

Evaluation of Processing and Nutritional Attributes of Seabuckthorn Fruit Fractions of Indian Summer and *Sinensis*

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- Material and Methods
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Species and Distribution

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- **Sea Buckthorn includes 5 species**
- ***H. rhamnoides*: 9 subspecies**
- **Canada: Indian Summer and *sinensis***



Sinensis vs Indian Summer

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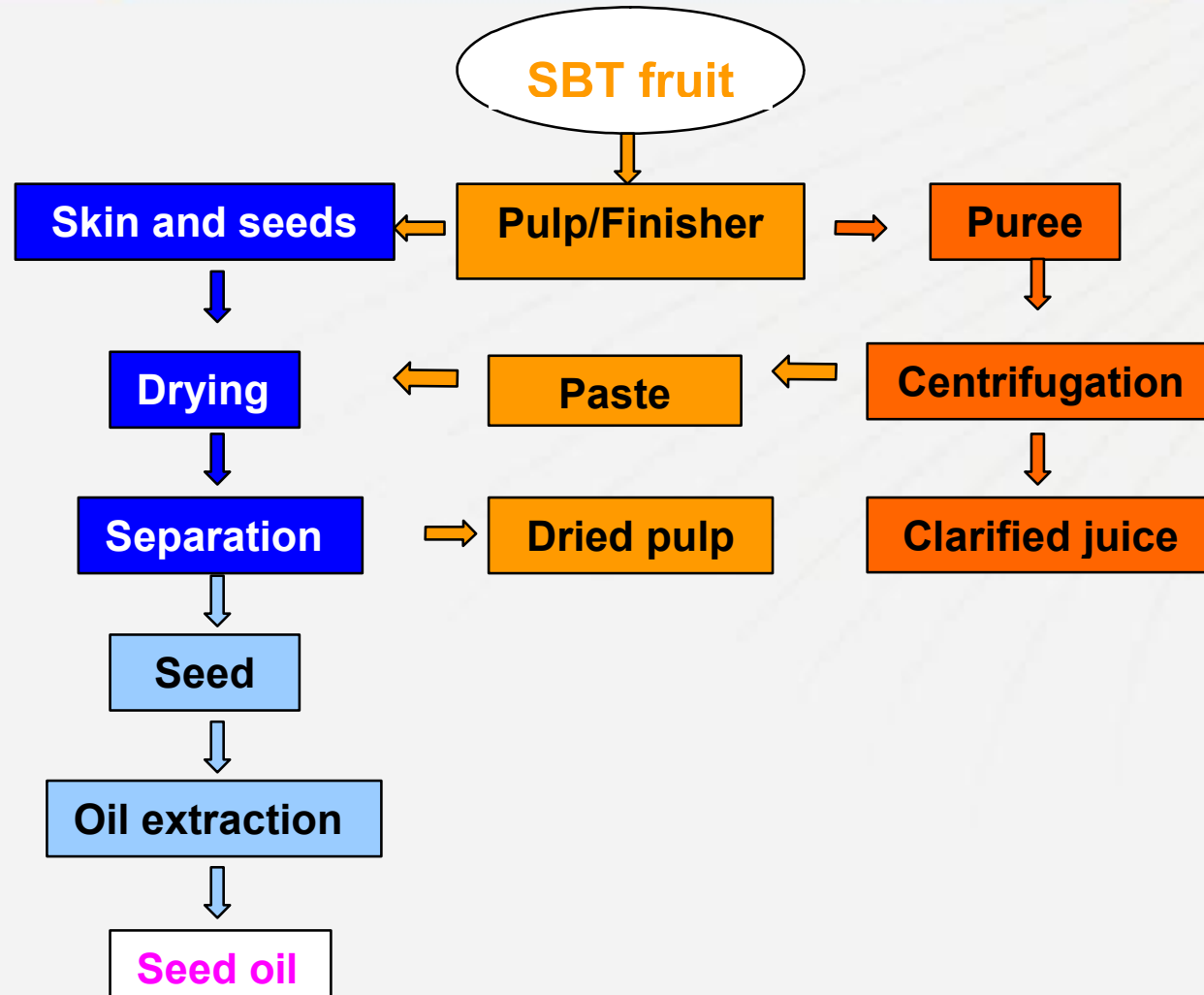
***Sinensis* cultivar**



