

## CHARACTERIZATION OF THE APPLE VARIETY "AMALIA" ACCORDING TO THE UPOV SHEET

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**Key words:** "AMALIA", UPOV sheet, morphological and phenotypic characteristics

### INTRODUCTION

The apple (*Malus domestica* L.) is one of the most highly appreciated and handy domestic fruit, a valuable food for all ages. The Romans would regard the apple tree as sacred, as it offered shade and energy to travellers (Chira A. și colab., 1999; Rati I.V., 2001; Gradinaru G., 2002).

"AMALIA" is a variety of apple obtained by clonal selection at SC FRUCTEX BACAU SRL, homologated in 2018 by Prof. Rati Ioan Viorel, PhD (Nicolae St., și colab. 2018).

The ripening period places it within the group of summer-autumn varieties (10<sup>th</sup> August-late November) and makes it be regarded as the variety that replaces winter apple consumption with seasonal apple consumption. Local consumers have named it the "Summer Jonathan".

In Romania, the evolution of the apple production sector is similar to global trends, i.e. a relative stability of production volume accompanied by the reduction of orchard areas. Although in the last 15 years the total area of apple orchards has decreased from 81.5 thousand ha to 60.5 thousand ha, the global harvest has oscillated around the level of 525 thousand tons. This places Romania on the 7<sup>th</sup> place in the European Union and 26<sup>th</sup> place in the world. Considering the production volume of apple juice of approximately 23-26 thousand tons, it is estimated that 35% of the apple harvest is processed and 65% is directed to the fresh market (Braniste N., și colab., 2011).

### MATERIAL AND METHODS

The observations and measures were made in the field of hybrids located at SC Fructex SRL, in the northern part of Bacău, on the Bistrița river meadow.

This land is suitable for plantations of fruit trees and bushes, due to the relief of hill and hilly area.

The Fructex Research Centre has developed in the field of fruit growing, aiming to promote modern culture, phytosanitary, conventional and biological pest control technologies.

The research field is carried out both nationally and internationally and focuses on the

promotion of modern culture technologies and valuable varieties of apple, cherry, plum, sea buckthorn with high genetic resistance to diseases, thus using a small number of phytosanitary treatments compared to common varieties.

The soil is alluvial with horizon A (20-30 cm) without horizon B, and horizon C up to 70-80 cm showing Ca in mineral composition (Mihaescu Gr., 1996).

The trees in the experimental field are grafted on the M106 rootstock, at 4m distance between rows and 2m distance inside row, guided in "palm" shape with oblique arms (Mihaescu Gr., 1996; Oprea St. Cociu V., 1989).

The productivity test was conducted over 5 years in the experimental field.

The characterization of the "AMALIA" apple variety was carried out according to the UPOV sheet - International Union for the Protection of Vegetal Creations imposed by OSIM - State Office for Inventions and Trademarks and ISTIS - State Institute for Testing and Registration of Varieties that traced the expression of characteristics, the variety reference and grade for 3 years.

Maintenance works (cuts, phytosanitary treatments, soil works, etc.) were carried out in accordance with the technologies specific to intensive apple plantations (Oprea St. Cociu V., 1989).

The intensive system is used in kernel and seed plants, grafted on medium-sized vegetative rootstocks. In this case, the trees bear fruit after 3-4 years, give maximum yield after 6-7 years and live up to 25-30 years.

### RESULTS AND DISCUSSIONS

Description of the AMALIA variety was carried out in accordance with the UPOV criteria (The International Union for the Protection of New Varieties of Plants), and the ISTIS and OSIM inspections were carried out during the 3 years. The highlighted morphological and phenotypic characteristics are:

- **Tree - vigour** - (Fig.1) vigour is described as **medium**, like the reference variety from the world

