Mulberry Germplasm

[G. Zviadadze], B. Sakandelidze, T. Dalalishvili

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Morphological Description and Economic Characterization of Mulberry Breeds Distributed in Georgia

At about 40 mulberry breeds were subjected to State breed testing /examination from 1946 till present. 21 breeds were given recommendation for their inculcation in industry and were zoned, including 14 breeds which were obtained via synthesized selection. These are:

#	Mulberry breed	Year of zoning	Breed authors
1	Gruzia	1950	Gr.Japaridze
2	Hybrid "Tbilniish-7"	1950	M.Shablovskaya
3	Tbilisuri	1958	M.Shablovskaya
4	Adreuli	1958	Gr.Japaridze, M.Shablovskaya
5	Iveria	1974	M.Shablovskaya
6	Kutaturi	1976	I,Marjanishvili, J.Dididze
7	Gruzniish-4	1980	M.Shablovskaya, V.Nikuradze
8	Hybrid-2	1980	M.Shablovskaya
9	Imeruli-1	1980	M.Shablovskaya, Z.Kharshiladze, E.Nikuradze
10	Imeruli-2	1980	M.Shablovskaya, Z.Kharshiladze, E.Nikuradze, V. Berdzenidze
11	Guria-10	1987	M.Shablovskaya, Z.Kharshiladze, E.Nikuradze, V. Berdzenidze
12	Guria-20	1987	M.Shablovskaya, Z.Kharshiladze, E.Nikuradze, K.Ebanoidze
13	Kolkheti-85	1987	M.Shablovskaya, Z.Kharshiladze, E.Nikuradze, V. Berdzenidze
14	Nata	1999	P.Naskidashvili, L.Tabliashvili

Among the above listed breeds, the breeds Tbilisuri, Iveria, Kutaturi, Gruzniish-4, Hybrid-2, Imeruli –1, Imeruli-2, Guria-10, Guria-20, Kolkheti-85 and Nata, in all 11 breeds, were recommended for distribution as the breeds relatively resistant to leaf curl.

10 breeds were exposed by passive selection. They were zoned. 5 breeds were introduced and 5 – were local mulberry breeds. These are:

#	Mulberry breed	Year of zoning
1	Russkaya	1958
2	Ukrainskaya –9	1972
3	Oshima	1994
4	Roso	1996
5	Ochinose	1996
6	Racha-10	1996
7	Egrisi	1999
8	Kutaturi-1	2008
9	Kitaturi-2	2008
10	Akhalkartuli-2	2008

Alongside with the above listed, at various times 44 breeds and forms were obtained and zoned. Part of those breeds was submitted for zoning. These breeds are:

1. Gruzniish-5;
2, Ukhvi;
3. Kartli;
4. Mtskheturi;
5. Gruzniish-7;
6.Samgoruli;
7. Form # 68;
8. Digmuri;
9.Triploid-13;
10. Digmuri-125;
11. Imeruli-90;
12.Rioni;
13. Hereti;
23. Digmuri-2;
24. Digmuri-3;
25. Digmuri-7;
26. Digmuri-16;
27. Digmuri-21;
28. Digmuri-27;
29. Digmuri-29;
30.Tbilniish-1;
31. Tbilniish-2;
32. Tbilniish-3;
33. Form # 2;
34. Form # 3;
35. Form # 4;

14.Saamo;
15.Racha-9;
16. Gashosani;
17. Form # 35;
18. Form # 14;
19. Form # 86;
19. Akhalkartuli-1;
21.Gruzniish-13;
22. Kutaturi-75;
36. Form # 4a;
37. Form # 109;
38. Form # 112;
39. Selective # 2;
40. Selective # 4;
41. Selective # 20;
42. Selective # 22;
43. Selective # 23;
44. Selective # 28.

Scientists-researchers such as Gr.Japaridze, A.Dididze, A.Marjanishvili, M.Shablovskaya, V.Nikuradze, V.Berdzenidze, Z.Kharshiladze, Ts.Japaridze, M.Kakulia, G.Aleksidze, G.Zviadadze, R.Kvachadze, L.Ninidze and others were working in mulberry selection at various times. Their contribution to selection, exposure, distribution and zoning and in revival-development of the branch at various times – is inestimable.

II. Characterization of Mulberry Breeds and Forms Obtained in Georgia since 1930 by Scientific Selection

a) Characterization of the zoned mulberry breeds

1."Gruzia"

The breed was obtained by clone selection. It belongs to Morus Kagayamae Koidz species. Author: Gr. Japaridze (Copyright # 191, July 18, 1950)

The plant is characterized by intense growth and strong trunk. Crown – big and compact, with thick and strong branches. Yearly growth of branches - 29-30 m. One-year branch is straight or slightly bent, with joints and light brown bark, inter-joint distance =5-7 cm.

Bud is big, brown, of oval form, with pointed tip, stuck to the branch. Leaf – big, green, whole-blade, of oblong cordiform, soft, with fleshy blade; and flat, moderately glittering surface, at the rim - slightly folded, rim - not homogeneous, notched; blade apex – pointed, oblong; base – cut in cardiform; petiole – thick, cylindrical, narrow, with deep canal, length 5-6 cm.

The breed is of female sex. It is characterized by average intensity fructification, collective fruit – of dark cherry color, large and oblong, with long pedicle, preserves dry stigma; fruit - is juicy, of sourish sweet taste.

Average stem plantation (3 X 3m) on the fifth year of exploitation yields 107,0 centner leaf.

Scions endure well long storing and give high positive result while grafting (80-95%).

The breed is highly sensitive to the leaf curl diease and is easily infected by bacteriosis.

2. Hybrid "Tbilniish-7

The hybrid was obtained by artificial inter-breed sex hybridization as a result of crossing of the breeds Lus (M. alba L.) and Cataneo (M. alba L.). Author: M.Shablovskaya (Copyright # 192, July 18, 1950).

The plant develops powerful and straight trunk; crown is thick, of conical form. One-year branch is of 2,5-3.0 m length. Is characterized by great number of growing sprouts and deep canal along the whole length of a branch; bark – gray. Inter-joints distance –4.0 cm. Bud – thin, pointed, of triangular form, closely stuck to the branch, gray brownish color.

Leaf – of big size (26 X 21 cm), dark green, oblong, cardiform, with thick blade; straight, glittering surface; petiole length – 7.0 cm

The breed is masculine; abundantly blossoming, flowers – thin, of oblong cylindrical form, petiole – long.

Hybrid "Tbilniish-7" is highly productive hybrid. In spring it yields 92 centner leaf per ha. Especially perspective is for autumn feeding when the leaf productivity reaches 140 centn./ha. Is recommended for feeding of silkworm of upper instars. Is good for fecundation of mother-stock-seed plantation. Is weakly infected by bacteriosis; can not resist low temperatures.

3."Tbilisuri"

The breed was obtained from the material obtained by free pollination, by manifold accurate sorting and focused rearing. It belongs to M. alba, Lin species Author: M.Shablovskaya (Copyright # 195, July 18, 1970).