Indian Summer cultivar

Seabuckthorn Processing

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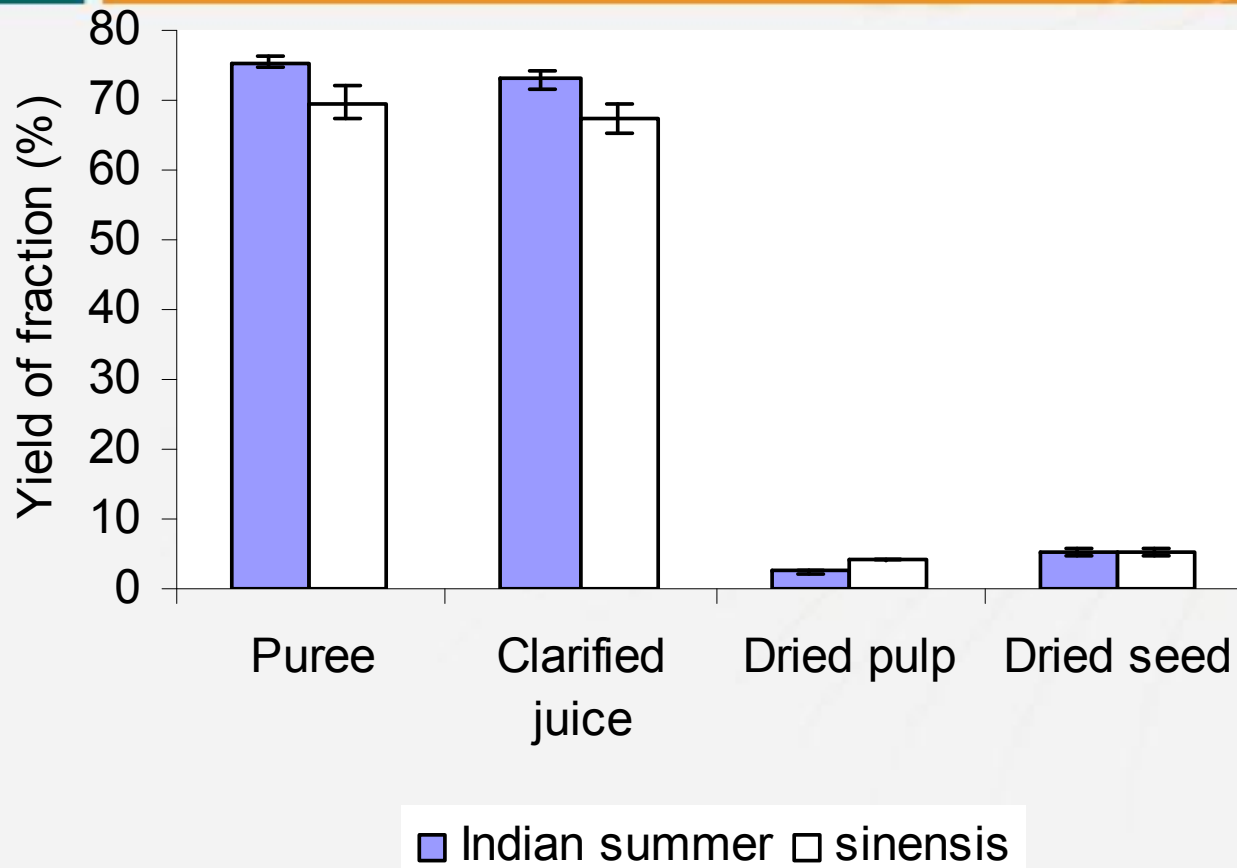
SBT Fruit, Seed and Pulp

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Yield of Seabuckthorn Fraction

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Note: 453 kg of Indian summer and 152 kg of *sinensis* have been processed

