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THE PHYSICAL-CHEMICAL ASSESSMENT OF PARENTAL GENOTYPES USED IN THE BREEDING PROGRAMME OF MORUS SP. PLANTS

CARACTERIZAREA FIZICO-CHIMICA A GENOTIPURILOR PARENTALE UTILIZATE IN PROGRAMUL DE AMELIORARE AL PLANTELOR MORUS SP

TANASE DOINA, CONSTANTINESCU MARILENA, UNGUREANU C.

S.C. Sericarom S.A. - Baneasa Research Branch, Bucharest

The paper work present the physical chemical assessment of parental genotypes used in obtaining of new mulberry hybrid lines developed in the Mulberry Breeding Programme. The experimental works used 5 female mulberry varieties belonging to Morus alba, Morus bombycis and Morus multicaulis and 2 Morus alba male mulberry varieties. The values of somatometric and chemical content estimation shall constitute the standard values for mulberry hybrids selection.
Key words: mulberry varieties, female and male genitors, hybrids, controlled pollination.

Introduction

The sericulture vegetal germplasm from Romania contents mulberry varieties belonging to five Morus species, being The National Mulberry Varieties Collection in the patrimony of C.S. SERICAROM Research Department, Bucharest.

The sericulture vegetal germplasm content 64 mulberry varieties, having a productive potential that allows obtaining important leaves quantities until 30 tones/ha by traditional technological methods.

Out of these 64 mulberry varieties it was establish the favorable areas for 20 varieties and for the others could not be implemented the suitable areas.

The most used mulberry varieties in Romania have the following agro productive characteristics (Table 1) recorded in the traditional technologies for exploitation (manual and mechanical works, organic and chemical fertilizations).

Table 1

The productivity and cultivation area for mulberry varieties

Mulberry varieties	Maximum biological production kg/ha	Maximum technological production kg/ha	Suitable cultivation area
Hu san 1	18.160	13.620	all sericulture areas
Hu san 2	24.560	18.420	all sericulture areas
Olteni	20.480	15.360	-
Hu san 32	17.760	13.320	all sericulture areas
Hu san 199	18.800	14.100	all sericulture areas
Ichinose	21.200	15.900	all sericulture areas
Kokuso 21	30.720	23.040	South, South – West
Ken-Mochi	20.400	12.500	-
Wasemidori	19.520	17.140	-
Ucraina 9	16.400	12.300	all sericulture areas
Ucraina 107	15.840	11.880	all sericulture areas
Eforie	11.360	8.520	all sericulture areas

In the frame of Sectorial Programme, during 2006 – 2010 period shall be develop breeding and creation activities for new mulberry varieties with better agro productive parameters, according with The Breeding Programme for mulberry by obtaining new mulberry hybrid lines (controlled pollination) and selection of the most valuable phenotypes.

Materials and Methods

The experimental works made to obtain new mulberry hybrid lines during 2006 – 2007 period, were accomplished by achievement of 45 hybrid combinations from the following variants by controlled pollination:

V1 - Ken Mochi (female) x Ucraina 1 (male)

V2 - Xuan 792 (female) x Bulgaria 2005 (male)

V3 - Hu san 2 (female) x Ucraina 1 (male)

V4 - Hibrid selectat Baneasa 2002 (female) x Ucraina 1 (male)

V5 - Ucraina 9 (female) x Kokuso 27 (male)

The selection of hybrid combinations it was made based on phisical – chemical parameters of parental genitors, knowing that the Morus plants are unisexual and dioceous plants and the F1 seeds present a better heteorosis , with sericulture interested agro productive chracteristics. The female mulberry varieties used in controlated pollination, belong to the following mulberry species:

V 1 - Ken Mochi (Morus bombycis)

V 2 - Xuan 792 (Morus multicaulis)