- assortment Revidar, the mark for this characteristic is 5 (UPOV 1).
- **Tree - type** – the AMALIA variety (Fig. 2) has the **branched** tree type, the reference variety in the world assortment is Revidar, and the mark for this characteristic is 2 (UPOV 2\*G).
  - **Tree** – branch architecture (excluding the columnar type) - for the AMALIA variety (Fig. 3) the branch distribution type is **cone-like shaped**, similar to the worldwide variety Revidar, and this characteristic is marked with 2 (UPOV 3\*G).
  - **Tree - type of fructification (fruit branches)** – at the AMALIA variety (Fig. 4), the fruit branches are short and long, being different from the reference variety from the world Revidar assortment, marked with 2 (UPOV 4).
  - The **one-year shoot** - at the AMALIA variety (Fig. 5) the characteristic expression falls within the **thick** category as at the reference variety Revidar of the world assortment. The rating given to this characteristic is 7 (UPOV 5).
  - The **one-year shoot - length of the internodes** - at the AMALIA variety (Fig. 6) the expression of characteristic falls within the **middle** category. The grade given to this characteristic is 5 similar to the reference variety Revidar in the world assortment (UPOV 6\*).
  - The **one-year shoot - colour on the side exposed to the sun** - at the AMALIA variety (Fig. 7) this characteristic is **medium-brown**, like at the reference variety from the world Revidar assortment. The rating given to this characteristic is 4 (UPOV 7).
  - **One-year shoot - the pubescence (on the upper half of the shoot)** at the AMALIA variety (Fig. 8) is **strong** like at the reference variety from the world Revidar assortment, being awarded the mark 7 (UPOV 8).
  - **One-year branch (number of lenticels)** – at the AMALIA variety (Fig. 9) this characteristic is **medium**, as at the reference variety Revidar in the world assortment, being marked with 5 (UPOV 9\*).
  - The **limb of the leaf** (orientation in relation to the branch) - at the AMALIA variety (Fig. 10), this characteristic is described as **upwards**, being different from the reference variety from the worldwide Revidar assortment and marked with 1 (UPOV 10\*).
  - The **leaf limb (length)** - at the AMALIA variety (Fig. 11) this characteristic is **medium**, similar to the reference variety from the world Revidar assortment, being marked with 5 (UPOV 11\*).
  - The **leaf limb (width)** – at the AMALIA variety (Fig. 12) this characteristic is described as **wide**, different from the reference variety from the world Revidar assortment. The rating for this characteristic is 7 (UPOV 12\*).
  - The **leaf limb (length/width ratio)** - at the AMALIA variety (Fig.13), this characteristic is described as **medium**, like at the reference variety from the world Revidar assortment, marked with 5 (UPOV 13\*).
  - The **leaf limb (intensity of green colour)** - at the AMALIA variety (Fig.14) is described as **medium**, like at the reference variety from the world Revidar assortment. The mark for this characteristic is 5 (UPOV 14).
  - The **leaf limb - the incisions on the leaf edge (upper half)** - at the AMALIA variety (Fig. 15), this characteristic is of the **serrated type I** like at the reference variety from the world Revidar assortment, being marked with 3 (UPOV 15\*).
  - The **leaf limb - pubescent on the inferior side** - at the AMALIA variety (Fig. 16) it is **medium**, like at the reference variety from the world Revidar assortment, marked with 2 (UPOV 16).
  - The **petiole - length** - at the AMALIA variety (Fig. 17), this characteristic is described as medium, marked with 5, similar to the reference variety from the world Revidar assortment (UPOV 17\*).
  - The **petiole - the intensity of the anthocyanidine colouring** - at the AMALIA variety (Fig.18) it is **medium**, like at the reference variety from the world Revidar assortment, marked with 5 (UPOV 18).
  - The **flower - the predominant colour at the bud stage** - this characteristic at the AMALIA variety is described as **light pink**, similar to the reference variety from the world Revidar assortment, marked with 3 (UPOV 19\*).
  - The **flower - the diameter with the open petals on a horizontal plane** - at the AMALIA variety, it is medium, marked with 5, similar to the reference variety from the world Revidar assortment (UPOV 20\*).
  - The **flower - the arrangement of the petals** - at the AMALIA variety these are **tangent**, marked with 2, like at the reference variety from the world Revidar assortment (UPOV 21\*).
  - The **flower - the stigma position in relation to the anthers** - at the AMALIA variety these are **at the same level**, like at the reference variety from the world Revidar assortment, marked with 2 (UPOV 22).
  - The **young fruit - the extension of the anthocyanic colour** - at the AMALIA variety (Fig. 19), this characteristic is described as **medium**, like at the reference variety from the world Revidar assortment and marked with 5 (UPOV 23).
  - The **fruit - size** - at the AMALIA variety (Fig. 20) is large, marked with 7, like at the reference variety from the world Revidar assortment (UPOV 24\*).
  - **Fruit - height** - at the AMALIA variety (Fig. 21), this characteristic is described as **medium**, similar to the reference variety from the world Revidar assortment and awarded mark 5 (UPOV 25\*).
  - **Fruit - diameter** - at the AMALIA variety (Fig. 22), the diameter is described as **large**, similar to