Trunk of the plant is not straight; crown is big, thick and open. Yearly growth of branches -18-20 m. One-year branch is slightly bent, bark is of grayish brown color. Bud – of average size, light brown, triangular, wide at the base, stuck to the branch.

Leaf is big, green or light green, wide cordiform, thick, fleshy, with soft blade, uneven, glittering surface. Petiole is thick, of 7-9 cm length. Often both sex flowers are in one inflorescence / flower cluster. Flowers are mostly of male sex; fruit is of cherry color. Leaf is of the whole blade form, with slightly convex cordiform surface, size - 26 x 22 cm. The breed is of relatively early species; it develops its leaf mass early, which provides early feeding of silkworm in spring. It is characterized by abundant leafage, gives high nutritive value leaf. Its low fructification facilitates leaf preparation for feeding; is characterized by great quantity of growing sprouts.

Plantation of average trunk trees (3 X 3 m) gives 98 centner leaf per hectare. It requires specific terms for scion storing and early periods of grafting. The breed is practically resistant to the leaf curl and bacteriosis.

4."Adreuli"

Th breed is obtained through free pollination, by means of individual sorting from the population material grown as a result of seed sowing. It belongs to M. alba L. species. Authors: M.Shablovskaya and Gr. Japaridze (Copyright # 482, October 10, 1959).

The breed is characterized by intense development. Crown is compact. One-year branch is straight (3.0-3-5 m), with great number of growing sprouts; bark – gray; bud – of big size, rounded, convex, stuck to the branch. Leaf – big (27 X 18 cm), light green, of integral-blade, oblong cardiform, soft and delicate, with glittering even surface, with long, well developed petiole.

The breed is single-chamber. We meet flower clusters with flowers of both sex. The breed is characterized by low fructification; collective fruit is long, sparse, of oblong-cylindrical form, often – deformed, sometimes collective fruit has inserted sections of remnants of male sex flowers.

Leaf remains soft for a long period. It is good for feeding of the 1st instar silkworm. One hectare of average trunk (3 X 3 m) plantation gives 79 centner leaf. Scion is well preserved up to the middle of May. It requires early period of grafting.

The breed is not resistant to mulberry leaf curl and bacteriosis. It can not stand low temperatures.

5."Iveria"

The hybrid was obtained by inter-breed hybridization as a result of crossing of the breeds "Gruzia" (M. Kagayamae Koidz.) and hybrid "Tbilniish-7". Author: M.Shablovskaya (Copyright: # 924, February 18, 1968).

The hybrid is characterized by the well-developed straight trunk. Crown is compact, of oval-conic form; annual branch growth – 33-34 m. One year branch is straight, slightly jointed; bark – grayish-brown; inter-joint distance is 6 cm; bud – big, pointed, brown, stuck to the branch.

Leaf is of big size, dark green color, wide cordiform, soft, thick; petiole – cylindrical, with thin canal, length - 5.0 cm.

The breed is female, of average fructification. Collective fruit –rounded, oval, of non-homogeneous size, preserves long dry stigma. Fruit is of cherry color, juicy and sweet. Branch leafing starts early and evenly. The breed is highly productive. On the fifth year of exploitation the average trunk plantation (3 X 3 m) yields 12 centner/ha leaf. Leaf is of high nutritive value. Scions are stored well for long periods. Percentage of successful bud grafting is high in all periods. The breed is relatively resistant to mulberry leaf curl. It is zoned for all regions of Georgia leading sericulture.

6."Kutaturi"

The breed was obtained via clone selection from the population obtained by free pollination of mulberry breeds. It belongs to M.alba Lin species. Authors: A. Dididze and A, Marjanishvili (Copyright # 198, July 18, 1950).

The plant is characterized by straight, well-developed stem. Crown is large, well-developed, slightly spread, not compact. One-year branch is straight, of approximately 2 m length, with gray bark. Inter-joint distance is 3-4 cm.; bud is big, light brown or pink, pointed and stuck to the branch

Leaf is large (26-20 cm), green, oblong cardiform, whole-blade, with not glittering surface. Length of petiole is 6 cm.

The breed is female, of abundant fructification. Collective fruit is big and stable, oblong, cylindrical, dark red; pedicle is long, sitting on the branch thickly and

in clusters. Is recommended as the female component for seeding-mother stock plantations. It gives strong, homogeneous generation. Scion is kept well up to the end of May and requires early periods of grafting.

The breed is relatively resistant to leaf curl and is infected weakly by bacteriosis.

7."Gruzniish-4"

The breed is obtained by close hybridization, via crossing of European breeds Cedrona and Kataneo of M. alba Lin. species. Authors: M. Shablovskaya and V. Nikuradze (Copyright # 2813, September 19, 1979).

The plant develops upright and strong stem. Crown is large, non-compact, spread; length of one-year branch – 2.0-2,2 meter, with light gray bark, slightly jointed. Inter joint distance – 6.0-6.5 cm. Bud is of average size, triangular form, pointed, light brown; leaf – large, dark green, integral-bladed, wide, cardiform, fleshy, with even, glittering surface. Veining –raised, rim – notched, top – short and pointed, base – moderately deepened; petiole - of average thickness, cylindrical, slightly wrinkled, length: 6.0-7.0 cm.

The breed is masculine; flower cluster – large and sparse, blossoming and leaf formation proceeds simultaneously. On the 5^{th} year of exploitation, one hectare average size stem plantation yields 103 centner leaf.

"Gtuzniish-4" is the early breed and requires early period of grafting. It is characterized by high rate of scion grafting and intense growth of sapling.

The breed is resistant to bacteriosis and relatively resistant to mulberry leaf curl. It is frost-resistant. Is recommended as a good fecundation agent and is used as one of the components in mother stock - seeding plantation. Is recommended for the regions of Georgia leading sericulture.

8. Hybrid "Tbilniish-2"

The hybrid was obtained by inter-breed artificial sex hybridization, by repeated crossing of the hybrid (Cedrona M.alba Lin X Tatarica M.alba Lin.) with Tatarica (M.alba Lin.). Author: M. Shablovskaya (Copyright # 483, October 10, 1959).

The plant develops the straight stem. Crown is of average size, oval and thick. Yearly growth of the branches equals to 25-30 m. One-year branch is the straight,

brown; inter-joint distance – 5 cm. Bud is of average size, pointed, stuck to the branch, brown; leaf size– 24 x 18 cm, green, whole-blade, of oblong cardiform, with even and slightly glittering surface. Top - slightly pointed; petiole of average thickness, cylindrical, with deep canal, length –6 cm.

The breed has only masculine flowers; flower clusters are large and sparse, intense flowering hinders leaf development. It is characterized by great number of growing sprouts. 49 centner leaf is btained from a hectare of plantation..

The breed is characterized by long vegetation period and late leaf coarsening. Therefore it is recommended for spring and repeated feeding.

The breed belongs to the breeds which are relatively resistant to leaf curl. It is distinguished by high resistance to bacteriosis; is characterized by high percentage of successful bud grafting in early periods of grafting. Is recommended as a good pollination agent and is used as male component in mother-stock-seed plantation.

