

MORPHOMETRIC VARIABILITY OF SEA BUCKTHORN SEEDS FROM WILD POPULATIONS AND CULTURE

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Key words: sea buckthorn, cultivars, spontaneous biotypes, variability

INTRODUCTION

Buckthorn *seed*, which is in fact the actual fruit, is found as one seed, very rarely as two inside the fruit. It is small, oblong, hard, ovoid and brown-fawn to blackish, covered by a thick spermoderm, composed of a lignified skin and two large, semicircular cotyledons. The seed is surrounded by an edible pericarp called *hypanthium*. The germination capacity is 2 years and the semen rest occurs in the fruit, as seeds can germinate immediately after extraction (BELDEANU C. E., 1972). The seeds have different colours - from brown to black and various forms - from elliptical (ssp. *rhamnoides*) to egg-shaped (ssp. *fluviatilis*) (LEBEDA A., 2007).

The morphological characterization of sea buckthorn has been addressed by numerous researchers in all areas where sea buckthorn grows spontaneously: ROUSI (1965, 1971) described the leaves of sea buckthorn from Russia; CHERNENKO et al., (2004) - the fruits and seeds of sea buckthorn from Uzbekistan and Kyrgystan; SINGH (2005) - the sea buckthorn from India; RONGSEN (2003) - the sea buckthorn from China; LI (2002) - the sea buckthorn from Canada; ARAS et al., (2007) - the sea buckthorn from Turkey.

MATERIAL AND METHOD

The plant material used in investigations of morphological variability of sea buckthorn seed was harvested from the culture of FRUCTEX Bacău (6 varieties, 4 biotypes) and from the spontaneous flora of the counties of Bacău, Neamț, Vaslui and Vrancea (31 biotypes).

The Bacău County plant material was collected in the months of October from 2008 - 2010. In Vaslui, the fruits were harvested in September 2010 and in Neamț and Vrancea counties in August 2010.

From each variety / biotype there were analysed 100 seeds / individual. Biometric

measurements were conducted to determine the length, width, and individual seed mass, namely the weight of 100 seeds, the L/W ratio.

Seed length and width were measured in mm with an electronic calliper (DIGITAL CALLIPER 0-150 mm) and the weight in grams, with an analytical balance (ACCULAB).

The obtained data were processed in Microsoft Excel and interpreted statistically. The following biometrical indices were calculated: \bar{x} - arithmetic mean; s - standard deviation; s% - variation coefficient; sx - standard deviation of the arithmetic mean (arithmetic mean error); sx% - the arithmetic mean standard deviation in percentage (mean error in percentages).

The seeds showed great variability, especially regarding colour and size.

Depending on the seed colour, the plant material studied can be classified as follows:

- biotypes with dark-brown seeds: the varieties *Auraș*, *Silvia*, *Victoria*, the culture biotype Delta 60M and the biotypes from the spontaneous flora Coteni-5, Gherăiești-3, Gherăiești-4, Gherăiești-6, Vaduri-1, Câmpuri -1, Câmpuri -2, Câmpuri -3;

- biotypes with red-brown seed colour: the Roșu Albastru culture biotype, Coteni and Vibratina plant material derived from populations of Coteni-1, Coteni-2, Coteni-3, Viforeni, Gherăiești-1, Gherăiești-2, Gherăiești- 55, Vaduri-3, Varnița-1, Pogana-1, Pogana-2;

- biotypes with black seeds: the analysed biotypes from the populations of Coteni-4, Letea-1-6, Ruginoasa 1-2, Varnița-2.

The investigated biotypes from Neamț county, respectively Vaduri-1-3, show the highest variability for the character seed colour, each biotype highlighting a characteristic colour (Table no. 1).

The biotypes Letea 1-6 harvested in Bacău county showed the same seed colour (black).

Regarding seed shape, we have identified two predominant forms of seeds: elliptical and ovate-lanceolate, as shown in Figures 1-30.

