

# Chemical characteristics of nectarine genitors used for breeding program in Romania

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**Summary:** The geographic location of Bucharest area, the nature of its soil and its climate offer remarkably favourable conditions for nectarine growing, with juicy and well flavoured fruit, good for fresh consumption and processing.

The five years' investigation (1996–2000) has helped to identify some nectarine cultivars and hybrids (NJNI 58, ARK 165, ARK 139, Morton, ARK 107, Romamer I, ARK 125, Firebrite) with exceptional fruit quality (dry matter content, titratable acidity, vitamin C content, overall sugar, and amount of pectic substances).

Dry matter content varied over the three years from 8.3 to 18.5% (NJNI 68), meanwhile titratable acidity varied between 0.26 and 1.08% (Romamer I). Sugar / acidity ratio was within the limits of 8.6 and 36.5 (Nectarated 7). Nectarines have high vitamin C content, over 10 mg/100g (Fairlane, NJN 67, Regina, Harko), glucides were found in Firebrite, Romamer I varieties and NJN 21, CIRIT127, HFSR3P4, HNA hybrids.

Some cultivars have been recommended for planting in this southern area of Romania (Crimsongold, ARK 125, Harko, Hardyred, ARK 134), others used as quality genitors (ARK 85, Nectarated 7, NJN 21, ARK 21, ARK 134, Fantasia) in breeding projects.

**Key words:** nectarine, fruit quality, Bucharest area

## Ecologic conditions

The short characterisation is found in the adjacent paper (Ivascu, A.: Research Station for Fruit Tree Growing Baneasa, Bucharest, Bdv. Ion Ionescu de la Brad, Nr. 4, Sect. 1, code 71592, Romania

## Material and method

Investigations took place at the Research Station for Fruit Tree Growing Baneasa, during 5 years 1996- 2000. Fourty-six cultivars were tested (19 cultivars and 27 hybrids) with early ripening occurring between July 1 and 15 (reference cultivar-Pocahontas), mid-season maturation means July 15–30 (reference cultivar-Flavortop) and late maturation August 1 to 10 (reference cultivar-Fantasia). The varieties came from USA, Canada, Italy, France and Romania.

The following characteristics were determined: dry matter content, overall sugar content, titratable acidity, vitamin C content, pectic substances, as well as water and ash content in the fruits (Bellini 1993, Crisosto, 1997).

It might be useful to have a summary of the procedures used to get those values, e.g. equipment used, references for producers, harvesting methods etc.

## Results

1. The content of refractometric dry substance (Table 1) varied from 8,3% (HCR3P8) to 18.5% (NJNI 68) in 1996. High content of dry substance was also recorded in NJN 58 (17.2%), Flavortop (16.8%), ARK 141 (16.5%), Morton (16.4%), CIRIT127 (16.2%), B8R1T4 (16.0%), ARK139 (15.7%).

In 1997 low percentage of is this dry matter were recorded, varying from 8.8% (Independence) to 16.4% (Nectarated 10), Romamer I only recorded 15%, the average accumulation this year being of 12% (13 cultivars). Values over 12% were recorded in: Crimsongold, HSRIP11, ARK 125, Nectarated 4, Firebrite, NJN 68, Flavortop, Fairlane, ARK 141 and NJN 67.

In early cultivars, in 1998 the accumulations of dry substance were extremely reduced since maturation took place during the second decade of June.

That was why, except for the HNB hybrid (14% dry substance accumulated) all the series of early and late cultivars up to Pocahontas reference one (12.5%) oscillated between 7.0% (PSCR17P26) and 13.4% (Mayred). All medium and late maturation cultivars recorded accumulations between 8.7% (Flavortop) and 16.0% (ARK 85, Morton).

Accumulations over 15% were recorded in Nectarated 4, NJN 21 and Fantasia (1999).

