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**DETERMINATION OF SOME PHYSICAL AND SENSORY
PROPERTIES OF MILK, DARK AND WHITE CHOCOLATES
ENRICHMENT WITH SUNFLOWER SEED, FLAX SEED,
OAT AND DRIED DAMSON PLUM**

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Table 1

Melting point and texture properties of enrichment chocolate samples¹

Enrichment chocolate samples	Melting point (°C)	Hardness (kg force)
White chocolate	29.13±0.12 ^a	1.91±0.09 ^b
White chocolate with flaxseed	22.67±0.42 ^d	2.00±0.09 ^a
White chocolate with sunflower seed	21.93±0.21 ^e	1.75±0.03 ^c
White chocolate with oat and rice	27.07±0.06 ^c	1.88±0.01 ^b
White chocolate with damson plum	27.20±0.17 ^b	1.63±0.01 ^d
Milk chocolate	29.97±0.06 ^a	2.90±0.05 ^a
Milk chocolate with flaxseed	27.03±0.06 ^d	2.39±0.07 ^c
Milk chocolate with sunflower seed	26.00±0.10 ^e	2.39±0.00 ^c
Milk chocolate with oat and rice	28.27±0.06 ^c	2.68±0.00 ^b
Milk chocolate with damson plum	29.10±0.10 ^b	2.41±0.13 ^c
Dark chocolate	30.57±0.06 ^a	3.51±0.01 ^a
Dark chocolate with flaxseed	27.03±0.06 ^d	3.25±0.03 ^c
Dark chocolate with sunflower seed	26.77±0.25 ^e	2.79±0.05 ^e
Dark chocolate with oat and rice	29.57±0.06 ^c	3.45±0.01 ^b
Dark chocolate with damson plum	29.93±0.06 ^b	2.88±0.18 ^d

¹ Measurements were done at 20°C, mean of five determinations \pm SD, means followed by the same letter within each column are significantly different at $p < 0.05$ level (Duncan's multiple range test)

Chocolate and cocoa products are preferred by a large community and as well as being a pleasure to eat. In the last decade, the studies about all sort of chocolate enrichment with functional foods during the shelf life are very limited. And in the examined works, there are no declarations about chocolate enrichment with sunflower seed, flax seed, oat and dried damson plum. The aim of this project is enrichment the milk, dark and white chocolates with sunflower seed, flax seed, oat and dried damsonplum, and determine some physical, and sensory properties of enrichment milk, dark and white chocolate.

Table 2. L^* , a^* , b^* values of enrichment chocolate samples ¹

Enrichment chocolate samples	L^*	a^*	b^*
White chocolate	81.09 \pm 0.05 ^a	-3.86 \pm 0.02 ^c	26.07 \pm 0.21 ^a
White chocolate with flaxseed	71.75 \pm 0.13 ^e	-3.70 \pm 0.00 ^b	16.65 \pm 0.01 ^e
White chocolate with sunflower seed	77.46 \pm 0.07 ^b	-4.87 \pm 0.02 ^d	21.49 \pm 0.05 ^c
White chocolate with oat and rice	73.38 \pm 0.20 ^d	-0.83 \pm 0.27 ^a	22.25 \pm 0.08 ^b
White chocolate with damson plum	75.96 \pm 0.92 ^c	-5.00 \pm 0.16 ^e	20.99 \pm 1.23 ^d
Milk chocolate	35.22 \pm 0.05 ^a	6.44 \pm 0.01 ^c	9.06 \pm 0.05 ^c
Milk chocolate with flaxseed	34.71 \pm 0.35 ^b	6.78 \pm 0.19 ^b	9.30 \pm 0.18 ^b
Milk chocolate with sunflower seed	34.97 \pm 0.60 ^c	6.72 \pm 0.06 ^b	9.19 \pm 0.12 ^b
Milk chocolate with oat and rice	34.70 \pm 0.04 ^b	8.65 \pm 0.08 ^a	11.72 \pm 0.00 ^c
Milk chocolate with damson plum	34.34 \pm 0.42 ^d	6.34 \pm 0.17 ^d	8.77 \pm 0.06 ^d
Dark chocolate	29.71 \pm 0.08 ^a	2.73 \pm 0.08 ^e	3.98 \pm 0.14 ^c
Dark chocolate with flaxseed	29.74 \pm 0.23 ^a	3.32 \pm 0.11 ^b	4.41 \pm 0.15 ^b
Dark chocolate with sunflower seed	29.36 \pm 0.25 ^b	3.06 \pm 0.10 ^c	4.04 \pm 0.03 ^c
Dark chocolate with oat and rice	27.72 \pm 0.02 ^c	4.94 \pm 0.03 ^a	5.33 \pm 0.02 ^a
Dark chocolate with damson plum	29.24 \pm 0.02 ^d	2.85 \pm 0.20 ^d	4.03 \pm 0.14 ^c

¹ Measurements were done at 20°C, mean of five determinations \pm SD, means followed by the same letter within each column are significantly different at $p < 0.05$ level (Duncan's multiple range test)

Table 3. Sensory attributes of enrichment chocolate samples¹

Enrichment chocolate samples	Appearance	Texture	Flavour	Overall acceptability
White chocolate with flaxseed	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	4.50±0.53 ^c
White chocolate with sunflower seed	4.75±0.46 ^c	3.00±0.00 ^a	5.00±0.00 ^a	4.88±0.35 ^a
White chocolate with oat and rice	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	4.88±0.35 ^a
White chocolate with damson plum	4.88±0.35 ^b	3.00±0.00 ^a	5.00±0.00 ^a	4.75±0.46 ^b
Milk chocolate with flaxseed	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	4.38±0.74 ^c
Milk chocolate with sunflower seed	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	4.75±0.46 ^b
Milk chocolate with oat and rice	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	5.00±0.00 ^a
Milk chocolate with damson plum	4.89±0.33 ^b	3.00±0.00 ^a	5.00±0.00 ^a	5.00±0.00 ^a
Dark chocolate with flaxseed	5.00±0.00 ^a	3.00±0.00 ^a	4.86±0.38 ^b	4.43±0.53 ^c
Dark chocolate with sunflower seed	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	4.86±0.38 ^b
Dark chocolate with oat and rice	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	5.00±0.00 ^a
Dark chocolate with damson plum	5.00±0.00 ^a	3.00±0.00 ^a	5.00±0.00 ^a	5.00±0.00 ^a

¹Means followed by the same letter within each column are significantly different at $p < 0.05$ level (Duncan's multiple range test)