Table 1. Characterization of the seeds of the buckthorn varieties/biotypes investigated morphologically

Harvesting location	Variety/biotype	Seed colour	Seed shape	No. seeds/fruit	Seed size
FRUCTEX Bacău	<i>Auraș</i>	dark brown	ovate-lanceolate	1	large
	<i>Ovidiu</i>	reddish-brown	elliptical	1	small to average
	<i>Silvia</i>	dark brown	elliptical	1	small to average
	<i>Serpenta</i>	reddish-brown	ovate-lanceolate	1	large
	<i>Tiberiu</i>	dark brown	elliptical	1	average
Bacău	<i>Victoria</i>	dark brown	ovate-lanceolate	1	very large
	Delta 60 M	dark brown	ovate-lanceolate	1	very large
	Roșu Albastru	reddish-brown	ovate-lanceolate	1	average
	Vibratina	reddish-brown	elliptical	1	average
	Coteni	reddish-brown	elliptical	1	small to average
	Coteni-1	reddish-brown	ovate-lanceolate	1	small to average
	Coteni-2	reddish-brown	ovate-lanceolate	1	small to average
	Coteni-3	reddish-brown	ovate-lanceolate	1	average
	Coteni-4	black	ovate-lanceolate	1	average
	Coteni-5	dark brown	elliptical	1	small to average
	Letea-1	black	elliptical	1	small
	Letea-2	black	elliptical	1	small to average
	Letea-3	black	ovate-lanceolate	1	small to average
	Letea-4	black	elliptical	1	average
	Letea-5	black	ovate-lanceolate	1	average
	Letea-6	black	ovate-lanceolate	1	average
	Viforeni	reddish-brown	ovate-lanceolate	1	large
	Schitu-Frumoasa	black	elliptical	1	small
	Gherăiești-1	reddish-brown	elliptical	1	average
	Gherăiești-2	reddish-brown	elliptical	1	average
	Gherăiești-3	dark brown	elliptical	1	small to average
	Gherăiești-4	dark brown	elliptical	1	small to average
	Gherăiești-5	reddish-brown	elliptical	1	average
Gherăiești-6	dark brown	elliptical	1	average	
Neamț	Vaduri-1	dark brown	elliptical	1	average
	Vaduri-2	black	elliptical	1	small to average
	Vaduri-3	reddish-brown	elliptical	1	average
	Ruginoasa-1	black	elliptical	1	average
	Ruginoasa-2	black	elliptical	1	small to average
Vrancea	Varnița-1	reddish-brown	elliptical	1	average
	Varnița-2	black	ovate-lanceolate	1	average
	Câmpuri-1	dark brown	elliptical	1	small to average
	Câmpuri-2	dark brown	ovate-lanceolate	1	average
Vaslui	Câmpuri-3	dark brown	ovate-lanceolate	1	small to average
	Pogana-1	black	elliptical	1	small to average
	Pogana-2	black	elliptical	1	average

RESULTS AND DISCUSSIONS

Regarding the character of “seed length”, as shown in Table 2, the mean value for the biotypes from FRUCTEX Bacău fluctuated between 3.49 mm (the variety *Silvia*) and 5.89 mm (the biotype Delta 60M). The biotypes collected from the counties of Bacău, Vrancea, Vaslui and Neamț highlight average values close to those from the culture of FRUCTEX Bacău.

The Delta 60M biotype has the highest (\bar{x}) average for the character “seed length” (5.89 mm), followed by Viforeni (5.38 mm) and Letea-4 (5.03 mm). The smallest fruits were identified at the biotype Schitu-Frumoasa (\bar{x} = 3.36 mm).