- the reference variety in the world Revidar assortment, marked with 7 (UPOV 26\*).
- **Fruit - the height/diameter ratio** - at the AMALIA variety (Fig. 23) the ratio between height and diameter is **low**, similar to the reference variety from the world Revidar assortment, marked with 3 (UPOV 27\*).
  - **Fruit - general shape** – the AMALIA variety (Fig. 24) has a general **obolid** shape, this characteristic being marked with 7 and similar to the Revidar reference variety from the world assortment (UPOV 28\*G).
  - The **fruit - coasting** - for the AMALIA variety this characteristic is marked as **absent or poor**, being awarded mark 1, similar to the reference variety from the world Revidar assortment. (UPOV 29).
  - The **fruit - the crown at the top of the calyx**, at the AMALIA variety (Fig. 25), is **medium**, like at the reference variety from the world Revidar assortment, being marked with 2 (UPOV 30).
  - The **fruit - the size of the calyx** - for the AMALIA variety (Fig. 26), this characteristic is described as medium and marked with 5, like at the reference variety from the Revidar world assortment (UPOV 31\*).
  - The **fruit - the length of the large sepal** - at the AMALIA variety (Fig. 27), the length of the sepal is **large**, being different from the reference variety from the world Revidar assortment, marked with 7 (UPOV 32).
  - The **fruit - pruinescence on the epidermis** - at the AMALIA variety (Fig. 28) is absent or poor, like at the reference variety from the world Revidar assortment, marked with 1 (UPOV 33\*).
  - The **fruit - the waxy layer** - at the AMALIA variety (Fig. 29) this characteristic is absent or very poor, marked with 1, like at the reference variety from the world Revidar assortment (UPOV 34).
  - The **fruit - the background colour (if it is visible)** - at the AMALIA variety (Fig. 30), this characteristic is marked as yellowish green, like at the reference variety from the world Revidar assortment, marked with 5 (UPOV 35\*).
  - The **fruit - the percentage of the cover colour** - for the AMALIA variety (Fig. 31) this characteristic is described as medium, like at the reference variety from the world Revidar assortment, marked with 5 (UPOV 36\*G).
  - The **fruit - cover colour** - at the AMALIA variety (Fig. 32) is purple red, being marked with 4, like at the reference variety from the world Revidar assortment (UPOV 37\*G).
  - The **fruit - the intensity of the cover colour** - at the AMALIA variety (Fig. 33) the intensity of the cover colour is in continuous areas with strongly delimited strips and the grade given to this characteristic is 3, similar to the reference variety from the world Revidar assortment (UPOV 39\*G).
  - The **fruit - striae width** – for the AMALIA variety (Fig. 34) the striae are described as **medium** and marked with 5, like at the reference variety from the world Revidar assortment (UPOV 40\*).
  - The **fruit - the weight of the subsurface around the peduncle cavity** - at the AMALIA variety (Fig. 35) it is described as medium, marked with 2, similar to the reference variety from the world Revidar assortment (UPOV 41\*).
  - The **fruit - the weight of the subsurface on the fruit surface** - at the AMALIA variety (Fig. 36) it is described as absent or very small, similar to the reference variety from the world Revidar assortment, and marked with 1 (UPOV 42).
  - The **fruit - the weight of the subsurface around the chalice cavity** - at the AMALIA variety (Fig. 37), this characteristic is absent or very poor, similar to the reference variety from the world Revidar assortment, being marked with 1 (UPOV 43\*).
  - The **fruit - the number of lenticels** - at the AMALIA variety (Fig. 38), this characteristic is described as medium, being marked with 5, like at the reference variety from the world Revidar assortment (UPOV 44).
  - The **fruit - the size of the lenticels** - at the AMALIA variety (Fig. 39) this characteristic is medium, similar to the reference variety from the world Revidar assortment, being given the mark 5 (UPOV 45).
  - The **fruit - the length of the peduncle** – at the AMALIA variety (Fig. 40), this characteristic is described as **long**, similar to the reference variety from the world Revidar assortment, receiving the mark 7 (UPOV 46\*).
  - The **fruit - the peduncle thickness** - at the AMALIA variety (Fig. 41), this characteristic is described as **medium**, similar to the reference variety from the world Revidar assortment, marked with 7 (UPOV 47\*).
  - The **fruit - the depth of the pedunculus cavity** - at the AMALIA variety (Fig. 42) it is described as deep, as in the Revidar variety of reference in the world assortment, being marked with 7 (UPOV 48\*).
  - The **fruit - the width of the peduncle cavity** - for the AMALIA variety this characteristic is described as medium, receiving the mark 5, like the reference variety from the world Revidar assortment (UPOV 49\*).
  - The **fruit - the depth of the chalice cavity** - at the AMALIA variety this characteristic is **medium**, similar to the reference variety from the world Revidar assortment, being awarded the mark 5 (UPOV 50\*).
  - **Fruit - firmness of the pulp** - at the AMALIA variety this characteristic is described as **medium**, like at the Revidar variety of reference in the world assortment, marked with 5 (UPOV 52\*).
  - The **fruit - pulp colour** - at the AMALIA variety (Fig. 43), this characteristic is described as a