V 3 - Hu san 2 (Morus multicaulis)
V 4 - Hibrid 2002 (Morus alba)
V 5 – Ucraina 9 (Morus alba)
The male parental mulberry varieties, used for controlated pollination are:
V 1 – Ucraina 1 (Morus alba)
V 2 – Bulgaria 2005 (Morus alba)
V 3 – Ucraina 1 (Morus alba)
V 4 – Ucraina 1 (Morus alba)
V 5 – Kokuso 27 (Morus alba)

The method for obtaining new mulberry hybrid lines was represented by controlated pollination with izolation paper bags on the female inflorescences in order to obtain the 5 mentioned variants. (Photo 1)

Photo 1. Controled pollination with paper bags izolation

To compare in the field the agro productive parameters where used as control variants the mulberry hybrids obtained by free pollination, from the same branch with paper bags izolation.

Is was obtained these controled variants:

Control 1 - Ken Mochi (Morus bombycis)

Control 2 – Xuan 792 (Morus multicaulis)
Control 3 - Hu san 2 (Morus multicaulis)
Control 4 - Hibrid 2002 (Morus alba)
Control 5 – Ucraina 9 (Morus alba)

The parental forms were assessed by somatometric estimations applied to mulberry plants belonging to mulberry collection, according with the experimental variants.

The physical – chemical characterization of the mulberry parental forms was accomplished according with the assessment methodology for mulberry varieties concerning the following agro productive characters:

- the length of two years old mulberry branch;
- total number of sprouts/plant;
- total length of sprouts and the length of frozen sprout;
- leaves number/sprout;
- leaves square area;
- weight of 25 leaves (with and without leafstalk);
- mulberry varieties productivity by leaves production/plant;
- chemical composition concerning the dry material and protein content.

Results and Discussions

It was obtained 45 hybrid combinations by controled pollination, according with the following results:

V1 - Ken Mochi x Ucraina 1 = 9 hybrid combinations
V2 - Xuan 792 x Bulgaria 2005 = 1 hybrid combinations
V3 - Hu san 2 x Ucraina 1 = 25 mulberry fruits without seeds – 0 hybrid combinations
V4 - Hibrid selectat Baneasa x Ucraina 1 = 35 mulberry fruits without seeds – 0 hybrid combinations
V5 - Ucraina 9 x Kokuso 27 = 35 hybrid combinations

It was obtained 179 seeds for the following combinations by free pollination:

Control 1 - Ken Mochi - free pollination – 59 seeds
Control 2 – Xuan 792 – free pollination – 0 seeds
Control 3 - Hu san 2 - free pollination – 10 seeds
Control 4 - Hibrid 2002 - free pollination – 110 seeds
Control 5 – Ucraina 9 – free pollination – 0 seeds.

The somatometric assessment of mulberry parental forms used in controlled pollination are presented in the table 2.

Tabel 2

The physical – chemical characterization of mulberry parental forms

Mulberry variety	Morus species	Sprout length (cm)	Leaves square area (cm^2)	Leaves weight (g)	Leaves production/ plant/ season (kg)	Leaf water content (% DM)	Leaf protein content (%DM)
Ken Mochi	Morus bombycis	143.8	138.0	3.1	3.0	73.30	25.10
Xuan 792	Morus multicaulis	150.3	186.5	6.1	3.3	77.43	25.90
Hu san 2	Morus multicaulis	122.0	195.1	6.0	2.9	74.60	25.77
Baneasa selected hybrid	Morus alba	167.3	161.8	3.5	2.1	77.34	26.71
Ucraina 9	Morus alba	175.0	164.4	3.9	3.2	72.30	24.87
Ucraina 1	Morus alba	90.9	104.3	2.8	2.1	70.5	22.55
Bulgaria 2005	Morus alba	157.8	113.9	2.7	2.7	72.03	23.65
Kokuso 27	Morus alba	141.5	183.7	4.7	3.2	76.95	25.85

The table data distinguish values of vegetative growing regarding the annually sprouts length in the 90, 9 – 175, 0 cm range for the mulberry varieties Ucraina 1 (male) and Ucraina 9 (female). The leaf protein content is between 22, 55 – 26, 71 % DM for mulberry varieties Ucraina 1 (male) and respectively Baneasa Selected Hybrid (female).