We may classify the biotypes according to the average value of the character (\bar{x}) “seed length” as follows:

- less than 4 mm: *Silvia* and *Tiberius* varieties ; Vibratina and Coteni (culture) biotypes; the biotypes

Coteni-1, -2, -5; Letea-1, -2; Schitu-Frumoasa, Gherăiești-3, -5; Vaduri-2; Ruginoasa-1, -2; Varnița-1; Câmpuri -1, -3 (from the spontaneous flora);
 - 4-5 mm: *Auraș*, *Ovid*, *Serpenta*, *Victoria* varieties, the Roșu-Albastru (culture) biotypes; Coteni-3, -4; Letea-3, -5, -6; Gherăiești -1, -2, -4, -6; Vaduri -1, -3; Varnița-2; Câmpuri 2; Pogana-1, -2 (from the spontaneous flora);
 - more than 5 mm: Delta 60M (culture biotype); Letea-4; Viforeni (spontaneous).

The variation coefficient values for the character “seed length” do not exceed 10% for most analysed biotypes, which shows that this character is genetically stable.

Average values of s% were recorded by the biotypes Letea-2 (10.75) Letea-3 (12.62) and Coteni-1 (12.54) and the lowest values of the variation coefficient were found at the biotypes from the FRUCTEX Bacău farm – the variety *Serpenta* (2.39) and Gherăiești-6 (3.02), from the spontaneous flora.

Table 2. The variation of the character “seed length” (mm) in populations of *Hippophaë rhamnoides* L.

Harvesting year	Name of variety/ biotype	The values of statistical parameters				
		x	s	s%	sx	sx%
2008	<i>Auraș</i>	4.85	0.28	5.78	0.028	0.57
	<i>Ovidiu</i>	4.07	0.20	4.91	0.020	0.49
	<i>Silvia</i>	3.49	0.14	4.01	0.014	0.40
	<i>Serpenta</i>	4.84	0.43	2.39	0.043	0.23
	<i>Tiberiu</i>	3.99	0.19	4.76	0.019	0.47
	<i>Victoria</i>	4.83	0.22	4.55	0.022	0.45
2009	Delta 60 M	5.89	0.29	4.92	0.029	0.49
	Roșu Albastru	4.52	0.20	4.42	0.020	0.44
	Vibratina	3.79	0.27	7.12	0.027	0.71
	Coteni	3.71	0.25	6.73	0.025	0.67
	Coteni-1	3.43	0.43	12.54	0.043	1.25
	Coteni-2	3.59	0.18	5.02	0.018	0.50
	Coteni-3	4.60	0.26	5.66	0.026	0.56
	Coteni-4	4.33	0.37	8.55	0.037	0.85
	Coteni-5	3.96	0.16	4.04	0.016	0.40
	Letea-1	3.97	0.27	6.80	0.027	0.68
	Letea-2	3.72	0.40	10.75	0.040	1.07
	Letea-3	4.91	0.62	12.62	0.062	1.26
	Letea-4	5.03	0.24	4.77	0.024	0.47
	Letea-5	4.65	0.30	6.54	0.030	0.65
	Letea-6	4.56	0.31	6.79	0.031	0.67
	Viforeni	5.38	0.24	4.46	0.020	0.44
Schitu-Frumoasa	3.36	0.22	6.06	0.022	0.60	
2010	Gherăiești-1	4.04	0.17	4.20	0.017	0.42
	Gherăiești-2	4.09	0.18	4.40	0.018	0.44
	Gherăiești-3	3.97	0.24	6.04	0.024	0.60
	Gherăiești-4	4.16	0.02	5.28	0.022	0.52
	Gherăiești-5	3.68	0.19	5.16	0.019	0.51
	Gherăiești-6	4.30	0.13	3.02	0.013	0.30
	Vaduri-1	4.40	0.24	5.45	0.024	0.54
	Vaduri-2	3.95	0.25	6.32	0.025	0.63
	Vaduri-3	4.31	0.22	5.32	0.022	0.53
	Ruginoasa-1	3.99	0.24	6.01	0.024	0.60
	Ruginoasa-2	3.99	0.20	5.01	0.020	0.50
	Varnița-1	3.94	0.19	4.82	0.019	0.48
	Varnița-2	4.91	0.23	4.68	0.023	0.46
	Câmpuri-1	3.58	0.15	4.18	0.015	0.41
	Câmpuri-2	4.70	0.25	5.31	0.025	0.53
	Câmpuri-3	3.97	0.23	5.79	0.023	0.57
	Pogana-1	4.07	0.24	5.89	0.024	0.58
	Pogana-2	4.20	0.18	4.28	0.018	0.42

