New findings on SBT ingredients from leaves, bark and berries

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Content

- Scientific Goal
- Samples and materials
- Chemical composition of plant parts
- Comparison of varieties
- Conclusions

Samples and materials

- Branches, leaves and Berries from
  - Hergo
  - Leikora
- Berries from Russian and German brands
- Identified origion
- Identified varieties

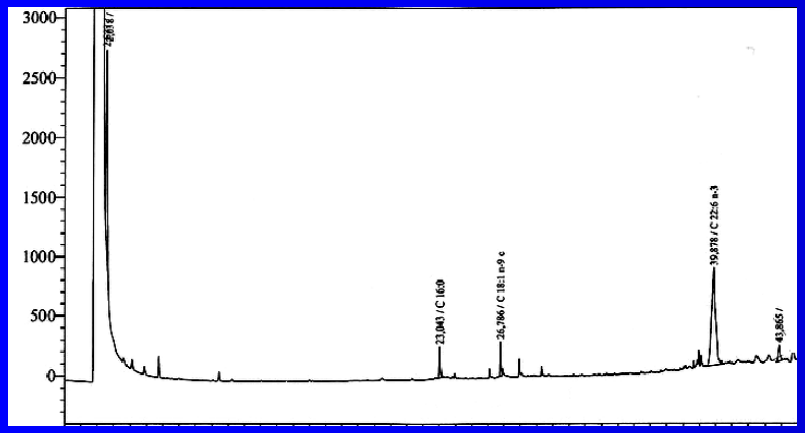
Fatty acids

Experimental conditions

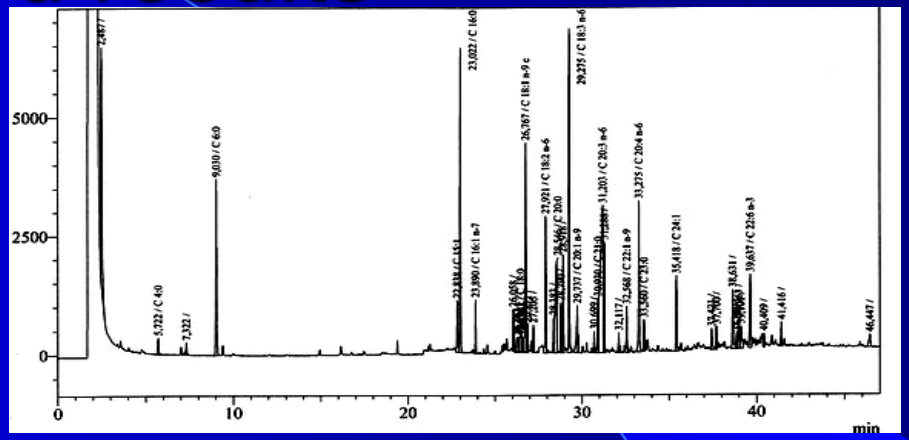
Parameter	Value
Solvent	Petrol ether
Extraction time	2 h
Temperature of water bath	80°C
Stationary phase	Sp2380, 30 m
Mobile phase	Helium, 20 cm/s
Injection volume	20 µl

