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Mulberry multipurpose use makes the plant unique in the world.

Mulberry is the basis for sericulture development. It provides the field with food base. People around the world were using mulberry advantages during centuries and reached the success.

One prominent researcher (G. Solmidjanov) said that mulberry fruit is as essential to Tadjic people as rice for Chinese, potatoes for Russians.

Multipurpose use of unique features of mulberry, at this stage is of great importance.

Research should be implemented about the Economic efficiency, Technology and production of non-traditional livestock feed received from mulberry leaves roughened in autumn. In addition, future research work will be conducted about mulberry fruit (especially "triploid - 13"), processing technology and economic efficiency, (Fig. 1).



**Fig. 1. "triploid - 13" fructified mulberry tree. (Strong raising and productive variety with thick fruit, black sour sweet taste without seeds. Recommended for canning and confectionary, chocolate production.**

Information about the use of roughened mulberry leaves as livestock feed was not found in old literature sources. According to famous sericulture specialist, President of BACSA, Dr. Tsenov said: "Тема о многоцелевого применения

**ТУТОВЫХ НАСАЖДЕНИИ ОЧЕНЬ АКТУАЛЬНА И МНЕ БУДЕТ ИНТЕРЕСНО ПОЛУЧИТЬ БОЛЬШЕ ИНФОРМАЦИИ О РАБОТАХ И РЕЗУЛЬТАТОВ ПО ЭТОЙ ТЕМЕ В ГРУЗИИ" (2014 Г.),** which is a positive expression and the first steps of problem solving is connected to some difficulties.

In sericulture on every 1000 tons of live cocoon producing there are spent 20,0 thousand tons of fresh leaf is spent, while the total mass of the leaf roughened in the fall exceeds and is being lost without any use.

Out of 20,0 thousand tons of rough leaf to prepare 40% we will get 8,0 thousand of raw materials. This equals to (50%) 4,0 thousand tons of dry material or 2,7 tons of fodder.

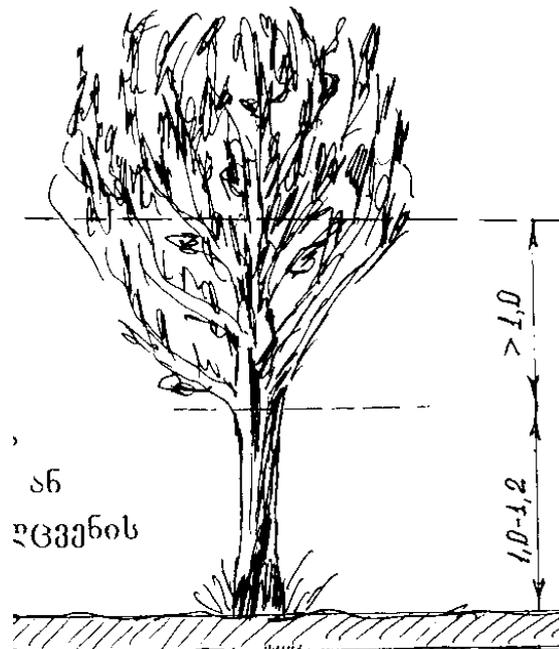
Roughened mulberry leaf with its nutrient composition greatly exceeds not only the meadow hay, also to alfalfa and clover comparable (20,0 – 22,0%) index.

### **Leaf Processing And Storage Rules**

Processing time and exploitation rules for roughened mulberry leaf shall be selected so as to ensure plant strengthening and increase the production of leaf spring feeding.

The researchers conducted many researches and agreed on following:

***1. The optimal is to slope cut of mulberry for silkworm spring feeding, and in the fall (September last decade – till November leaf falling) - From roughened mulberry leaf to prepare non-traditional food and its exploitation should be implemented so that the branches of the annual growth of no less than 1.0 meters in height to remain next year's spring feeding (Fig. 2); By this can be achieved strengthening of the plants and leaf increase by 25% for spring time.***



**Fig 2. Mulberry exploitation in Autumn**

2. *Exploitation is conducting every year by using of garden scissors or electric cutter (Fig. 3). After which they are collecting raw materials, shade drying and sheltering.*



**Fig. 3. Electric cutter Ehs-550 (Austria).**

3. *Livestock fodder received from 1 tone of roughened mulberry leaves contains the following items:*