9."Imeruli-1"

This is a compound hybrid obtained by inter-species hybridization, via crossing of the breeds # 03 (M. bombycis Koidz X M. multicaulis P.) and the hybrid "Tbilniish-2". Authors: M.Shablovskaya, Z. Kharshiladze and V. Nikuradze (Copyright # 2814, September 18, 1979).

Crown of the plant is of a large size, spread; stem – upright; one-year branch – straight, bark – greenish–gray, average branch size – 2 m.; inter-joint distance – 5 cm, bud – oblong, rounded, of average size.

Leaf – large, cordiform, whole-blade, with glittering surface, edge – rounded, notched, top- short and pointed. Petiole – cylindrical, wrinkled, average size.

The breed is masculine; it gives great quantity of fertile pollen. It is considered the good pollination agent; flowers are along the whole length of branches, but their major part is accumulated in the lower section; blossoming somewhat hinders development of leaf in spring.

Average leaf yield of 7-8 year plantation (3 X 3 m) per year equals to 85 centner. The breed is relatively resistant to the leaf curl, at about 10% of plants is infected. Bacteriosis and cylindosporosis are not observed. Is zoned for the regions of distribution of mulberry curl.

10."Imeruli-2"

The breed was obtained by inter-breed hybridization, by crossing of the breeds # 2 (M. Kagayamae Koidz.) and the hybrid -7 (M.alba L.). Authors: M. Shablovskaya, G.Kharshiladze, V.Berdzenidze (Copyright # 3521, November 27, 1983).

Crown is slightly open, unfolded; stem – uptight, bark –yellowish brown. Average length of a branch - 2 m. Inter-joint distance – 6 cm. Bud – triangular, brownish- gray, stuck to the branch, of average size.

Leaf – oblong, cardiform, full-blade, thick and fleshy, with glittering surface, rim –notched, base – cut, apex - slightly pointed.

The breed is female; fructification – low, fruit - cylindrical, average size, dark cherry.

The breed is tolerant in the zone of leaf curl. 10-year average-stem plantation (3 X 3m) yields 85 centner leaf.

11. "Guria-10"

The breed was obtained by inter-breed hybridization, by crossing of the breeds # 02 (M. Kagayamae Koidz.) and the hybrid "Tbilniish-7" (M.alba Lin.) Authors: M. Shablovskaya, G.Kharshiladze, V.Nikuradze, K.Ebanoidze (Copyright # 4448, October 15, 1987).

Leaf – wide, cardiform, rather large, dark green, base of the blade – slightly cut, rim – notched, surface – even, glittering, thick and solid, of strong consistency.

Branches – straight, bark –dark brown; bud – triangular, stuck to the branch, brown.

Breed is female. Fruit – cylindrical, dark cherry, of average size The breed is of average fructification.

Breed is tolerant in the zone of curl disease. In 1981-1982 average leaf productivity at the Ozurgeti Breed Testing Station equaled to 52.9 c/ha.

12."Guria-20"

"Guris-20" is a compound hybrid obtained by inter-species hybridization, by crossing of the breed "Gruzia" Morus Kahayamae Koidz and hybrid "Tbilniish-2".

Authors: M. Shablovskaya, G.Kharshiladze, V.Nikuradze, K.Ebanoidze (Copyright # 4449, October 15, 1987).

Leaf – cardiform, rather large, green, base of the blade – moderately cut, rim-lacerated; surface – even.

Branches – straight, bark –reddish brown; bud – rounded, dark gray; collective fruit – reddish-white, cylindrical and of average size. Fructification – weak.

Breed is tolerant in the zone of curl disease. In 1981-1982 average leaf productivity at the Ozurgeti Breed Testing Station equaled to 55.5 c/ha.

13."Kolkheti-85"

The breed belongs to M.alba Lin species and is obtained by means of analytical selection from the population obtained by free pollination of the breed "Kutaturi". Authors: M. Shablovskaya, G.Kharshiladze, V.Nikuradze. (Copyright # 4450 October 15, 1987).

Leaf- wide, cardiform, rather large, dark green, blade rim – notched, surface – even, glittering, thick, solid, of fleshy consistency. Collective fruit –reddish black, cylindrical form, average size. Fructification level –average; branch –straight, bark – brown, bud - triangular, stuck to the branch.

Breed is tolerant in the zone of curl disease. In 1982-1983 average leaf productivity at the Ozurgeti Breed-Teation Station equaled to 78.2 c/ha.

14."Nata"

The breed was obtained by chemical mutagenesis. The plant is of one-chamber (♀♂) species. It is characterized by a large, ball-form, compact, slightly open crown. One- year branch is straight or slightly bent (170-180 cm). It develops great quantity of growing sprouts. Bud is triangular, of average size; leaf – dark green, with glittering, wavy surface, fleshy. Scion endures well keeping in polyethylene bags. Breed is frost-resistant; relatively stable - to leaf curl. In common agrotechnical conditions it gives up to 10 tons leaf per ha.

As was stated above, alongside with the above described 14 breeds 5 introduced and 5 local mulberry breeds were revealed in Georgia by passive selection and were zoned. These breeds are:

Introduced Mulberry Breeds

1. "Russkaya"

The breed was introduced from Pyatigorsk district, Russian Federation. The breed is female one, of abundant fructification. Flower clusters sit group-like in the basal section of a branch. Fruit is round, cylindrical form. Seed output is high.

The breed is distinguished by leaf consistency. It is characterized by soft, of relatively slight veining, whole-blade leafs. Crown is not compact, is open.

The breed practically is resistant to the leaf curl. It belongs to the 3rd category, is zoned since 1958 for all regions of Georgia leading sericulture.

2. "Ukrainuli-9"

The breed was obtained by inter-species hybridization (M.multicaulis x M. Bombycis). The breed is feminine.

Leaf is whole-blade, cardiform, light green, soft, with even surface. Leaf blade size: 19 x 17 cm.

Branch bark color – dark green, inter-joint distance – 4,6 cm. Fruit – black. The breed is resistant to bacteriosis. Leaf yield in low stem plantation is 91 c/ha. Live cocoon yield per ha – 845 kg, The breed is zoned for south districts of Ukraine and for west Georgia since 1972.

3. "Oshima"

The breed belongs to Morus Bombycis Koidz. species. Crown is compact, one-year branch is long; inter-joint distance – 3 cm. Branch bark color – chestnut. At about 35% growing sprouts are developed on the branch. Bud is oval, light chestnut. Leaf segmented, oval, blade rim – notched, top – pointed, oblong, leaf blade – even, solid, green, with glittering surface, veining – moderate, leaf blade size – 12 x 10 cm.

Leaf yield - 56,4% in the average, number of sprouts per branch – 15, leaf number – 86. Average leaf mass 3,9 g, Percentage of freezing of branch top section –10-18.

Oshima was zoned since 1994 for the regions of Georgia leading sericulture since the breed practically resistant to mulberry leaf curl.

4. "Roso"

The breed belongs to Morus multicaulis Perr. species It is characterized by good growth, is female.