Fatty acids

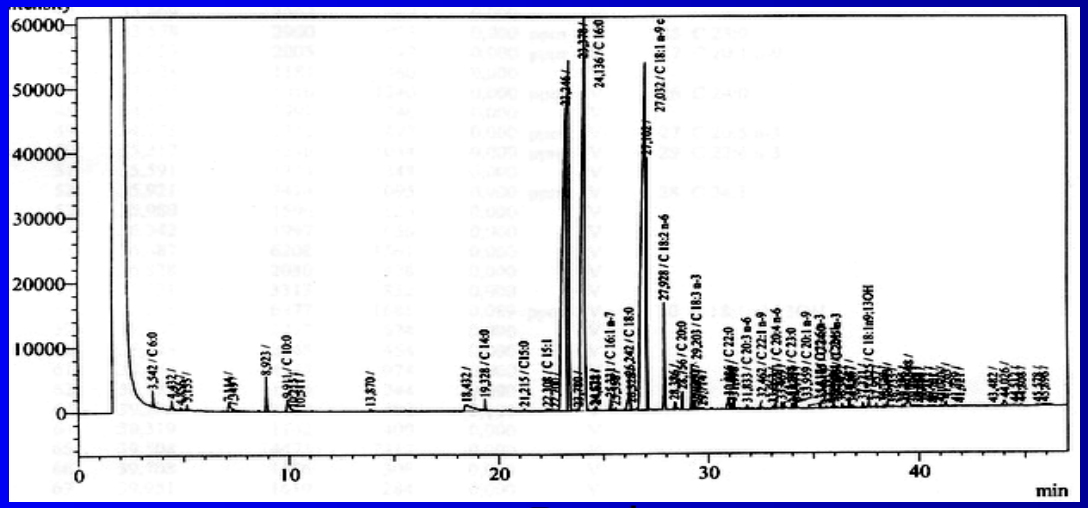
Obtained results



Branches



Leaves



Berries

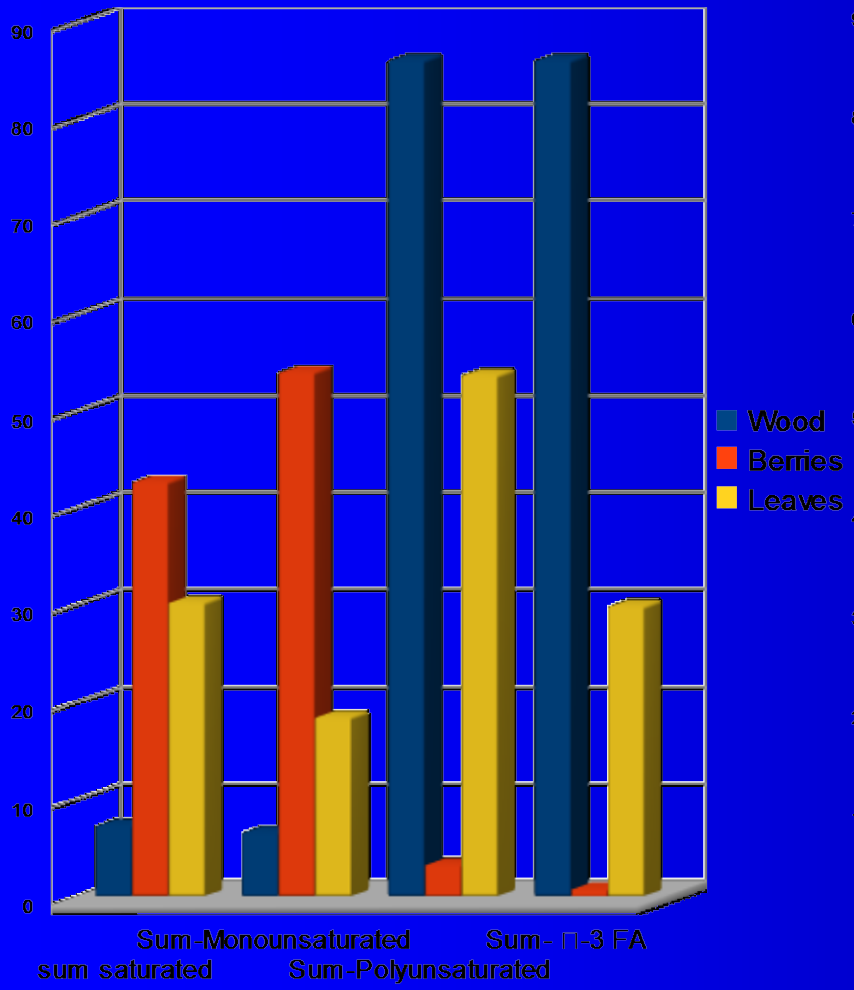
Fatty acids

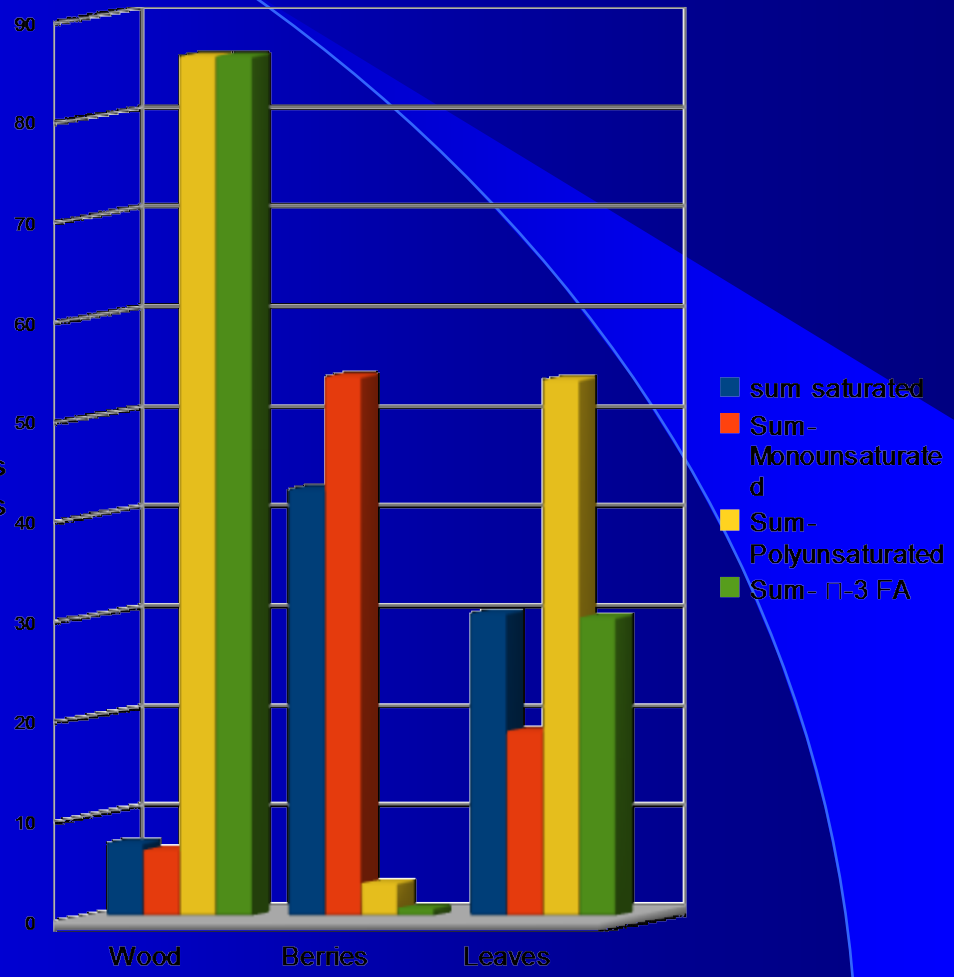
Obtained results

NAME	Samples			NAME	Samples		
	Wood	Berries	Leaves		Wood	Berries	Leaves
4:0	0.0%	0.0%	0.9%	cis 20:0	0.0%	0.3%	9.2%
8:0	0.0%	0.8%	0.0%	cis 18:3 n3	0.0%	0.8%	0.0%
10:0	0.0%	0.6%	0.0%	cis 20:1 n9	0.0%	0.0%	3.5%
12:0	0.0%	1.1%	0.0%	cis 20:3 n3	0.0%	0.0%	25.6%
14:0	0.0%	0.3%	0.0%	cis 22:0	0.0%	0.0%	2.5%
16:0	7.3%	38.5%	15.7%	cis 22:1 n9	0.0%	0.0%	2.5%
16:1 n7	0.0%	23.8%	2.3%	cis 20:4 n6	0.0%	0.0%	2.5%
18:0	0.0%	1.2%	1.9%	cis 22:6n3	86.1%	0.0%	4.4%
cis 18:1 n9	6.6%	25.5%	10.2%	Sum	100.0%	100.0%	100.0%
cis 18:1 n7	0.0%	4.6%	0.0%	Sum saturated	7.3%	42.7%	30.3%
cis 18:2 n6	0.0%	2.5%	6.4%	Sum-Monounsaturated	6.6%	54.0%	18.5%
cis 18:3 n6	0.0%	0.0%	14.8%	Sum-Polyunsaturated	86.1%	3.3%	53.7%

Fatty acids

Obtained results





Phospholipides

Obtained results

Substanses/ Samples	Leaves	Berries	Branches
Serin	4.5 mg/g	4.3 mg/g	-
Phosphatidilseirin	3.1 mg/g	-	-
Phosphatidylethanolamine	2.7 mg/g	-	-
Lysophosphatidylcholin	2.0 mg/g	-	-
Lysophasphatidylethanolamine	1.5 mg/g	-	-
N-acetylphosphatidylethanolamine	5.4 mg/g	5.5 mg/g	-
Acyl-phosphatidylethanolamine	1.0 mg/g	0.9 mg/g	-
Phosphatidylinosil	1.9 mg/g	2.0 mg/g	-
Phosphatylcholin	1.2 mg/g	-	-
Glycolipides and tryglycerides	~1 mg/g	~1 mg/g	~1 mg/g