For the character “seed length” (mm), the sx% index recorded values between 0.23 and 1.26, which shows that the average values obtained by us are reliable.

The character “seed width” oscillates between 1.24 mm (Coteni-1) and 2.62 mm (Letea-4), most biotypes studied having \bar{x} above 2 mm. Higher values of this parameter were found at the biotypes Letea-4, Delta-60M and Vaduri 3, the seed diameter exceeding 2.5 mm (see Table 4.)

Surprisingly, the variability of this character is higher than that of those discussed previously. Although most biotypes have a low variability of seed width (s% below 10), 11 of which have an average variability, some of them, such as Coteni-1, Letea-3 and Letea-5, show rather high variability (s% has values close to 20) (Table 3).

The values recorded by sx show that the calculated arithmetic means are reliable.

Regarding the character “seed biomass” from Table 4, the individual Delta 60M stands out by having the largest seeds (2.21 g / 100 seeds) and Coteni-2 by having the smallest seeds (0.64 g / 100 seeds).

We may classify the biotypes according to the average value of the “seed biomass” (\bar{x}) as follows:

- over 0.60 g / 100 seeds: the biotypes Coteni-1, -2; Gherăiești-3 and *Silvia* variety;
- between 0.60-0.80 g / 100 seeds: the (culture) biotypes Coteni; Schitu-Frumoasa;
- between 0.80-0.90 g / 100 seeds: the varieties *Serpenta* and *Tiberiu*; the biotypes Roșu-Albastru; Vibratina; Coteni-4, -5; Letea-1, -2; Gherăiești-2, -4; Ruginoasa-1, -2; Varnița-1; Câmpuri 1; Pogana-1, -2.
- over 1 g / 100 seeds: the varieties *Auraș*, *Ovidiu*, *Victoria*, Coteni-3, Letea-3, -5, -6; Viforeni, Gherăiești-1, -6; Vaduri-1, -2, -3; Varnița-2.

Table 3. The variation of the character “seed width” (mm) in populations of *Hippophaë rhamnoides* L.