Leaf – wide cordiform, base – round, cut, end – pointed and rounded simultaneously; edge- round, notched, wide whole-blade, leaf surface – glittering, wavy, solid, fluffing – slight, veining –well expressed; of average thickness, soft, light green, leaf is preserved fresh long and is used for summer and autumn feedings.

Branch – straight, gray, develops thick and long branches, is characterized by good capacity to form sprouts; inter-joint distance –4,2 –4,5 cm; bud – light brown, triangular form, average size, closely stuck to the branch. Crown – compact, branch orientation – straight, of moderate development, bark – grayish-yellowish; stem – straight, upright; fructification – of average intensity. Fruit – black, giving abundant seed. In Japan seed and seedlings obtained from this seed is used as rootstock material, since it is characterized by well-developed root system. The breed is characterized by rather high genetic resistance potential to mulberry leaf curl and good leaf yield. It belongs to the late breeds. It was zoned for sericulture regions of Georgia since 1996.

5. "Ichinose"

The breed is of Japanese origin, female. It belongs to Morus alba Lin. species. The breed is widely distributed in Japan as the breed possessing good economic indices and that of rather high resistance to mulberry leaf curl.

Leaf – oblong, cardiform, segmented on both sides, with five sections, base - round, top –pointed, sometimes even rounded. Leaf rim –notched, green, slightly glittering, thin-bladed, of good consistency, fluffiness –moderate, blade size – 13,75 x 9,45 cm; inter-joint distance – 3,0-3,5 cm; branch –upright, greenish-gray, is characterized by good growing capacity, has good capacity for sprout development.

Bud – light brown, triangular, closely stuck to the branch; average size; crown - rounded, open; stalk – grayish-brown, well developing, fructification – moderate, is characterized by low blossoming.

Breed Ichinose is distinguished by good potential productivity, together with rather high resistance to leaf curl, which contributes to preservation of leaf yield. Plants of this breed don't die by this disease. The breed is zoned for sericulture regions of Georgia since 1996.

Local Mulberry Breeds

6. "Egrisi"

The breed was exposed in strongly infected zone of West Georgia, among premises of Kutaisi Zonal Experimental Station of Sericulture. The breed belongs to Morus multicaulis Perr. species. The breed is masculine. Leaf is oblong, cardiform. Base –slightly cut, top – slightly pointed, rim – moderately notched, size prior to exploitation - 15,05x8,08 cm, after exploitation – 24,8x16,9 cm, dark green, whole-bladed; surface – even, fluffiness–average, veining – expressed, thickness – moderate, consistency – soft, petiole – 6,8 cm, rounded. Branch – straight, intensely growing, thick, grayish, capacity to form sprouts – good, inter-joint distance – 3,8 cm; number of warts per inter-joint – 59, gray, oval, of very small size. Bud –triangular, rounded, solid, dark brown, does not stick the brunch closely. Crown – compact, rounded, branch orientation -east-west, The breed is propagated well by bud and scion grafting; wind and frost resistant.

On some branches close location of two buds is observed. The breed is characterized by thick leafing, good capacity of sprout formation and high leaf yield. It is distinguished by good capacity of bud engrafting. Is weakly infected by bacteriosis and cylindrosporosis, is not infected by mildew. Is resistant to the leaf curl. Was zoned for west Georgia since 1999.

7. "Kutaisuri-1"

The breed belongs to Morus bobmycis Koidz. species. It is characterized by good capacity for branch growing. The plant is one-chamber form; feminine

prevails. Leaf is large, egg form, dark green, with even glittering surface, blade edge – not etched, sometimes – segmented; branch – straight, sometimes partly bent. Petiole – cylindrical, with slight canal. Bud – of average size, triangular, closely stuck to the branch. Crown – well developed, of bowl form. Location of branches in the crown – vertical. Inter-joint distance – 4,5 cm in the average.

The breed is mainly propagated in the nurseries, by grafting with wintered bud. Young, 7-8 years old plant gives approximately 43,6 centner leaf per ha, while the yield of 15-16 years old plant – respectively reaches 72.8 centner.

In the zone of leaf curl infection the breed reveals by high capacity for regeneration and preservation of productivity.

8. "Kutaisuri-2"

The breed belongs to Morus bobmycis Koidz. species. It is characterized by good branching. It develops great quantity of growing sprouts; is.the feminine breed. Fructification – lower than average. Leaf is large, egg form, thick, fleshy, dark green, with glittering surface. Branch – straight, or partly curved, gray. Inter-joint distance – moderate. Bud – triangular, closely stuck to the branch. Crown – of bowl form, seldom open.

The breed is propagated by grafting with wintered bud. Its propagation is made in warmed ground by scion rooting too. Breed "Kutaisuri-2" is characterized by high leaf productivity. Young, 7-8 years old plant gives 45,5 centner leaf per ha, while the yield of full age plant (15-16 years old) – respectively reaches 108 centner.

In the zone of leaf curl infection the breed is characterized by high regeneration capacity and productivity.

9. "Akhalkartuli-2"

The breed "Akhalkartuli-2" was selected at the Kutaisi Zonal Experimental Station of Sericulture on the base of mulberry leaf polymorphosis. It belongs to Morus alba Lin. species. Leaf is complete, without segments, leaf rim – single-notched, sometimes double-notched; veining – average, fluffing – weak, leaf size 22 x 13 cm; petiole – cylindrical, with weak canal, size – 5,9 cm; branch – gray, with brown

warts; 47 warts per inter-joint. Branch ends - slightly bent, the plant develops great number of branches; is characterized by good sprouting capacity and good leafing.

Bud is conical, light chestnut, stuck to the branch, inter-joint distance –3,5 cm. Crown –compact, stem – well-developed, wind and frost resistant.

The breed is bi-sexual, mainly – masculine. We seldom meet both sex flowers in one flower cluster, sometimes gives collective fruit; fruit is reddish-violet, with small quantity of seed.

The breed is propagated well by bud and scion grafting. It gives abundant leaf.

b) Characterization of Local and Perspective Mulberry Breeds and Forms

Mulberry Breeds

1. "Gruzniish-5"

The breed was obtained in 1956 by inter-species hybridization, by crossing of geographically remote parent couples, European breed Cedrona (M. alba L.) and Japanese Toyoroma (M.alba L.). Author: M. Shablovskaya.

The plant is distinguished by strong stem. Crown is large, open, spread. Llength of one-year branch – 2.0-2,5 meter, with light gray bark. Inter-joint distance – 6.5-7.0 cm. Bud is of great and average size, light brown, slightly bent, triangular. leaf – large, dark green, cardiform, full-blade, thick and soft, edge – notched, leaf end – pointed, base -short, slightly deepened, petiole - long, 6,0-7,0 cm

The breed is masculine; flower clusters are located along the whole length of the branch. Majority of flower clusters is accumulated in the lower part of the branch which hinders leafing of this section of a branch..

In the 5^{th} year of exploitation, one hectare plantation yields 108 centner leaf.. Leaf is highly nutritious. Yield of raw silk thread of silkworm fed with this leaf equals to 107 kg per ha. Scions can not endure long storing and they are recommended for early grafting. Rate of successful scion grafting equals to 72-73%. Saplings are characterized by intense growth.