**cream** colour, similar to the reference variety from the world Revidar assortment, being marked with 2 (UPOV 53\*).

- **The fruit - the opening of the carpel cups (in the cross section)** - at the AMALIA variety these were described as **closed or slightly open**, similar to the reference variety from the world Revidar assortment, being marked with 1 (UPOV 54\*).
- **The beginning of blossom** - (10% of the open flowers) - at the AMALIA variety this characteristic unfolds **early**, similar to the

reference variety from the world Revidar assortment, being marked with 3 (UPOV 55\*G).

- **The crop yield** - at the AMALIA variety (Fig. 44), this characteristic is described as **medium**, similar to the reference variety from the world Revidar assortment, marked with 5 (UPOV 56).
- **Consumption maturity** - at the AMALIA variety, this characteristic is described as **medium**, similar to the reference variety from the world Revidar assortment, being marked with 5 (UPOV 57\*G).



Fig. 1. Tree – vigour, Amalia variety



Fig. 2. Tree – type, AMALIA variety



Fig. 3. Tree – cone-like shaped, AMALIA variety



Fig. 4. Tree – fruit type, short and long fruit branches, AMALIA variety



Fig. 5. One-year shoot – thickness, AMALIA variety

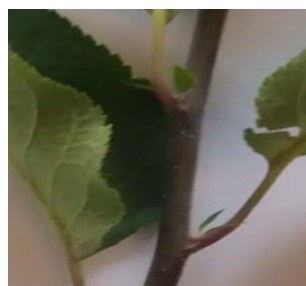


Fig. 6. One-year shoot – length of internodes – AMALIA variety



Fig. 7. One-year shoot – colour on the side exposed to the sun – middle-brown – AMALIA variety



Fig. 8. One-year shoot – strong pubescence on the upper half of the shoot - AMALIA variety

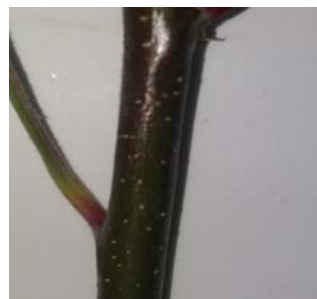


Fig. 9. One-year branch - number of lenticels - medium – AMALIA variety



Fig. 10. The limb of the leaf (orientation in relation to the branch), upwards - AMALIA variety



Fig. 11. Leaf limb (length) – medium, AMALIA variety



Fig. 12. Leaf limb (width) – medium, wide, AMALIA variety



Fig. 13. Leaf limb (length/width ratio) – medium, AMALIA variety



Fig. 14. Leaf limb (intensity of green colour) – medium - AMALIA variety



Fig. 15. Leaf limb – incisions on the leaf edge (upper half) – serrated type I – AMALIA variety



Fig. 16. Leaf limb - pubescent on the inferior side, middle, AMALIA variety



Fig. 17. Petiole – length, medium - AMALIA variety



Fig. 18. Petiole – the intensity of the anthocyanidine colouring, medium AMALIA variety



Fig. 19. Young fruit - the extension of the anthocyanic colour, medium, AMALIA variety