Nutritional Value of SBT Fractions

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Fraction	Juice		Pulp		Seed	
	Indian Summer	<i>Sinensis</i>	Indian Summer	<i>Sinensis</i>	Indian Summer	<i>Sinensis</i>
Energy (cal/100g)	53	49	481	429	431	412
Protein (g/100g)	0.6	0.6	6.8	11.9	29.8	24.7
Fat (g/100g)	1.4	0.8	23.53	13.73	12.9	9.1
Carbohydrates (g/100g)	9.5	9.8	60.6	64.6	49	57.7
Sodium (mg/100g)	2.9	27.8	12.0	74.4	6.5	53.7
Calcium (mg/100g)	10.9	8.3	94.6	95.4	53.1	75.5
Iron (mg/100g)	1.1	0.9	5.8	13.9	5.3	6.5
Potassium (mg/100g)	192				677	475
Moisture (g/100g)	88.2	88.5	7.0	8.3	6.3	6.8
Ash (g/100g)	0.3	0.3	2.1	1.5	2	1.7
Vitamin A (IU/100g)	636	308	8212	4397	< 10	< 10
Vitamin C (mg/100g)	187	450	442	743	2	2.6
Beta Carotene (IU/100g)					1459	2346

Fat Composition of SBT Fractions

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Fraction Tests	Juice		Pulp		Seed	
	Indian Summer	<i>Sinensis</i>	Indian Summer	<i>Sinensis</i>	Indian Summer	<i>Sinensis</i>
Fat (g/100g)	1.4	0.8	23.53	13.73	12.9	9.1
Saturated Fat	0.6	0.3	8.85	4.87	2.03	1.22
Monosaturated Fat	0.7	0.4	11.12	6.21	2.98	2.13
Polyunsaturated Fat	0.1	0.1	3.56	2.53	7.92	5.75
Trans Fat	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cholesterol (mg/100g)	< 1	< 1	< 1	< 1	< 1	< 1
Omega 3	0.00	0.00	0.65	0.51	3.78	2.13
Omega 6	0.10	0.10	2.91	2.02	4.14	5.75
Omega 7	0.50	0.20	8.63	4.58	0.70	0.15

Fatty Acid Profile

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Fraction Tests	Juice		Pulp		Seed	
	Indian summer	<i>Sinensis</i>	Indian summer	<i>Sinensis</i>	Indian summer	<i>Sinensis</i>
Myristic Acid C14:0					0.03	0.02
Myristoleic Acid C14:1, n-5				0.04		
Palmitic Acid C16:0	0.6	0.30	8.58	4.62	1.5	0.93
Palmitoleic Acid C16:1, n-7	0.5	0.20	8.63	4.58	0.7	0.15
Heptadecanoic Acid C17:0					0.03	
Stearic Acid C18:0			0.27	0.21	0.41	0.22
Oleic Acid C18:1, n-9	0.2	0.20	2.49	1.63	2.25	1.96
Linoleic Acid C18:2, n-6	0.1	0.10	2.91	2.02	4.14	3.19
Linolenic Acid C18:3, n-3			0.65	0.51	3.78	2.56
Arachidic Acid C20:0					0.06	0.05
Methyl transmyristelaidate C14:1T				0.12		
Eicosenoic Acid C20:1					0.03	0.02

* Blank means either the number is too small or component was not analyzed

Fatty Acid Profile by Percentage

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Fraction Tests	Juice		Pulp		Seed	
	Indian summer	<i>sinensis</i>	Indian summer	<i>sinensis</i>	Indian summer	<i>sinensis</i>
Palmitic Acid C16:0	43	38	36	34	12	10
Palmitoleic Acid C16:1, ω -7	36	25	37	33	5	2
Stearic Acid C18:0			1	2	3	2
Oleic Acid C18:1, ω -9	14	25	11	12	17	22
Linoleic Acid C18:2, ω -6	7	12	12	15	32	35
Linolenic Acid C18:3, ω -3			3	3	29	28

* Blank means either the number is too small or component was not analyzed

Carbohydrate Composition

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Fraction	Juice		Pulp		Seed	
	Indian Summer	<i>Sinensis</i>	Indian Summer	<i>Sinensis</i>	Indian Summer	<i>Sinensis</i>
Tests						
Carbohydrates (g/100g)	9.5	9.8	60.6	64.6	49	57.7
Total Sugar	3.4	4.4	7.9	6.9	4.1	5.3
Total Dietary Fibre	<1.0	<1.0	31.0	39.6	41.2	46.5