The breed reveals average resistance to leaf curl, it is resistant to bacteriosis, endures well low temperatures.

2. "Gruzniish-7"

The breed was obtained in 1958 by inter-species hybridization, by crossing of "Gruzia" (M.Kagayamae Koidz.) and hybrid Tbilniish-7. Author: M. Shablovskaya.

The plant is characterized by straight and well-developed stem. Crown is compact and conical. Yearly growth of branches– 30-31 m. One-year branches are slightly jointed and upright, bark –light brown. Inter joint distance – 5.0-5.5 cm. Bud is brown, thin, triangular, pointed, stuck to the branch.

Leaf – wide, cardiform, green, with soft and wet blade; convex, with glittering surface, end –short and pointed; petiole cylindrical, with slight canal, length – 4,5-5,0 cm.

The breed is feminine; fructification – high; collective fruit – rounded-oval, average size, dark cherry. The breed is characterized by early leafing and late maturing. Leaf is of good quality. On the 5^{th} year of exploitation, a hectare plantation yields 109 centner leaf. Yield of raw silk thread obtained from silkworm fed with this leaf equals to 102 kg per ha.

Scions can not be kept long. At early bud grafting the rate of successful scion grafting equals to 86-89%.

The breed is very sensitive to leaf curl, less sensitive to bacteriosis.

3 "Kartli"

The breed was obtained in 1958 by inter-species hybridization, by crossing of breeds "Gruzia" (M.Kagayamae Koidz.) and hybrid "Tbilniish-2". Author: M. Shablovskaya.

The plant is characterized by straight and well-developed stem. Crown is compact and well leafed. Yearly growth – 30-31 m. One year branch is slightly bent with light brown bark. Inter joint distance – 4.0 cm. Bud is large, of triangular form, pointed, stuck to the branch. Leaf – of average size, green, oblong, cardiform, with integral blade, thick, soft, rim – notched, end – slightly pointed, base –weakly deepened; petiole - cylindrical, with boldly expressed canal.

The breed is one-chamber. Masculine flower clusters dominate. The breed is characterized by average rate blossoming; collective fruit – is oblong, cylindrical, non-homogeneous (small and average) size, dark cherry, with thin petiole.

The breed is highly productive.. A hectare plantation yields 121 centner leaf. Yield of raw silk thread obtained from silkworm fed with this leaf equals to 114 kg per ha. Scions are will-preserved at storing. At spring grafting, the rate of successful grafting equals to 76-88%. The breed is moderately sensitive to leaf curl and bacteriosis.

4. "Ukhvi"

The breed was obtained in 1961 by inter-species hybridization, by crossing of breeds "Gruzia" (M.Kagayamae Koidz.) and hybrid "Tbilniish-7". Authors: M. Shablovskaya, V.Nikuradze.

The plant is characterized by straight and well-developed stem. Crown is large. Yearly branch growth – 35-36 m. One year branch is upright, slightly jointed; with gray, greenish and glittering bark. Inter-joint distance – 4.5 cm. Bud is thin, light brown, at the base – wide, stuck to the branch.

Leaf - oblong, cardiform, with integral blade, dark green, soft, fleshy, blade – even, slightly glittering. End – slightly pointed; petiole - cylindrical and thick; petiole length –5,0-5,5 cm.

The breed is a one-chamber form, of average rate blossoming. Masculine flowers dominate They are large and friable and are located in the lower section of the branch. Collective fruit is of irregular form, of average size, light cherry color.

The breed is highly productive. A hectare plantation (3 x 3 m) on the fifth year of exploitation yields 106,7 centner leaf. Yield of raw silk thread obtained from silkworm fed with this leaf equals to 106 kg per ha. Scions are less pretentious to storing conditions. Scions are preserved well at storing in sleeping condition. The rate of successful grafting equals to 74-81%.

The breed is moderately sensitive to the leaf curl and bacteriosis.

5. "Digmuri"

The breed was obtained in 1961 by inter-species hybridization, by crossing of breeds "Gruzia" (M.Kagayamae Koidz.) and hybrid "Tbilniish-7". Author: M. Shablovskaya.

The plant is characterized by straight, well-developed stem. Crown is of average size, solid and thick. Yearly growth of branches– 28-29 m. One year branch is slightly curved, light gray. Inter-joint distance – 5.0-5.5 cm. Bud is average, pointed, light gray, stuck to the branch. Leaf is large, dark green, with integral blade, solid, not coarse, slightly uneven surface, with well expressed veining; rim - rounded, notched; end – often blunt, sometimes – pointed; base –deepened cardiform, with small angle. Petiole –cylindrical, length -5,0 cm.

The breed is the one-chamber form, blossoming varies according to years. It has single, oblong form dark cherry color collective fruits, which fall early. A hectare of average stem plantation on the fifth year of exploitation yields 105,5 centner leaf. Yield of raw silk thread obtained from silkworm fed with this leaf equals to 103 kg per ha.

Scions endure well long storing and at spring grafting, the rate of successful grafting is high. The breed is sensitive to leaf curl and is not infected by bacteriosis.

6. "Samgoruli"

The breed was obtained in 1963 by analytical selection, by multiple, individual selection from hybrids obtained by free pollination and by purposeful rearing. It belongs to M.alba L. species. Authors: M. Shablovskaya. V.Nikuradze, V.Berdzenidze.

The plant is characterized by straight and powerful stem. Crown is large and broom form. Yearly growth of branches– 36-37 m. One year branch is straight, dark brown, slightly elevated at the junction of a leaf. Develops great number of growing sprouts. Inter-joint distance – 4.5-5,0 cm. Bud is average, brown, triangular with pointed top, wide at the base, convex, freely sitting. Leaf - large and average size, dark green, oblong, egg-form, with integral blade, soft, fleshy, straight with moderately glittering surface. Leaf rib - of average size, with well expressed relief, of non-homogeneous horseshoe form, end –pointed, rim –notched, base –straight or slightly deepened; petiole – cylindrical, of average thickness, with slightly expressed canal, length 4,5-5,0 cm.

The breed is the one-chamber form. Masculine flowers prevail. Flower clusters are located on the lower section of a branch. Fruit is dark cherry.

The breed is highly productive. A hectare of average stem plantation on the fifth year of exploitation yields 129 centner leaf. Is recommended for spring and repeated feeding. At bud grafting in early periods the positive result reaches 85-89%. Is very sensitive to leaf curl and relatively resistant to bacteriosis.

7. "Mtskheturi"

The breed was obtained in 1968 by inter-species hybridization, by crossing of breeds "Gruzia" (M.Kagayamae Koidz.) and "Cataneo" (M.alba Lin.). Authors: M. Shablovskaya, V.Nikuradze, V.Berdzenadze.

The plant has the powerful stem. Crown is compact, broom-like, well leafed. One year branch is straight, length –1,25 cm, with small number of growing sprouts, weakly jointed; with brown bark. Inter-joint distance – 7-8 cm. Bud is big, brown, triangular, with pointed head, wide -at the base, slightly bent. Leaf – average size, dark green, cardiform, with integral blade, soft, fleshy, of average glittering, even surface; end – pointed, somewhat oblong, base –moderately deepened; petiole cylindrical, with narrow and deep canal.