Harvesting year	Name of variety/biotype	The values of statistical parameters				
		x	s	s%	sx	sx%
2008	<i>Auraş</i>	2.14	0.13	6.07	0.013	0.60
	<i>Ovidiu</i>	2.40	0.10	4.16	0.015	0.41
	<i>Silvia</i>	1.95	0.13	6.66	0.013	0.66
	<i>Serpenta</i>	1.96	0.15	7.65	0.015	0.76
	<i>Tiberiu</i>	2.22	0.13	5.85	0.013	0.58
	<i>Victoria</i>	2.40	0.15	6.25	0.015	0.62
2009	Delta 60 M	2.61	0.31	11.87	0.031	1.18
	Roşu Albastru	2.06	0.13	6.31	0.013	0.63
	Vibratina	2.13	0.15	7.04	0.015	0.70
	Coteni	2.00	0.23	11.5	0.023	1.15
	Coteni-1	1.24	0.22	17.75	0.022	1.77
	Coteni-2	1.72	0.11	6.40	0.011	0.64
	Coteni-3	2.10	0.23	10.96	0.023	1.09
	Coteni-4	1.71	0.15	8.78	0.015	0.87
	Coteni-5	2.14	0.19	8.87	0.019	0.88
	Letea-1	1.78	0.19	10.67	0.019	1.06
	Letea-2	1.93	0.28	14.50	0.028	1.45
	Letea-3	2.22	0.41	18.46	0.041	1.84
	Letea-4	2.62	0.15	5.72	0.015	0.57
	Letea-5	2.23	0.43	19.28	0.043	1.92
	Letea-6	2.25	0.37	16.44	0.037	1.64
	Viforeni	2.32	0.27	11.63	0.027	1.16
Schitu-Frumoasa	2.04	0.13	6.37	0.013	0.63	
2010	Gherăieşti-1	2.34	0.29	12.39	0.029	1.23
	Gherăieşti-2	2.18	0.11	5.04	0.011	0.50
	Gherăieşti-3	2.16	0.15	6.94	0.015	0.69
	Gherăieşti-4	2.50	0.19	7.60	0.019	0.76
	Gherăieşti-5	2.33	0.13	5.57	0.013	0.55
	Gherăieşti-6	2.41	0.12	4.97	0.012	0.49
	Vaduri-1	2.31	0.15	6.49	0.015	0.64
	Vaduri-2	2.23	0.12	5.38	0.012	0.53
	Vaduri-3	2.52	0.13	5.15	0.013	0.51
	Ruginoasa-1	2.03	0.11	5.41	0.011	0.54
	Ruginoasa-2	2.24	0.11	4.91	0.011	0.49
	Varniţa-1	2.17	0.11	5.06	0.011	0.50
	Varniţa-2	2.08	0.16	7.69	0.016	0.76
	Câmpuri-1	2.02	0.08	3.96	0.008	0.39
	Câmpuri-2	2.05	0.10	4.87	0.010	0.48
	Câmpuri-3	1.91	0.15	7.85	0.015	0.78
	Pogana-1	2.22	0.13	5.85	0.013	0.58
	Pogana-2	2.23	0.11	4.93	0.011	0.49

Most analysed individuals, irrespective of their origin (spontaneous flora / culture) showed an average variability (s% with values between 10 and 20) and the variety *Serpenta* recorded the highest value (s% = 20.00), hence being more sensitive to the influence of environmental factors. Few biotypes exhibit low variability of this character (s% with values below 10): the variety *Tiberiu* (s% = 7.44), Schitu-Frumoasa (s% = 8.59), Vaduri-3 (s% = 9.32%), Câmpuri 1 (s% = 8.75).

Even if the variability of the character “seed biomass” is greater compared to the seed length and seed diameter, the values obtained are accurate, sx% recording values below 3% for all the analysed biotypes.

In the case of seeds, it was determined the ratio between their length and width (L/W). The data

in Table 4 shows that the average value of this ratio fluctuated between 1.59 (the biotype Gherăieşti-5) and 2.80 (Coteni-1). These values demonstrate that the seeds of all the investigated biotypes have an oblong form. Only in the case of some of them (for example, the variety *Serpenta*, the biotypes Coteni-1 and -4, Varniţa-2) where the ratio L/W has values higher than 2.3 - their shape is obviously elongated, whereas at others (such as the *Ovidiu* and *Silvia* varieties, all the biotypes from the populations of Gherăieşti and Vaduri, etc.), the ratio L/W is between 1.5 and 2.0 – the shape of seeds is slightly rounded.

The analysis of the shape, size and colour of fruits and seeds of sea buckthorn biotypes from both culture and spontaneous populations revealed the fact that there is no clear phenotypic correlation between fruit colour and seed colour.

Table 4. The variation of the character “seed biomass” (g) in populations of *Hippophaë rhamnoides* L.