The leaf production/plant/season presents the values in the 2, 1 – 3, 3 kg intervals for Ucraina 1 variety and Xuan 792 (female variety).

As a note, the mulberry male variety Ucraina 1 was selected to be used as male genitor because it's an earlier variety.

The male variety Kokuso 27 was selected to be used as male genitor for its leaves protein content and vegetative growing (leaf production/plant).

The female mulberry varieties selected to be used in The Breeding Programme are distinguished by vegetative growing, leaf production and protein content...

To distinguish the physical – chemical characteristics of mulberry parental forms in a better manner was used its graphical representation (Fig. 1, fig. 2 and fig 3)

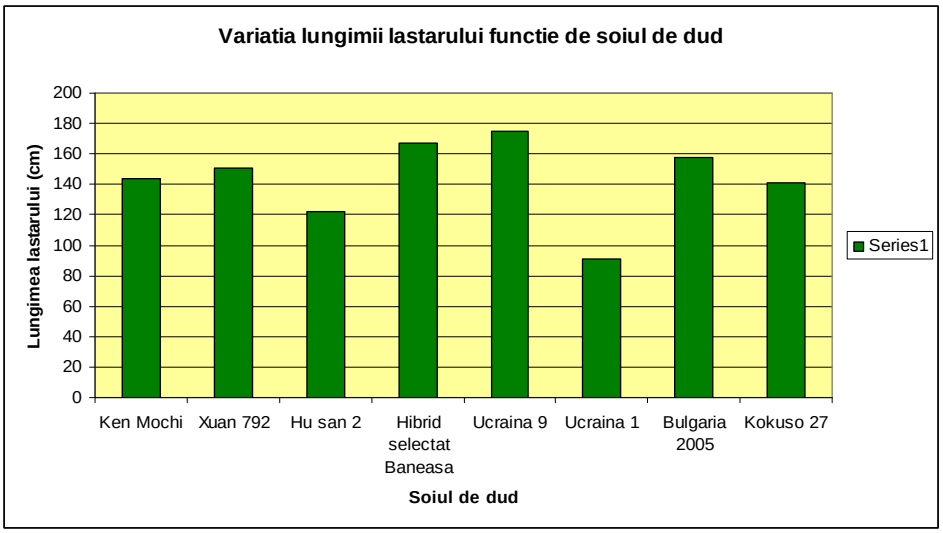

Fig. 1 Variation of sprout length for mulberry parental varieties

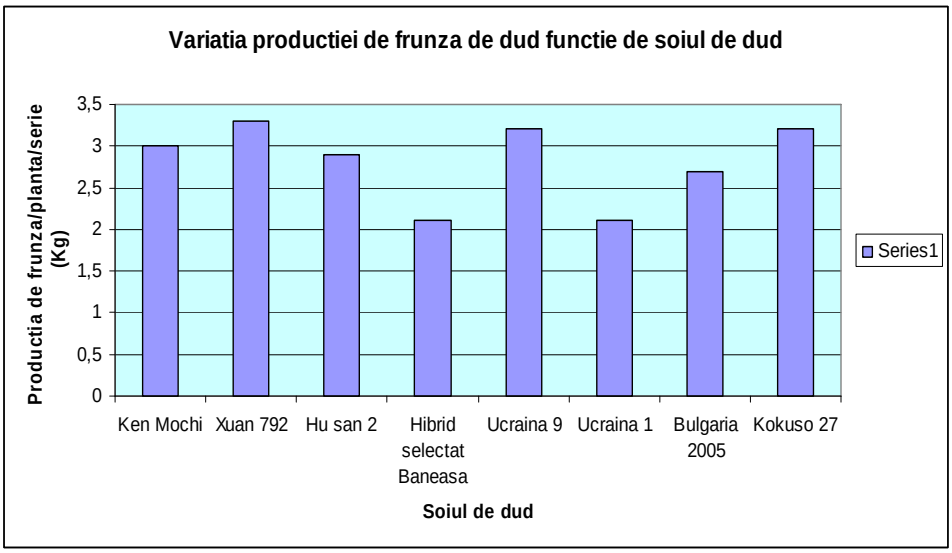

Fig. 2. Variation of leaves production for mulberry parental varieties

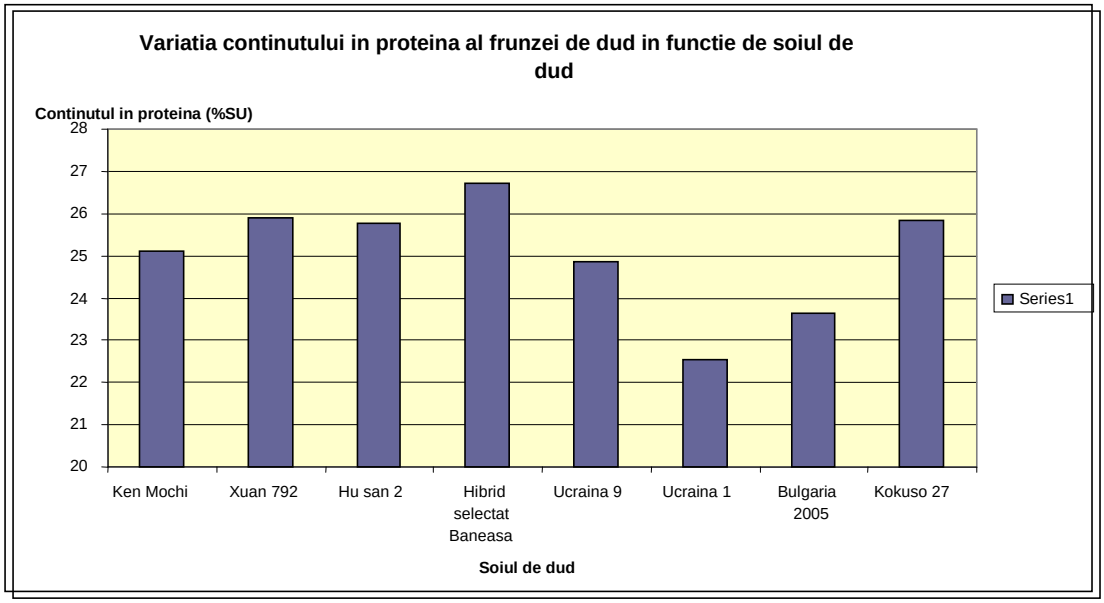

Fig. 3. Variation of protein leaves content for mulberry parental varieties

These values for physical – chemical characterization of parental forms shall be considerate the standard values for evaluation of mulberry hybrids obtained by controlled pollination in the selection field. This operation concerning the assessment and selection of the new hybrid combination lines shall be accomplish during the 2008 vegetative period.

Conclusions

The experimental data distinguish as conclusions the following aspects:

1. It was used as female mulberry genitors the mulberry varieties with significant importance for 3 Morus species (Morus bombycis, Morus alba and Morus multicaulis).
2. It was used as male mulberry genitors, 2 mulberry varieties with significant importance, belonging to Morus alba species, on of them – Ucraina 1, it's a earlier variety and Kokuso 27 are belated.
3. The mulberry varieties used in our experimental works presented the values of sprout length between 90, 9 – 175, 0 cm for Ucraina 1, respectively Ucraina 9.
4. The mulberry varieties used in our experimental works presented the values of leaves production between 2, 1 – 3, 3 kg for Ucraina 1, respectively Xuan 792.
5. The mulberry varieties, as parental forms, presented values of leaves protein content in the limits of 22, 55 – 26, 71% DM for Ucraina 1 and respectively Baneasa Selected Hybrid.

6. The values of the physical chemical parameters of parental genitors shall be considerate as referential values for mulberry hybrids combinations obtained by controlled pollination in the selection field.

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