Average accumulations of nectarines on ripening stages: early stage-reference tree- Pocahontas (10.8%); NJA-9.7% and Romamer I-14,3%; medium stage-reference tree-Flavortop (13,3%); HCR3P8-9,8%, NJN 68, ARK 165-14.1%; late stage-reference tree-Fantasia (13.1%); ARK 145-12.2%, Nectarated 10-14.8%.

Oscillations limits of the dry substance % in certain cultivars and hybrids are wide, being greatly influenced by weather conditions so that they can present differences of 7% (Flavortop, ARK 71).

During the investigations the variation was very low in other cultivars (1–2%) being influenced by the maturity stage of the sample (Firebrite, ARK 109, NJN 67, Armking, ARK 145).

Table 1 Chemical compounds of some nectarine cultivars and hybrids at the research station bancaasa (Average 1996–2000)

No.	Cultivar or hybrid	Total acidity content %	Total sugar content %	Sugar acidity ratio	Vitamin C ascorbic acid mg/100g	% Pectic subs.	Soluble glucide %	Ash content %	Energetic value Kcal/100	Water %	% Dry substance refractometric
1.	HNA	0.64	7.4	11.5	8.1	0.60	7.8	0.21	39.04	90.24	9.7
2.	PSCR17P26	0.71	9.2	12.9	6.1	0.77	7.2	0.32	47.76	88.06	10.08
3.	ROMAMER I	1.08	2.3	8.6	5.2	0.80	7.9	0.38	51.92	87.02	14.3
4.	CRIMSONGOLD	0.92	9.9	10.5	8.7	0.84	6.5	0.42	56.96	85.76	12.0
5.	ROMAMER II	0.70	7.4	10.5	6.3	0.67	5.6	0.40	34.36	91.41	10.2
6.	INDEPENDENCE	0.65	7.1	10.9	6.4	0.75	6.2	0.36	44.76	88.89	9.2
7.	HSR1P11	0.75	8.9	11.8	8.1	0.65	5.7	0.56	41.08	89.73	10.7
8.	MAYRED	0.66	9.4	12.2	13.4	0.60	5.3	0.34	47.06	67.90	12.3
9.	HNB	0.60	9.0	16.3	11.3	0.61	7.5	0.36	52.32	86.92	12.6
10.	ARK 125	0.70	9.3	13.3	7.2	0.98	5.4	0.35	41.52	89.62	12.6
11.	NJN 58	0.80	11.3	14.1	6.3	0.60	8.4	0.17	42.01	87.90	13.2
12.	HARDYRED	0.60	9.5	15.8	11.1	0.69	5.9	0.23	40.88	89.78	11.0
13.	HFSR3P4	0.60	8.8	14.6	9.1	0.63	9.5	0.35	44.60	88.85	13.0
14.	POCAHONTAS	0.45	7.3	16.2	7.4	0.52	6.1	0.39	38.32	90.42	10.8
15.	NECTARED 4	0.85	9.4	11.0	13.2	0.45	5.0	0.88	35.92	91.02	13.2