Harvesting year	Name of variety/biotype	The values of statistical parameters					Weight 100 seeds	L/W ratio (mean)
		x	s	s%	sx	sx%		
2008	<i>Auraş</i>	0.0100	0.0010	10.00	0.0001	0.10	1.0858	2.26
	<i>Ovidiu</i>	0.0088	0.0021	10.05	0.0001	0.10	1.2308	1.70
	<i>Silvia</i>	0.0068	0.0011	16.18	0.0001	1.68	0.6801	1.80
	<i>Serpenta</i>	0.0090	0.0018	20.00	0.0001	2.00	0.9060	2.48
	<i>Tiberiu</i>	0.0094	0.0007	7.44	0.0007	0.74	0.9455	1.80
	<i>Victoria</i>	0.0129	0.0014	10.85	0.0001	0.77	1.2932	2.02
2009	Delta 60 M	0.022	0.0056	11.36	0.0002	1.13	2.2132	2.29
	Roşu Albastru	0.0097	0.0015	15.46	0.0001	1.54	0.9644	2.20
	Vibratina	0.0092	0.0012	13.04	0.0001	1.30	0.9207	1.79
	Coteni	0.0079	0.0029	18.50	0.0010	1.85	0.7908	1.87
	Coteni-1	0.0068	0.0013	19.12	0.0001	1.19	0.6810	2.80
	Coteni-2	0.0064	0.0008	12.50	0.0008	1.25	0.6420	2.09
	Coteni-3	0.0138	0.0118	11.00	0.0011	1.10	1.3892	2.22
	Coteni-4	0.0084	0.0016	19.05	0.0001	1.90	0.8280	2.55
	Coteni-5	0.0089	0.0010	11.23	0.0001	1.12	0.8931	1.86
	Letea-1	0.0081	0.0017	19.41	0.0017	1.94	0.8157	2.26
	Letea-2	0.0087	0.0025	14.68	0.0025	1.46	0.8776	1.97
	Letea-3	0.0140	0.0017	12.14	0.0001	1.21	1.4060	2.30
	Letea-4	0.0153	0.0011	7.18	0.0010	0.71	1.5388	1.93
	Letea-5	0.0128	0.0017	13.28	0.0001	1.32	1.2870	2.16
	Letea-6	0.0131	0.0016	12.21	0.0001	1.21	1.3144	2.08
	Viforeni	0.0128	0.0012	17.28	0.0001	1.72	1.2866	2.35
Schitu-Frumoasa	0.0079	0.0013	8.59	0.0001	0.85	0.7986	1.79	
2010	Gherăieşti-1	0.0100	0.0014	10.40	0.0001	0.14	1.0062	1.77
	Gherăieşti-2	0.0088	0.0014	15.90	0.0001	1.59	0.8814	1.88
	Gherăieşti-3	0.0690	0.0012	10.73	0.0001	0.17	0.6948	1.84
	Gherăieşti-4	0.0113	0.0015	13.27	0.0001	1.32	1.1398	1.67
	Gherăieşti-5	0.0092	0.0010	10.86	0.0001	1.08	0.9224	1.59
	Gherăieşti-6	0.0108	0.0010	9.25	0.0001	0.92	1.0846	1.78
	Vaduri-1	0.0116	0.0015	12.93	0.0001	1.29	1.1630	1.91
	Vaduri-2	0.0104	0.0013	12.50	0.0001	1.25	1.0445	1.77
	Vaduri-3	0.0118	0.0011	9.32	0.0001	0.93	1.1874	1.71
	Ruginoasa-1	0.0090	0.0012	13.33	0.0001	1.33	0.9070	1.96
	Ruginoasa-2	0.0096	0.0013	13.54	0.0001	1.35	0.9670	1.78
	Varniţa-1	0.0083	0.0011	13.25	0.0001	1.32	0.8382	1.81
	Varniţa-2	0.0101	0.0012	11.88	0.0001	1.18	1.0162	2.37
	Câmpuri-1	0.0080	0.0007	8.75	0.0007	0.87	0.8094	1.78
	Câmpuri-2	0.0095	0.0010	10.52	0.0001	1.05	0.9519	2.29
	Câmpuri-3	0.0078	0.0009	11.53	0.0009	1.15	0.7890	2.08
	Pogana-1	0.0083	0.0010	12.04	0.0001	1.20	0.8325	1.83
	Pogana-2	0.0095	0.0010	10.52	0.0001	1.05	0.9545	1.88

There was, however, found a tendency at the biotypes with intense-orange/reddish-orange fruits orange to present black seeds, whereas the yellow/yellow-orange fruit samples have brown-reddish seeds.

