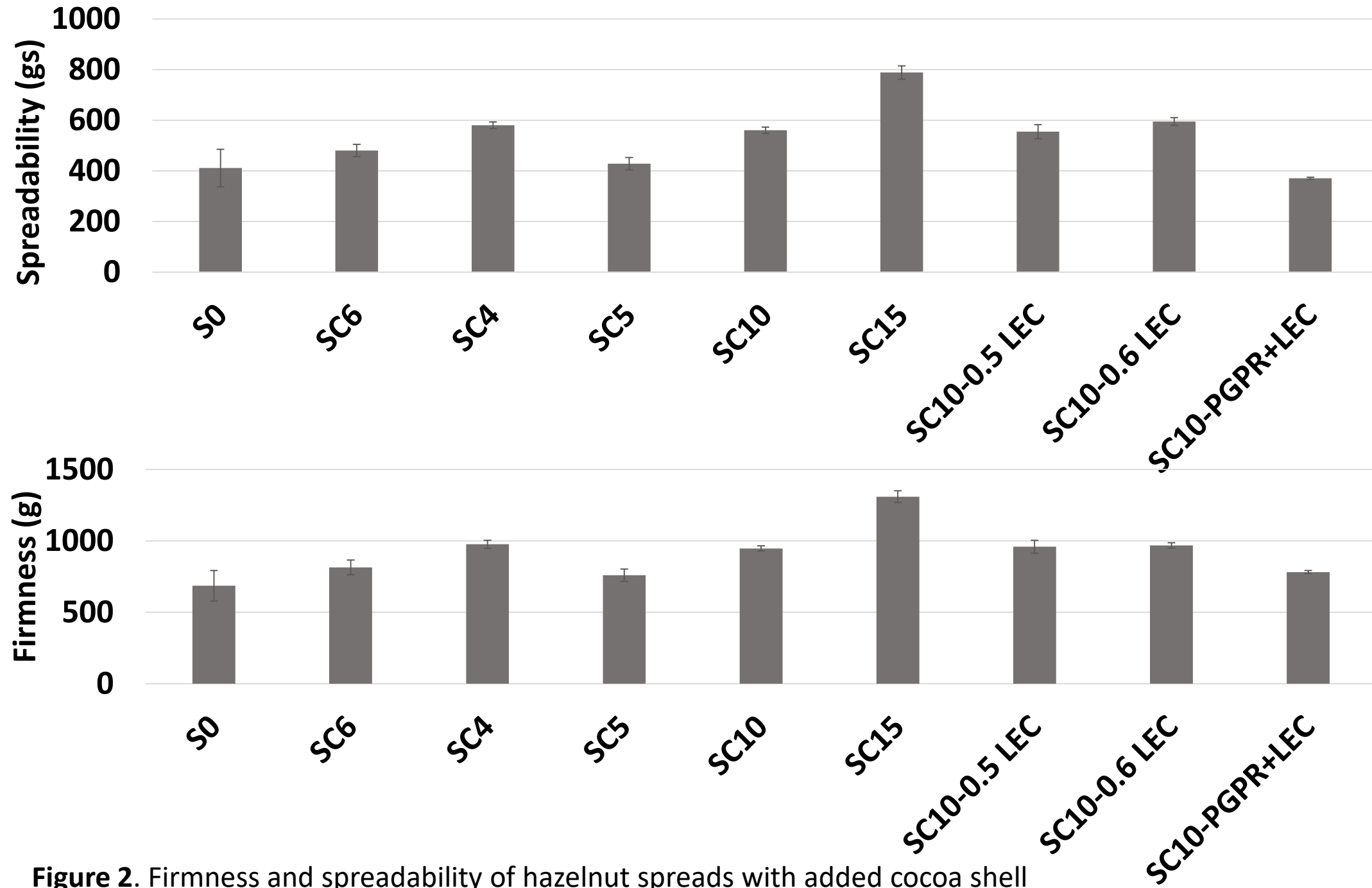


Figure 1. Colloidal satability of hazelnut spreads with added cocoa shell

*S0-spread without cocoa shell, SC6-spread with 6.3% of cocoa powder replaced, SC4-spread with 4.2% of cocoa powder replaced, SC5-spread with 5% of sugar replaced, SC10-spread with 10% of sugar replaced, SC15-spread with 15% of sugar replaced, SC10-0.5 LEC-10% of sugar replaced and 0.5% lecithin added, SC10-0.6 LEC-10% of sugar replaced and 0.6% lecithin added, SC10-PGPR+LEC-10% of sugar replaced and 0.2% polyglycerol polyricinoleate and 0.3% lecithin added



*S0-spread without cocoa shell, SC6-spread with 6.3% of cocoa powder replaced, SC4-spread with 4.2% of cocoa powder replaced, SC5-spread with 5% of sugar replaced, SC10-spread with 10% of sugar replaced, SC15-spread with 15% of sugar replaced, SC10-0.5 LEC-10% of sugar replaced and 0.5% lecithin added, SC10-0.6 LEC-10% of sugar replaced and 0.6% lecithin added, SC10-PGPR+LEC-10% of sugar replaced and 0.2% polyglycerol polyricinoleate and 0.3% lecithin added

Figure 2. Firmness and spreadability of hazelnut spreads with added cocoa shell