The breed is the one-chamber form. Flowers are mostly masculine. Flower cluster is oblong, thin, friable; feminine flowers are of average size, compact; abundantly blossoming, flower clusters are located in the lower segment of a branch. Blossoming retards the leaf development

The breed is highly productive. A hectare of 5-6 year plantation yields 101 centner leaf. Is recommended for feeding upper instar worms. Scions are kept well, positive results at scion grafting reaches 85-98%

8. Form # 68

This form was obtained in 1968 by inter-species hybridization, by crossing of breeds "Gruzia" (M.Kagayamae Koidz.) and hybrid "Tbilniish-7". Authors: M. Shablovskaya, V.Nikuradze, V. Berdzenidze.

The plant is characterized by straight, well-developed stem. Stem bark is brown. Crown is of average size, oval, with average number of branches. A year branch is

joined and slightly curved, with light gray bark. Inter-joint distance – 7.0 cm. Yearly branch growth –29-30 m. Bud is brown, triangular, with oblong head, wide at the base, stuck to the branch.

Leaf is oblong, cardiform, with integral-blad, dark green, soft, fleshy, blade is even, slightly glittering, top- somewhat oblong, petiole – cylindrical and thick, length –5,0-5,5 cm.

The breed is the one-chamber form, of average blossoming.. Masculine flowers prevail, which are solid and friable. Flowers grow mainly in the lower section of a branch. Collective fruit is of irregular form, average size, light cherry color.

Leaf is of good quality. One hectare average stem plantation (3 x 3) on the fifth year of exploitation yields 106,7 centner leaf. Yield of raw silk thread obtained from silkworm fed with this leaf equals to 106 kg per ha. Scions are less pretentious to terms of storing. Buds are kept long in sleeping state and at bud grafting positive result reaches 74-91%.

The breed is infected moderately by leaf curl and bacteriosis.

9. "Digmuri-125"

This form was obtained in 1961-1982 by inter-species hybridization, by crossing of #02 (M.Kagayamae Koidz.) and # 020 (M/alba L.) and by further multiple selection . Authors: M. Shablovskaya, Z.Kharshiladze, V. Berdzenidze, V.Nikuradze.

The breed is masculine, abundantly flourishing . Leaf – cardiform, large, with integral blade, dark green, with even and glittering surface. Base of the leaf blade – deeply cut, top – slightly pointed.

The breed is relatively resistant to leaf curl. In the zone of infection gives rather high yield of leaf. Nutritive value – high. Leaf yield from average stem plantation (3 x 3 m) equals to 61,8 centner/ha.

10. "Rioni"

This form was obtained in 1982 by inter-species hybridization, by crossing of #02 (M.Kagayamae Koidz.) and hybrid "Tbilniish-7" (M.alba L.). Authors: M. Shablovskaya, V. Berdzenidze, V.Nikuradze, Z.Kharshiladze.

The breed is feminine, flower cluster –average size, fruit – dark cherry, oblong-cylindrical form, sweet- sour taste, fructification – moderate.

Leaf – rather large, dark green, with even and glittering surface. Blade – integral, wide cardiform, base – straight, top – pointed. Is characterized by high nutritive value, is well assimilated. It belongs to breeds relatively less resistant to leaf curl. Leaf yield equals to approximately 65 centner/ha.

11. "Gruzniish-13"

Crown –broom-form. One-year branch – jointed, long, with greenish-gray bark, with small spots..

Bud – oblong, with pink peel, sitting freely in leaf base.

Leaf –integral blade, wide, cardiform, rim – double notched, with asymmetric base, top-pointed, dark green, with glittering surface, fleshy, of soft consistency, sizes: 16,0 x 12.5 cm. Petiole length –3 cm, masculine, flower cluster - amentaceous.

12. "Kutaisuri –75"

One –chambered. Flower cluster – amentaceous, with sitting stigma. Crown – open; branch – straight and slightly curved; leaf – integral-blade, of egg form, rim – round, notched; leaf base - rounded, end – pointed, veining – moderate, dark green hie, thin.

Collective fruit- cylindrical, on long petiole, fructification – weak.

13 "Digmuri 29."

Feminine, with sitting stigma. Ovary – round, sitting on solid fluffy leg; flower cluster – short, cylindrical.

Crown – bowl form; one year branch – thick and long, grayish-steel, abundantly spotted. Bud – round, with brown peels, freely sitting.

Leaf – integral-blade, egg-form, rim – thin, cut; end – pointed, green, of average thickness, soft, with glittering surface; size: 12,0-10,0 cm; petiole – 34, cm.

Fruit – black, sweet, collective fruit -big, cylindrical form

14."Tbilniish-1"

Feminine, with sitting stigma, flower cluster – short, cylindrical, thick, petiole – fluffy.

Crown – broom-form, branch – straight or slightly curved, grayish bark, covered with small spots.

Bud – round, with brown peels, freely sitting in leaf bosom.

Leaf – integral-blade, egg-form, edge – round, notched; base – slightly deepened, veining – weak, dark green, thick, of soft consistency, sizes: 15,5 x 13,5 cm. Petiole length – 4,5 cm.

Fruit – black, insipid, collective fruit – of average size, cylindrical. Fructification – intense.

15."Tbilisuri-2"

Feminine form, with sitting stigma, ovary -one-chamber, flower clusters - rounded, grown by groups.

Crown – semi open, branch – straight, thick, jointed, covered with spots..
Bud – round, is accompanied with advent buds stuck to the branch..

Leaf – integral-blade, edge – round, notched; base – cut, veining – weak, dark green, thick, with glittering surface, size: 21,1 x14,3 cm. Petiole length – 4 cm.

Fruit –reddish brown, insipid, collective fruit – big, round; fructification – weak.

16. "Tbilisuri 3"

Feminine, with short-column stigma, ovary –one-chamber, flower - rounded. Crown – sparse, open, one year branch – jointed, with gray bark.

Bud – round, oblong, sitting freely in leaf bosom, with peels, pink.

Leaf – integral-blade, cardiform, edge – wide, notched; base – moderately cut, end – pointed, dark greenish, thick, soft, sizes : 16,0 x 13,3 cm. Petiole length – 4,6 cm.

Fruit – cherry color, not tasty, collective fruit – big, cylindrical. Fructification – average.

17. "Digmuri –2"

Feminine, with sitting stigma, ovary –one-chamber, flower cluster -big, of cylindrical form. Crown – open, branch – jointed, steel color, covered with frequent spots.

Bud – round, egg-form, with brown peel, sitting freely on the branch.

Leaf – integral-blade, egg-form, asymmetric, edge – thick, notched; base – slightly cut, dark greenish, veining – moderate, thick, of soft consistency, size: 12,0 x 9,2 cm. Petiole length – 4 cm.

Fruit – dark cherry color, sour taste, collective fruit – cylindrical; fructification – intense.

18. "Digmuri –3"

Feminine, with sitting stigma, ovary -one-chamber, flower cluster short, cylindrical form.