Also, we cannot argue that the shape of fruits can provide information on the shape of seeds, but we have noticed that most oval-elongated fruits have elliptical seeds (sharper tips).

The fruits of all the investigated biotypes have just 1 single seed / fruit.

The seeds of some of the biotypes we studied highlighted similarities regarding the characters of colour and biomass with the varieties *Hippophaë rhamnoides* L. ssp. *turkestanica* and *Hippophaë rhamnoides* L. ssp. *Salicifolia*, whose colour varies

from light brown to dark brown and to black, and the biomass of 100 seeds oscillates between 0.718 and 1.331.

CONCLUSIONS

The average length of seeds ranged between 3.49 mm (the variety *Silvia*) and 5.89 mm (the biotype Delta 60M), the average width of the seeds ranged between 1.71 mm (Coteni-4) and 2.62 mm (Letea -4), and the biomass for 100 seeds varied between 0.64 g (the biotype Coteni-2) and 2.21 g (the biotype Delta 60M).

The character “seed length” had low variability, and seed “width” and “biomass” showed a high and average variability.

ABSTRACT

Hippophaë genre shows an amazing diversity. Morphological differences in the gender make particular reference to the shape, color of fruits and seeds, color and leaves disposition on shoots, etc. The paper presents some aspects of seed biometry of six varieties of sea buckthorn and four wild biotypes grown in the experimental field FRUCTEX Bacau, compared with 31 spontaneous biotypes collected from Bacau, Neamt, Vaslui, Vrancea. We analyzed the following morphological parameters: length, width and seed biomass, after which subsequently recorded values were statistically processed. Length seeds character showed a low variability and the width and biomass seeds showed a medium to high variability.

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The appearance of the seeds of some sea buckthorn varieties



Fig. 1. Variety *Auraș*



Fig. 2. Variety *Ovidiu*



Fig. 3.. Variety *Silvia*



Fig. 4. Variety *Serpenta*



Fig. 5. Variety *Tiberiu*



Fig. 6. Variety *Victoria*

The aspect of seeds of some sea buckthorn biotypes from the culture of FRUCTEX Bacău



Fig. 7. Biotype Delta 60M



Fig. 8. Biotype Roșu Albastru



Fig. 9. Biotype Coteni



Fig. 10. Biotype Vibratina

The aspect of seeds of some sea buckthorn biotypes from the spontaneous flora of the county of Bacău



Fig. 11. Biotype Coteni-2



Fig. 12. Biotype Coteni-3



Fig. 13. Biotype Coteni-4



Fig. 14. Biotype Letea-2



Fig. 15. Biotype Letea-3



Fig. 16. Biotype Viforeni



Fig. 17. Biotype Schitu-Frumoasa



Fig. 18. Biotype Gherăiești-1



Fig. 19. Biotype Gherăiești-2



Fig. 20. Biotype Gherăiești-3

The aspect of seeds of some sea buckthorn biotypes from the spontaneous flora of the counties of Neamț, Vaslui and Vrancea



Fig. 21. Biotype Ruginoasa-1



Fig. 22. Biotype Vaduri-1



Fig. 23. Biotype Vaduri-2



Fig. 24. Biotype Vaduri-3



Fig. 25. Biotype Varnița-1



Fig. 26. Biotype Varnița-2



Fig. 27. Biotype Câmpuri-2



Fig. 28. Biotype Câmpuri-3



Fig. 29. Biotype Pogana-1



Fig. 30. Biotype Pogana-2