Allantoin

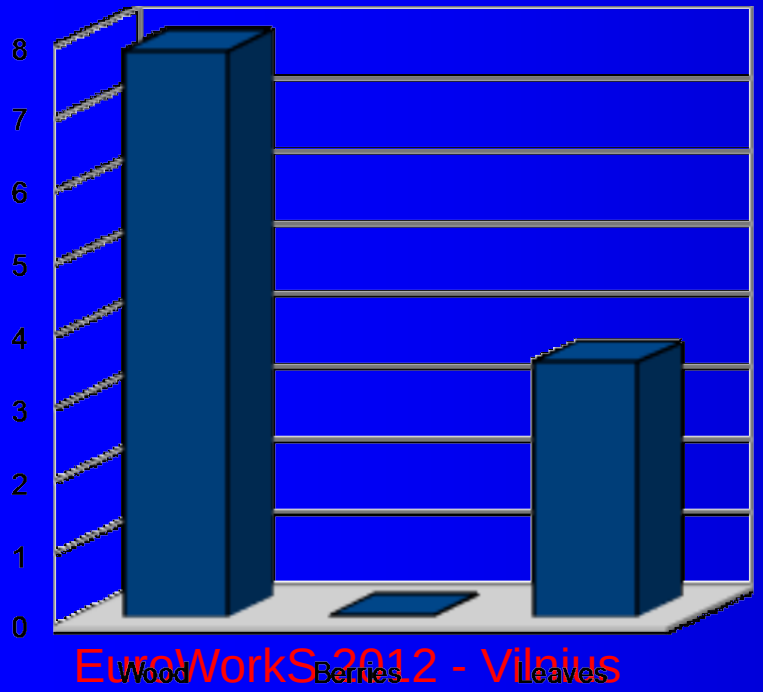
Experimenal conditions

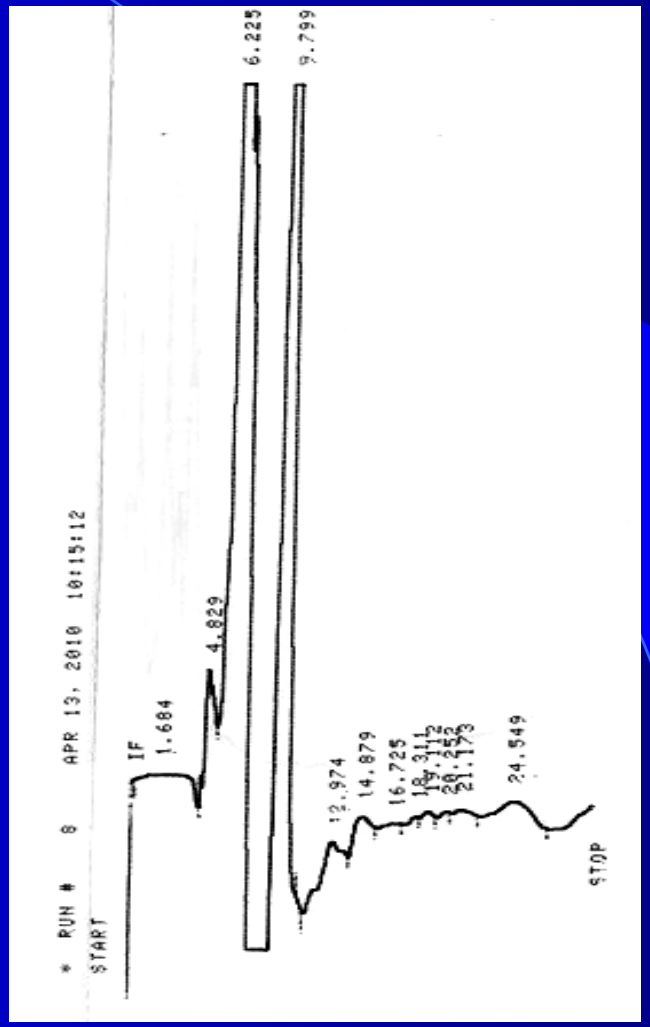
Parameter	**Value**
Stationary phase	Column: LiChrosper 100 NH_2, 5 µm, 250x4 cm
Mobile phase	Acetonitrile/Water in the ratio of 90/10
Flow of fluid	0.8 cm^3/min
Injection volume	20 µl
Retention time	10 min