SBT Seed Oil Extraction

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- Solvent Extraction
- Cold Press
- Supercritical CO₂

Seed Oil Recovery by Extraction Methods

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Extraction method	Oil yield (%)	Oil recovery (%)
Solvent extraction	12.9	100
SCF-CO ₂	11.63	90.2
Cold press	4.38	40

Seed Oil Profile by Extraction Methods

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Component Name (g/100g)	SCF-CO ₂ 300 bar/40°C	Soxhlet extraction	Cold press
Palmitic Acid C16:0	11.15	11.60	9.44
Palmitoleic Acid C16:1, n-7	6.25	5.41	4.46
Stearic Acid C18:0	2.56	3.17	2.71
Oleic Acid C18:1, n-9	15.35	17.40	15.41
Linoleic Acid C18:2, n-6	31.39	32.02	33.03
Linolenic Acid C18:3, n-3	31.1	29.23	33.87
Omega 3 Fatty Acids	31.1	29.23	33.87
Omega 6 Fatty Acids	31.9	32.02	33.15
Trans Fatty Acids	0.11	0.10	ND
Alpha Tocopherols (IU/100g)	260.2	224.0	72.0

α-tocopherols content was higher by SCF-CO₂ and solvent extraction methods and much lower by cold press

Conclusions

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- SBT fruits can be commercially processed into puree, pulp, seeds, and oil
- Puree from Indian summer was about 5% higher yield and better appearance, flavor and aroma compared with that from *sinensis*
- Puree, pulp and seed from Indian summer had higher fat, vitamin A and ω -7 fatty acids content than that from *sinensis*
- Puree and pulp from *sinensis* had higher sodium and vitamin C content than that from Indian summer

Conclusions

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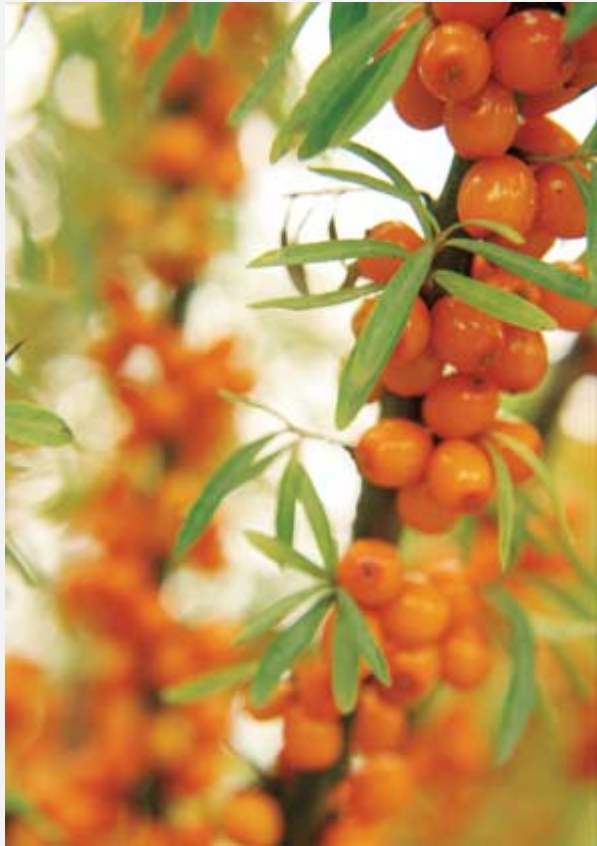
- Pulp from Indian summer contains 23.5% of oil, compared to 13.7% from *sinensis* pulp
- Indian summer pulp oil contains 36.7% of palmitoleic acid (ω -7), compared to 33.4% from *sinensis*. Pulp oils from both varieties contain high content of ω -7 fatty acids, which makes SBT fruit the most important sources of palmitoleic acid in the plant kingdom
- Seed oil can be extracted by different methods and their yield and quality are varied

Acknowledgement

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Thank You Very Much!

QUESTIONS?