16.	ARK 165	0.80	9.6	12.0	9.3	0.50	6.7	0.36	37.84	90.54	14.1
17.	ARK 139	0.55	10.4	18.9	8.4	0.69	7.2	0.40	45.80	88.55	13.6
18.	ARK 153	0.66	8.6	13.0	7.8	0.99	7.9	0.45	45.88	88.53	12.6
19.	ARK 134	0.67	9.1	13.5	8.6	0.78	7.5	0.44	45.92	88.52	11.4
20.	FIREBRITE	0.89	10.0	11.2	9.6	0.75	10.7	0.39	34.20	67.90	13.6
21.	HCR9P8	0.80	8.0	10.0	7.0	0.67	7.8	0.40	45.67	89.02	9.8
22.	HCR6P21	0.65	8.5	13.0	6.9	0.50	11.1	0.36	38.60	90.35	12.4
23.	NJN 21	0.83	9.4	11.3	8.4	0.51	8.3	0.15	48.76	87.81	13.0
24.	ARK 109	0.87	6.8	10.2	8.5	0.49	6.7	0.23	47.84	88.04	12.5
25.	MORTON	0.63	9.0	14.4	10.7	0.55	6.3	0.34	53.44	86.64	14.0
26.	HNC	0.63	8.6	13.6	11.8	0.60	4.1	0.49	40.74	89.81	13.0
27.	ARK 107	0.62	7.0	11.2	11.6	0.44	8.1	0.23	32.96	91.37	12.1
28.	ARK 85	0.51	8.7	17.0	8.5	0.70	8.1	0.18	34.20	83.95	13.4
29.	NJN 68	0.66	13.1	19.8	11.5	0.56	8.6	0.23	46.70	86.45	14.1
30.	ARK 114	0.61	8.4	13.7	9.4	0.67	6.5	0.35	44.44	88.89	12.2
31.	FLAVORTOP	0.95	12.9	13.5	6.3	0.68	10.1	0.14	34.56	78.97	13.3
32.	FAIRLANE	0.92	9.1	9.8	11.6	0.50	6.8	0.34	40.60	89.95	12.3
33.	ARK 71	0.67	10.2	15.2	9.0	0.69	7.4	0.72	37.58	78.67	13.1
34.	ARK 90	0.68	9.5	13.9	9.5	0.88	6.9	0.51	41.52	86.32	13.1
35.	ARK 141	1.02	11.5	11.2	9.8	0.76	8.2	0.57	43.01	86.45	14.1
36.	NJN 67	0.53	13.5	25.4	11.9	0.59	7.4	0.29	42.06	67.90	13.7
37.	REGINA	0.48	10.2	21.2	10.7	0.73	6.4	0.45	40.67	78.667	13.1
38.	CIRIT127	0.97	9.4	9.6	6.4	0.61	9.0	0.36	46.01	67.02	13.6
39.	B8RIT4	0.73	10.6	14.5	8.2	0.62	8.4	0.16	41.84	89.59	13.5
40.	HARKO	1.03	15.0	14.7	10.8	0.56	7.8	0.61	37.93	56.89	12.4
41.	WEINBERGER	0.70	9.6	13.7	8.5	0.67	5.7	0.65	36.90	67.68	12.3
42.	NJN 237	0.80	11.6	10.5	7.9	0.68	7.4	0.42	32.45	78.67	12.7
43.	FANTASIA	0.75	10.7	14.2	8.2	0.80	7.6	0.56	37.87	59.89	13.1
44.	NECTARED 7	0.26	9.5	36.5	9.9	0.71	8.2	0.42	37.92	90.52	14.2
45.	NECTARED 10	0.40	14.4	36.0	17.0	0.76	8.4	0.37	36.78	78.90	14.8
46.	ARK 145	0.69	8.0	11.5	6.7	0.53	7.4	0.37	35.32	91.17	12.2