Allantoin

Obtained results

Samples	Content mg/g	Content %
Branches	78	7.8
Berries	0.2	0.02
Leaves	35	3.5





SBT varieties and brands

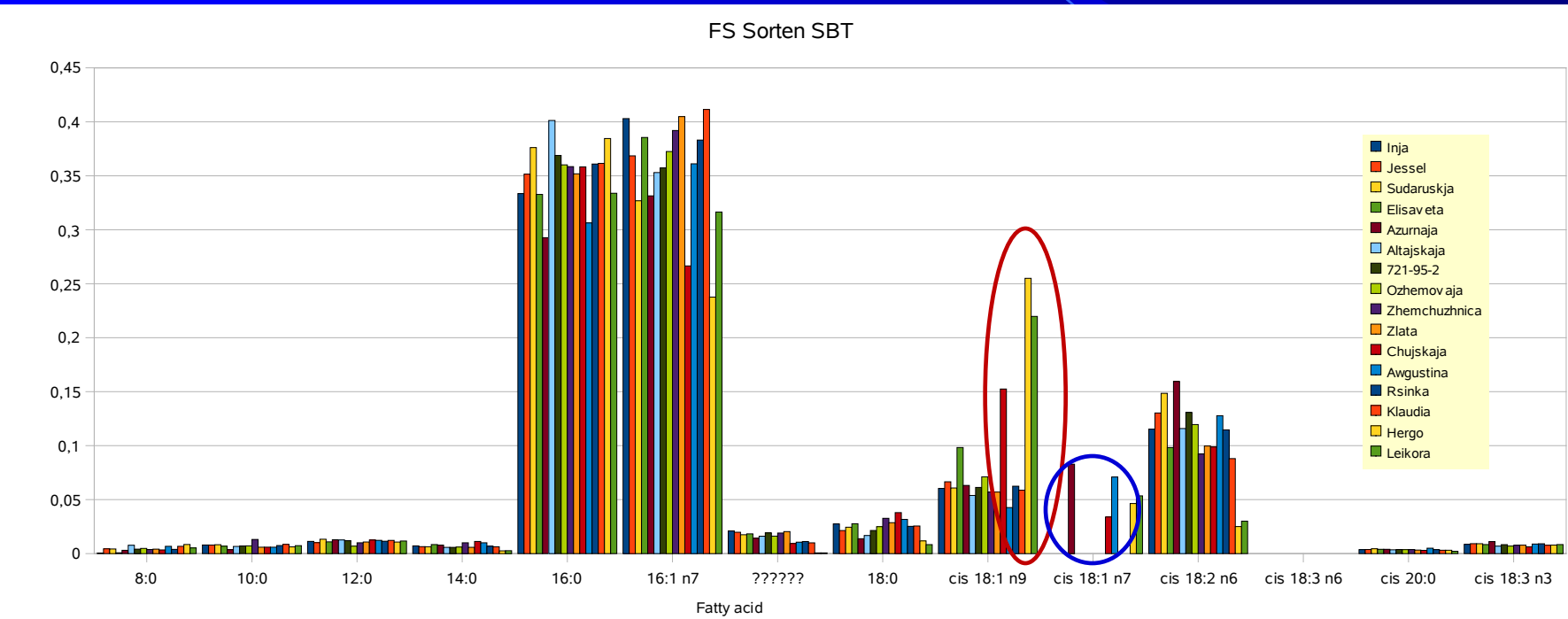
- From over 100 varieties world-wide
- Many of them in Russia (origin Altai, Russia)
- About half dozen varieties in Germany (origin from Baltic sea cost)
- Investigated brands

- Inja
- Jessel
- Sudaruskja
- Elisaveta
- Azurnaja
- Altajskaja
- 721-95-2
- Ozhemovaja
- Zhemchuzhnica
- Zlata
- Chujskaja
- Awgustina
- Rsinka
- Klaudia
- Hergo
- Leikora