Crown – open, branch – long, covered with steel color spots..

Bud – oval, with brown peel, stuck to the branch.

Leaf – integral-blade, egg-form, asymmetric, edge – round, notched; base – slightly cut, dark greenish, thick, with glittering surface, of soft consistency, size: 16,0 x 13,0 cm. Petiole length – 4,6 cm.

Fruit – cherry color, of sour aroma, collective fruit – cylindrical. Fructification – intense.

19. "Digmuri –7"

Feminine, with twisted stigma, flower cluster oblong, cylindrical form. Flowers in the cluster are sitting in line.

Crown – bowl form, branch – straight, long, greenish-gray, covered with frequent spots. Bud – oval, brown, sitting freely on the branch.

Leaf – integral-blade, egg-form, asymmetric, base – cut, end –pointed, dark green, soft.; size: 13,0 x 9,5 cm. Petiole length – 2,5 cm.

Fruit – cherry color, collective fruit – cylindrical. Fructification – intense.

20. "Digmuri –16"

Feminine, with sitting stigma, ovary – solid, one-chamber, flower cluster – short, cylindrical.

Crown – open, branches – straight, with chestnut bark.

Bud – egg-form, with pink peel, sitting freely in leaf bosom.

Leaf – integral-blade, egg-form, edge – wide, notched, base – deeply cut, end –blunt, veining – moderate, dark greenish color, thick, of soft consistency, with glittering surface size: 13,5 x 10,4 cm.

Fruit – cherry color, sweet, fructification – abundant.

21. Digmuri-27"

Feminine, with sitting stigma, sparse, with short, cylindrical flower clusters..

Crown – of semi pyramidal form, branches – straight and thick, grayish green bark, with frequent spots.

Bud – round, with pink peel, sitting freely on the branch.

Leaf – integral-blade, egg-form, edge – round, notched, base – with glittering surface, thick, of soft consistency; size: 12,0 x 10,0 cm.

Fruit – sweet; fructification – abundant.

22. "Digmuri-21"

Masculine, with amentaceous flower clusters.

Crown – irregular, branches – straight or curved in various directions. Bud – small, with low triangular blunt top, closely stuck to the branch.

Leaf – integral-blade, cardiform, edge – double- notched, base – cut, end – blunt, veining – weak, dark greenish color, thick, of soft consistency; size: 16,5 x 15,0 cm.

23. # 109. (from Kutaisi)

Feminine, with sitting stigma, ovary – round, sitting on thick fluffy leg, Flower cluster - short, cylindrical..

Crown – of semi pyramidal form, branches – straight, grayish-green. Bud – pin like, dark green, deeply sitting.

Leaf – integral-blade, egg-form, edge – round, notched, base – slightly cut, end – wide, pointed, dark green, soft; size: 11,0 x 7,5 cm.

Fruit – black, sour; collective fruit – oval, fructification – intense.

Mulberry Forms

1. # 2.

Masculine, flower cluster of oblong form, amentaceous..

Crown – bowl form, one-year branch – slightly curved, bark -greenish gray

Bud – conical, with brown peels, standing (separated from branch).

Leaf – integral-blade, wide cardiform, base – slightly cut, end – pointed, veining – moderate, with low fluffing, surface – irregular, dark greenish color, with glittering surface; size: 17,0 x 12,0 cm; petiole length –5,9 cm.

Fruit – black, sour taste; collective fruit – oval, fructification – intense.

2.# 3

Masculine, flower cluster of oblong form, amentaceous; four pollens with double pollen sack.

Crown – open, one-year branch – straight or slightly curved, gray, covered with spots. Bud – rounded, separated, with brown peel.

Leaf – integral-blade, cardiform, edge- double notched, cut, end -pointed, veining – moderate, dark greenish color, thick and soft; size: 19,0 x 16,0 cm. petiole length –3.5 cm.

3. # 4

Feminine, flower cluster – short, cylindrical; ovary – one chamber, stigma – sitting, open in two.

Crown – bowl form, thick; branch – straight, of rust color, with gray spots. Bud – conical, with pink peel, sitting freely on the branch.

Leaf – integral-blade, edge- double-notched, base – cut, end – pointed, bent; veining – moderate, dark green color, with glittering surface; thick, fleshy, size: 17,5 x 13 cm., petiole length –4 cm.

Fruit – black, juicy, unpalatable..

4. # 14

Feminine, with compact crown; branch –straight, with grayish hue, with short and moderate inter-joints (4.0 cm); bud – of average size, triangular, closely stuck to the branch; covered with brown peel.

Leaf – wide cardiform, integral-blade, size: 28-26 cm; on the growing sprouts, toward the branch end we meet slightly segmented leafs too; leaf is thick, with green hue, with convex, glittering surface.

Collective fruit – of average size, black, fructification – moderate Seed yield from fruit - high.

5. # 4a

Masculine, blossoming – moderate; masculine flower – oblong, cylindrical form; blossoming and leaf development – do not proceed simultaneously; stem and crown – well developed.

Annua; growth of a branch –up to 1,7 meter. Crown – pyramidal, branches dark gray; bud – slightly whitish – gray, conical.

Leaf – with whole edge, with fleshy blade, dark green glittering surface, cardiform; is characterized by good bud grafting. The form is of good fructification. On the first year of exploitation average-stem plantation yields 20,35 centner leaf per ha; average resistance rate to mulberry leaf curl after 4 years exploitation equals to 9,6%. The form is not infected by bacteriosis. The form was revealed at the experimental base of Kutaisi Zonal Testing Station of Sericulture in 1968.

6. # 35

Feminine, blossoming – moderate; blossoming and leaf development – proceed simultaneously. Fructification – intense; fruit –black Tree stem and branches

– straight. Yearly growth of a branch –up to 1,30 meter. Branches – gray, with round and oval spots; buds - of average size, dark brown, conical; inter-joint distance –short. Is characterized by powerful growth of branches and thick leafing. Leaf – round, with wide whole rim, with dark green glittering surface; blade - thick. On the first year of exploitation average-stem plantation yields 16,5 centner leaf per ha; Intense growing branches and abundance of leaf on branches provides high yield of leaf. Average rate of resistance to mulberry leaf curl after 4 years exploitation equals to 25,4%. The form is infected by bacteriosis weakly. The form was revealed at the nursery of experimental base of Kutaisi Zonal Testing Station of Sericulture in 1968.

7. # 109

Feminine, blossoming – moderate; blossoming and leaf development – proceed simultaneously. Fructification – moderate; fruit –round, black Tree stem well developed; yearly growth of a branch –up to 1,38 meter. Leaf – wide, with whole rim;. egg form and cardiform, with dark green glittering surface, fleshy, convex blade; veining – well expressed; edges – with rounded notching; leafing – good; blade is bent towards central vein, base – deeply cut at petiole; one year branch – gray. Buds – pointed, average size, light brown, triangular, closely stuck to the branch. Average rate of resistance to mulberry leaf curl after 4 years exploitation equals to 16,6%. The form is resistant to mildew and cylindrosporosis. Is infected by bacteriosis weakly. Fructification – high. On the first year of exploitation of average stem plantation yields 15,62 centner leaf. The form was revealed in 1969, in a village Tkachiri, Tskaltubo region.