2. Titratable acidity (TA) (expressed in malic acid equivalents) (Table 1) can vary within narrow limits from 0.26% (Nectared 7) to 1.08% (Romamer I) and is superior to that of TA in peaches. Cultivars with TA over 1% included Romamer I, ARK 141 and Harko.

In comparison to peaches that generally have 0.34 to 0.39% TA, nectarines have high overall TA. Therefore the taste of fresh fruits have better balance and a more pleasant flavour (or taste) than peaches.

3. All the analyses made to detect the overall reducing sugar in fruits (Table 1) lead to the conclusion that the limits it attains are 7.0% in ARK 107 hybrid and 15.0% in Harko cultivar. High sugar content, over 10%, is present in the following cultivars and hybrids: NJN 58, ARK 139, Firebrite, NJN 68, Flavortop, ARK 71, ARK 141, NJN 67, Regina, B8R1T4, Armking, NJN 237, Fantasia and Nectared 10.

The overall reducing sugar expresses both the content in reducing monosaccharides (glucose and fructose) existing as such in the fruit and the invertible sugar.

4. Sugar/acidity ratio (Table 1) is kept within the limits of 8.6 (Romamer I) and 6.5 (Nectared 7). The best balanced sugar to acidity ratio (of up to 10–12%) can be found in the fruits of Crimsongold, Romamer II, Independence, Nectared 4, Fairlane, ARK 145.

In certain cultivars and hybrids (HNC, HNA, PSCR17P26, C1R1T124) the sugar and acidity accumulation is below the quantity necessary to detect the favourable ratio between the two. Whenever this ratio is too high that is an indication of excess overall sugar, that is too sweet, less balanced taste (Morton, NJN 68, NJN 67, Nectared 7, Nectared 10).

5. The content in vitamin C ranges from 5.2 mg/100g (Romamer I) to 17.0 mg/100g (Nectared 10). (Table 1)

The following cultivars and hybrids presented high content of vitamin C, over 10 mg/100g: HNB, Hardyred, Nectared 4, Morton, HNC, ARK 107, NJN 68, Fairlane, NJN 67, Regina, Harko and Mayred.

6. Pectic substances are also important in nectarines (Table 1) for the processing of these fruits as jam, jelly, marmelade or creams. The limits of these chemical components vary from 0.44% (ARK 101) to 0.99% (ARK 154). High pectic substances were recorded in Romamer I, Crimsongold, ARK 125, ARK 141 and ARK 90.

7. The chemical composition of nectarines also contains soluble glucides (Table 1) in important percentages that range from 4.1% (HNC) to 11.1% (HCR6P21).

High percentages of soluble glucides were found in Firebrite, C1R1T127, HFSR3P4, HNA, Romamer I and NJN 21 cultivars and hybrids.

8. The whole of mineral substances remaining after the calcinating of the organic substances are representing

the ash content that for nectarines is light, reddish, very rich in ferro -oxides. The limits were set between 0.14% (Flavortop) to 0.8% (Nectared 4).

The quantity of mineral substances in nectarines is superior to that of peaches that have limits set for 0.37 to 0.59%.

9. Water content of fruits (Table 1) is high, ranging from 83.95% (ARK 85) to 91.76% (ARK 107).
10. Energetic value nectarines (Table 1), that is calories at 100g edible part, is high enough. The variation limits range from 32.96 Kcal/100g (ARK 107) to 56.96 Kcal/100g (Crimsongold). High energetic values are present in Romamer I, HNB, Morton, PSCR17P26, ARK 139, ARK 165, ARK 154, and NJN 21.

## Conclusions

High percentages of dry substance have been found in NJN 58, ARK 165, Morton, HNC, ARK 107, Flavortop, Romamer I, Crimsongold, ARK 125, Firebrite, NJN 68, Firelane and ARK 85, cultivars and hybrids (Ivascu, 1992).

High sugar content, over 10%, is present in NJN 58, ARK 139, Firebrite, Flavortop.

Most balanced sugar to acidity ratio can be found in Crimsongold, Romamer II, Independence, Nectared 4.

High content of vitamin C, over 10 mg/100g is present in: HNB, Hardyred, Nectared 4, Morton, HNC, ARK 107, NJN 68, Fairlane, NJN 67, Regina, Harko and Mayred.

The 0.44 to 0.99% pectic substance content in nectarines allow their being industrially processed into jam, jelly or pastes.

High energetic values are present in: Morton, Romamer I, ARK 139, ARK

165, NJN 21. The rather high nutrient value, the content of vitamin C as well the balanced ratio between sugar and acidity prompt nectarines as high quality fruits.

Firelane, Harko, Hardyred, Romamer I, ARK 125, Firebrite, ARK 134 are recommended for planting in southern Romania.

Fantasia, Flavortop, Crimsongold, ARK 85, NJN 21 are used for quality genitors in the breeding program at the Research Station for Fruit Tree Growing Baneasa – Bucharest, Romania.

## References

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