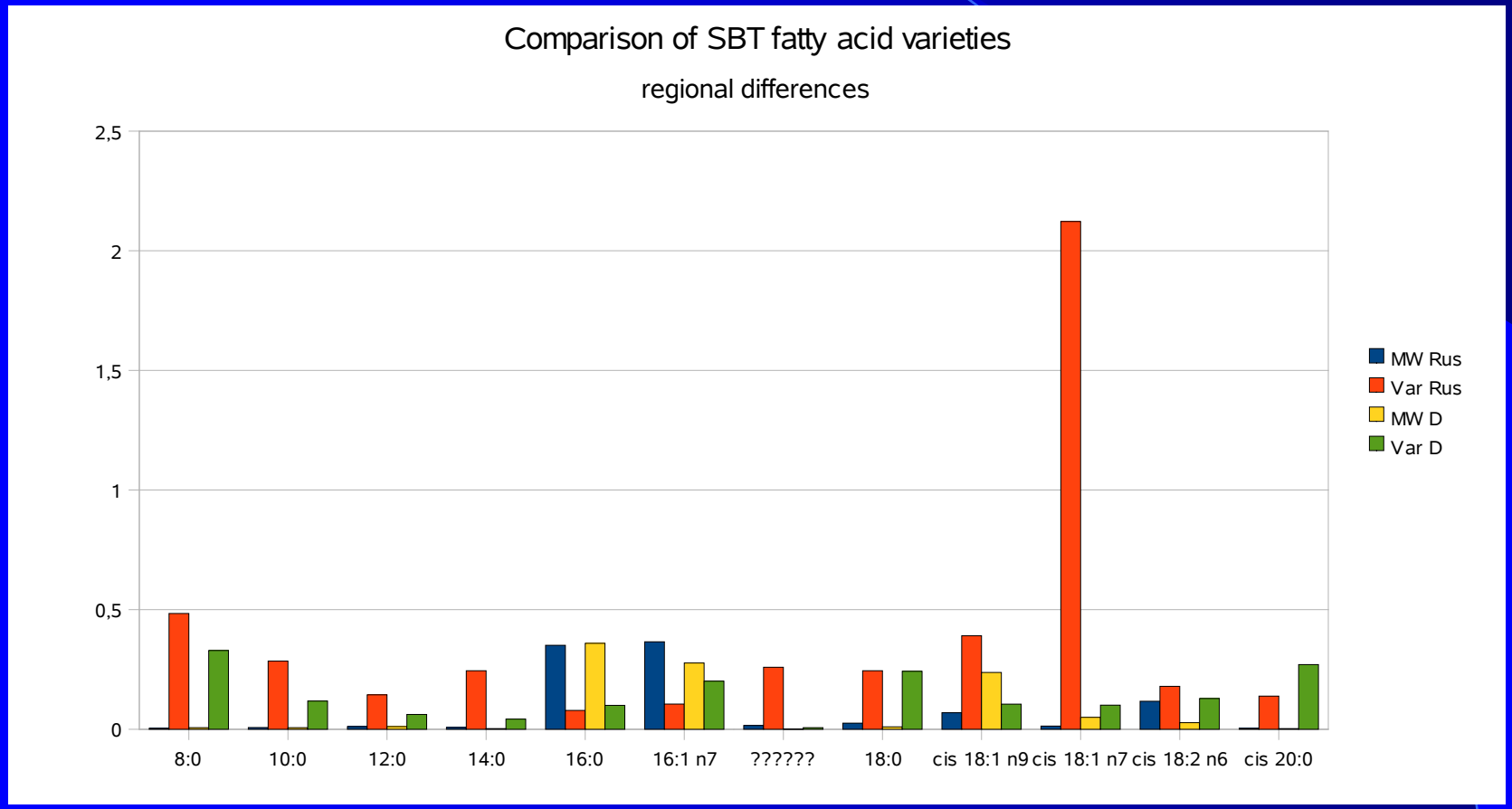
Experimental design

- Extraction of oil with methanol / chloroform - method after Folch et al. (modified)
- Fatty acid composition after transesterification with TMSH by capillary GC (DGF method)
- Carotenoids by HPTLC on Silicagel, CAMAG scanner
- saponification by ethanolic potassiumhydroxide
- Tocopherols on normal phase HPLC, 300 mm x 4,6 mm, mob. phase i-octane / ethylacetate 96/4
- Sterols by GC (OV 101, 30m x 0,25mm, 0,2 µm; derivatization with BSTFA