8. # 112

Feminine; blossoming – moderate; blossoming and leaf development – proceed simultaneously. Fruit –round, black Tree stem straight and well developed; yearly growth of a branch –up to 1,70 m. Leaf – average, with rounded notched rim, cardiform. We meet whole-rim leafs too' leaf blade – thin, dark green, does not glitter very much. Veining is expressed well. Leafing – good; petiole – long; leaf top is pointed; one year branch – gray, spots round and slightly convex, dark gray. Buds – light brown, average size, triangular, closely stuck to the branch; inter-joint distance

of moderate length. Average rate of resistance to mulberry leaf curl after 3 years exploitation equals to 4,1%. The form is resistant to bacteriosis and cylindrosporosis. On the first year of exploitation of average stem plantation yields 11,55 centner leaf. The form was revealed in 1969, in a village Tkachiri, Tskaltubo region.

9. Selective # 2

Feminine; stigma –long-column; flower cluster –rounded. Crown –open; one year branch is gray, with round spots. Bud – egg-form, with brown peel, sitting freely in a leaf bosom.

Leaf – integral-blade, oblong, lancet form, asymmetric, rim –rounded notched, base –somewhat cut, veining – moderate, dark green, with glittering surface, thick, soft, size: 19,2x12,6 cm Petiole – 3,8 cm; fructification level – moderate.

10. Selective # 4

Feminine; stigma –long-column; flower cluster –short, cylindrical.

Crown –pyramidal, compact, branch –straight, greenish, with gray spots. Bud – conical, with straw color peel.

Leaf – integral-blade, edge –thick, round-notched; base –somewhat cut, top – wide, pointed, dark green, with glittering surface, thick, soft, sizes: 18x13,4 cm petiole – 3,5 cm; fructification – moderate.

11. Selective # 20

Masculine. amentaceous, pollen threads – long, fluffy;

Crown –broom like, branch –straight, jointed, with gray bark, bud – rounded, with pink color peel, closely stuck to the branch.

Leaf – integral-blade, oblong, egg-form, edge –notched; base –somewhat cut, top – pointed, veining –weak; green, average thickness, soft, with glittering surface, size: 20,4x16,2 cm; petiole – 4 cm.

12. Selective # 22

Feminine; one-chamber, with sitting stigma, rounded cylindrical. Crown –open, branches –straight, chestnut color. Bud – conical, with pointed head, pink lines, stuck to the branch.

Leaf – integral-blade or weakly segmented, edge –notched; base –somewhat cut, pointed,; veining –moderate, greenish-yellowish color, of average thickness, with glittering surface, size: 12.5x10,2 cm. Petiole – 3,6 cm; fruit- cherry color, sweet, collective fruit -cylindrical.

13. Selective # 23

Masculine, with sitting stigma, ovary – one chamber.. Crown –compact; branches –straight and jointed, of brown color.

Leaf – integral-blade, lancet form, edge –double-notched; base –asymmetrically cut; top –pointed; dark greenish; of moderate thickness, soft and fleshy, with glittering surface, size: 24.2x12,5 cm. Petiole – 3,8 cm.

Fruit- cherry color, sweet.

14. Selective # 28

Feminine, with short-column, one chamber ovary, flower cluster – oblong, cylindrical. Crown –thick, compact; branches –straight, bud – conical, with brown peel, freely sitting on the branch.

Leaf – oblong, egg-form; edge –double-notched; base –slightly cut; top –thin, pointed; dark greenish color; of moderate thickness, size: 19,0x13,5 cm. Petiole – 3,0 cm.

Collective fruit –cylindrical, fructification – moderate.

III. Characterization of Mulberry Breeds Obtained Through Folk Selection

1. Georgian Mulberry (Kartuli Bzhola)

Tall plant of spherical crown, branches –straight, bark - brown, leaf – integral-blade, oblong, egg-form, top – pointed, veining – weak. At the base of the central vein – fluffy; leaf size: 22x17 cm. Gives perfect quality abundant leaf yield. Is distributed mainly in Kutaisi, Khoni and Vani regions.

2. Sea Mulberry (Zghvis Bzhola)

Tall plant of cylindrical form crown, thickly branched. Branch - straight, leaf – consisting of 2 –4 sections, seldom -integral-blade, wide egg-form, veining – weak. Leaf size: 20x7 cm. Highly productive. Silkworm is fond of its leaf. Is distributed mainly in Chokhatauri, Lanchkhuti and Ozurgeti regions.

3. Mengrelian or Dadiani's Mulberry

Low trunk plant of pyramidal form crown, leaf – integral-blade, or segmented, wide egg-form, veining – moderate, dark green; leaf size: 25x18 cm. Highly productive, gives highly nutritive value leaf. Is distributed mainly in Zugdidi region.

4.Kvaruli Mulberry

Tall plant of pyramidal form crown, leaf – integral-blade, egg-form, dark green, Is characterized by big, oblong form yellowish fruit, consisting of great amount of seed. Fructification – abundant, leaf is of good nutritive value. Is distributed mainly in Kvareli region.

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5.Shaumyan Mulberry

Crown – wide, pyramidal form, leaf – integral-blade, cardiform, of abundant fructification, collective fruit – big, white. Gives good quality seed and seedlings of intense growing capacity.

6. "Saadreo"

Leaf –asymmetric, with slightly fluffy back; has big collective fruits. Fructification – abundant.

7. "Lagodekhuri"

Crown -compact, branch – straight, powerful, bark – light brown, bud –oval. 50% of sprouts on the branch are progressive. Flower cluster – cylindrical, flower – short column, collective fruit –cylindrical, oblong, white and sweet; leaf – oblong, egg-form, edge – slightly notched, blade base –slightly cut, top –pointed, green, veining – weak, glittering surface; Leaf size: 10x5 cm.

Leaf output – 55%; at about 16 sprouts and 112 leafs per meter branch. Average leaf mass – 3,0 g.

IV. Characterization of Mulberry Breeds of Fruit Designation

1. Triploid –13

Feminine, fruit breed. Was obtained by pollination of PS-9 (2n) by the use of pollen grain of tetraploid form of the very breed –PS-9 (4n) and by further selection of polyploid material (2n=3n=42).

Crown – open and intensely branched; bark of one year branch – grayish-greenish, with great number of small, oblong-oval form spots. Inter-joint distance –3,4-4,0 cm, Bud – small, low, triangular, its top – pointed, light brown.

Leaf - wide cardiform, integral-blade, end – high, base –slightly cut, thick, fleshy, dark green, located mostly at the top of the branch.

Breed is late. Leaf opening starts 8-10 days later than those of diploid breeds. Flower clusters sit on the branch by groups. Irregular, cylindrical, slightly bent and hunched. Fructification – abundant – massif. Collective fruit ripen simultaneously. dark cherry color, of deformed form, sour-sweetish taste.

Is easily propagated by scion grafting. Is recommended for fruit canning industry.