Fig. 20. Fruit size, large, AMALIA variety



Fig. 21. Fruit – height, medium, AMALIA variety





Fig. 22. Fruit – large diameter, AMALIA variety



Fig. 23. Fruit – height/diameter ratio, low, AMALIA variety



Fig. 24. Fruit – general ovoid shape, AMALIA variety



Fig. 25. Fruit – the crown at the top of the calyx, medium, AMALIA variety



Fig. 26. Fruit - the size of the calyx –AMALIA variety



Fig. 27. Fruit – length of the large sepal, AMALIA variety



Fig. 28. Fruit –pruinescence on the epidermis, absent or poor, AMALIA variety



Fig. 29. Fruit – absent or very poor waxy layer, AMALIA variety



Fig. 30. Fruit – background colour (if visible) – yellowish green, AMALIA variety



Fig. 31. Fruit – percentage of the cover colour, medium, AMALIA variety



Fig. 32. Fruit – cover colour, purple red, AMALIA variety

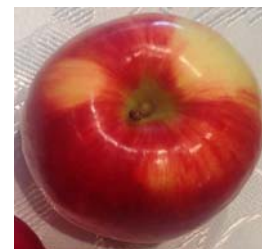


Fig. 33. Fruit – intensity of the cover colour, continuous areas with strongly delimited strips, AMALIA variety



Fig. 34. Fruit – striate width, medium, AMALIA variety



Fig. 35. Fruit – the weight of the subsurface around the peduncle cavity, medium, AMALIA variety



Fig. 36. Fruit – the weight of the subsurface on the fruit surface, absent or very small, AMALIA variety



Fig. 37. Fruit – weight of the subsurface around the chalice cavity, absent or very small, AMALIA variety



Fig. 38. Fruit – number of lenticels, medium, AMALIA variety



Fig. 39. Fruit – size of lenticels, medium, AMALIA variety



Fig. 40. Fruit – length of peduncle, long, AMALIA variety



Fig. 41. Fruit – peduncle thickness, medium, AMALIA variety



Fig. 42. Fruit - the depth of the pedunculus cavity, deep, AMALIA variety



Fig. 43. Fruit –pulp colour – cream, AMALIA variety



Fig. 44. Fruit – crop yield – medium, AMALIA variety

## CONCLUSIONS

- The AMALIA variety is part of the summer-autumn varieties, the ripening period being between August 10 and late November.
- The AMALIA variety shows medium strength, which facilitates maintenance work (pruning, phytosanitary treatments, etc.) and shows tolerance to apple scab (*Venturia inaequalis*).
- The AMALIA variety is recommended for modern intensive and super-intensive orchards, being suitable for integration into innovative technologies (fertilization, organic farming) with a high production capacity (over 50 t/ha). It can be grown in all fruit-growing areas dedicated to apple culture.
- The AMALIA variety yields crop every year, having the ability to adjust its fruit production, by producing short and long fruit branches.
- The fruits are large, uniform, Jonathan purple red with recognized organoleptic and market qualities.
- The sugar level in the AMALIA fresh fruit is 10% -12%, compared to winter varieties ranging from 18% to 20%, responding effectively to the nutritional requirements of the body against environmental factors. In the hot season the sugar requirement is lower and increases in the cold period when the body needs a higher amount of sugar.
- The AMALIA variety has been assigned, by the reporting authority (ISTIS), the reference number 05076 (Fig. 45).

- The AMALIA variety is present in the Fructex Bacau orchard and collection, being one of the varieties demanded by farmers due to its qualities.
- The AMALIA variety is multiplied in the nursery of the society on small and medium-sized rootstocks, with the biological label "CERTIFICATE" (Blue Label).

## ABSTRACT

"AMALIA" is an apple variety obtained by clonal selection at SC FRUCTEX BACAU SRL, homologated in 2018 by Prof. Engineer Rati Ioan Viorel, PhD.

"AMALIA" has been assigned by the reporting authority (ISTIS) the reference number 05076. This variety is present in the Fructex Bacau orchard and collection, being one of the varieties demanded by farmers due to its qualities.

The tree is medium in size, cone-like shaped, with short, medium and long fruit branches. It is a self-fertilizing variety.

The fruit is large, weighing between 190-200g, dark red in colour; the pulp displays great firmness and medium juice content, and pleasant taste. It has significant harvesting yield, achieving constantly 25-30 t/ha.

**Qualities:** It presents resistance to Apple scab (*Venturia inaequalis*) and good resistance to powdery mildew (*Podosphaera leucotricha*); the capacity of yield self-regulation enables constant crops every year.

**Shortcomings:** have not been observed as yet.



Fig. 45. The AMALIA apple variety



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