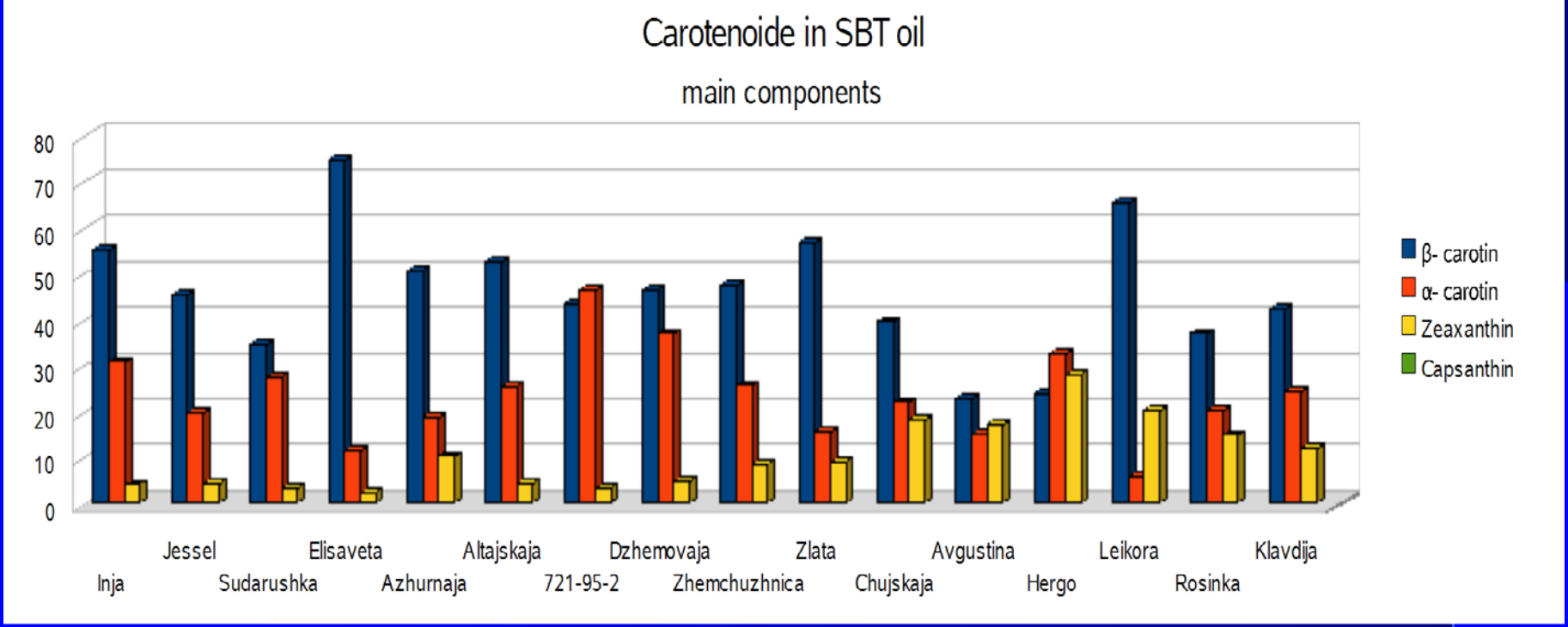
Fatty acid composition



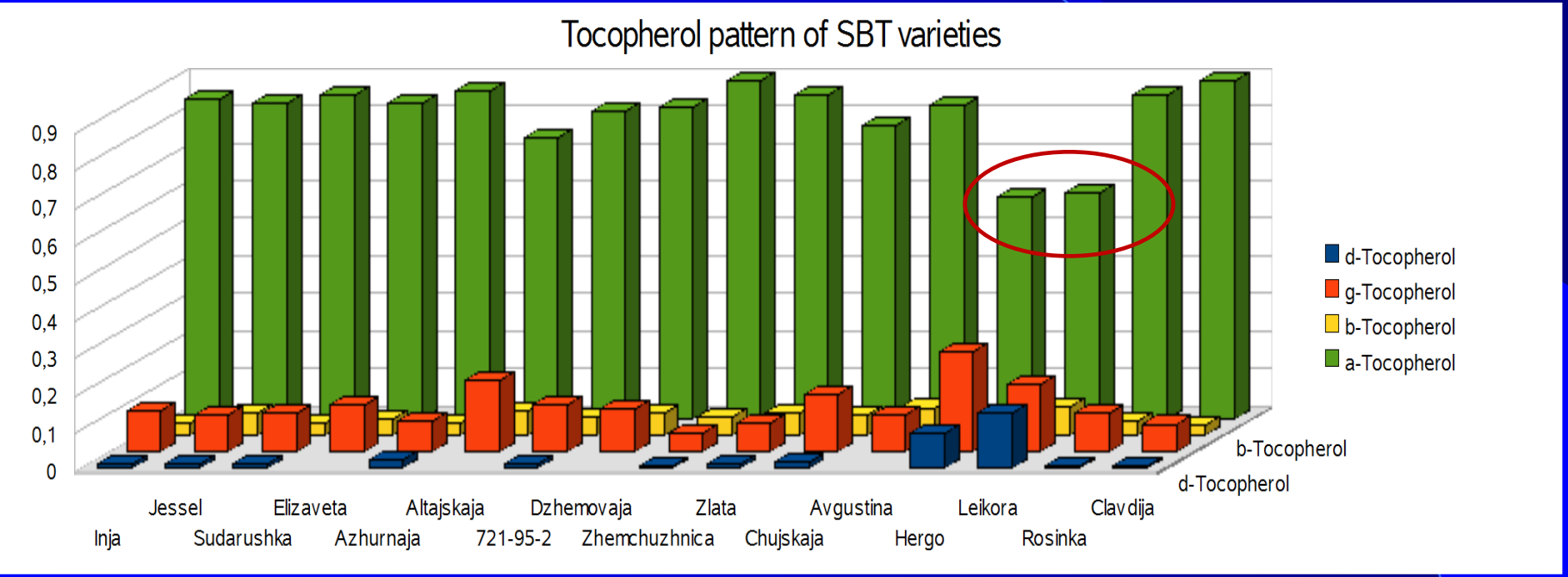
Fatty acid composition



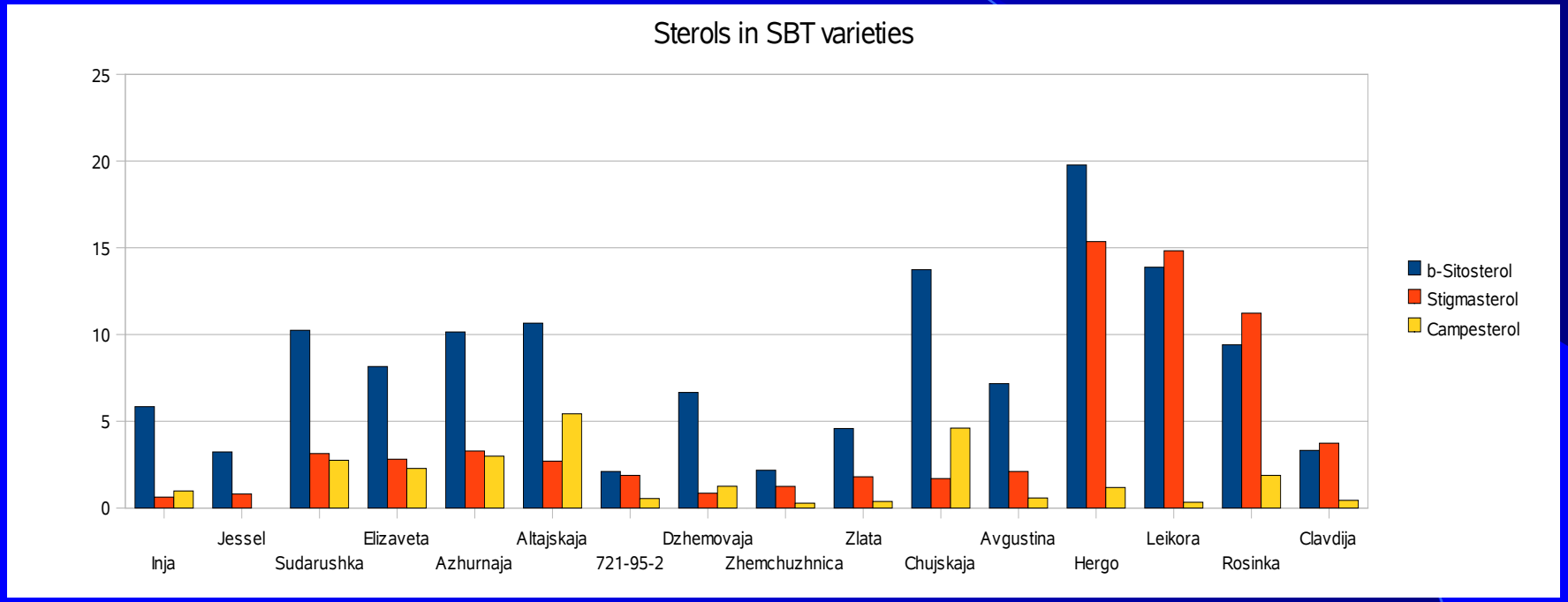
Carotenoid composition



Tocopherol pattern



Sterols in SBT



Conclusions

- Sea buckthorn contains the different bioactive compounds, like allantoins, fatty acids, flavonoids, etc.
- All parts of the plant contain poly-unsaturated fatty acids, including omega-3.
- Branches of the sea buckthorn is a very promissing material to obtained a large amount of Allantoin, which is an important compound in cosmetics having antimicrobial, healing and anti-aging properties.
- International SBT market is determined by great variety of brands
- Varieties differ widely causing different properties

Conclusions

- Fatty acid composition between Russian and German varieties is significantly different
- Tocopherol pattern can be used to distinguish between European and Russian varieties (lower α-Tocopherol in European varieties)
- Sterols are of different nature - no systematic pattern
- Capsanthin in SBT oil is a significant indicator for adulteration of SBT oil
- different chemical composition more depends on varieties the on region

Thanks for your kind attention