1. Dry items (85%) - 850 kg;
2. Raw protein (13,9%) - 139,0 kg;
3. Raw fat (2,9%) - 29,0 kg;

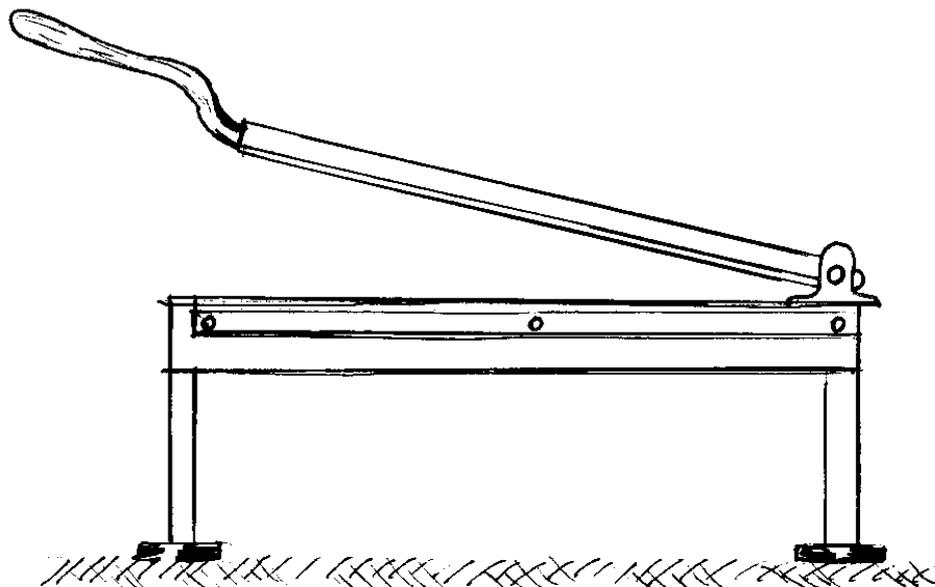
4. Raw fiber (24,9%) - 249,0 kg;
5. Extracted materials having no nitrogen - Carbohydrates (42,7%) - 427 kg;
6. Mineral substances (11,5%) – 115,0 kg;
7. Other biological active substances (4,1 %) - 41,0 kg.

Nutritional value of 1,0 ton of dried mulberry leaf contains 590,0 kg of food items. It is possible to use it in animal nutrition. Goats and sheep can eat mulberry leaves, so hay may be substituted with mulberry leaves by 50-60%. Also dry mulberry leaves can be used successfully in the lakes for fish raising (carpe, truce, and amour).

Dried mulberry leaves can be stored both in bulk and in bags

### **Rules of using dried leaves**

1. Dried leaves soaked in advance and then chopped should be given to grazing livestock in order to minimize losses (Fig. 4). (After soaking dried leaves chopping is easier and does not crumble). 2-3 kg per head of cattle. 0.5 kg - for sheep and goats.
2. Roughened leaves mixed (200 grams per kilo) with combined fodder should be given to poultry, cattle, pigs, rabbits.



**Fig.4. Dried leaves chopper**

## **Some issues of economic efficiency and advantages of small mulberry plantation within rows in sericulture farming**

Traditionally in Georgia people involved in sericulture used to sow corn, soybeans, vegetables, and other selected crops under the mulberry trees. Mulberry fruit was successfully used for producing of various productions. For the purpose of food base improvement and rational usage of agricultural lands it is important to plant such crops between mulberry rows which is not harmful for mulberry and will give high yield within lower costs.

Using of land of mulberry plantation to saw crops between the rows should be identified according to specialization zones. Mulberry plantation provides much less income than vineyard, tea, fruit trees and other perennial plants.

It is also important for sericulture development that between mulberry trees rows farmers growing agricultural crops should consider soil condition, irrigation possibility, agricultural machinery, distance between the rows and other several factors. Mainly it is advised to grow legumes between the rows.

Especially effective is growing legumes between the mulberry trees rows in such zones where the disease " curly leaf " is spread.

On 500.0 m<sup>2</sup> land area there will be in livestock feed the following ingredients:

- a) Raw protein - 56 kg;
- b) Food unit - 248 kg;

### **Approximate calculation:**

1. The market price of one kg of dry leaves approximately will be GEL 0,80; (by nutritional value the grass hay equals to grass flour);
2. The market price of one kg of soybean – GEL 1,50;
3. The market price of one kg of straw – GEL 0,10;

***The total amount is: (0,8 x 300 kg of dry leaf) +(38 x 1,5) + (38 x 0,1) = 300,8 GEL;  
Total income together with cocoon price will be 300,8 + 210= 510,8 GEL.***

On 500,0 m<sup>2</sup> land area we will receive

- a) Raw protein - 30,0 kg; b) Food unit – 431,0 kg;

**Approximate calculation:**

1. The market price of one kg corn seed – GEL 0,45;
2. The market price of one kg of maize straw – GEL 0,1;

The total amount:

$$(190 \times 0.45) + (327 \times 0.1) + (1.5 \times 10) + (12 \times 0,1) = 134,4 \text{ GEL.}$$

Finally, a farmer from the area of 500,0 m<sup>2</sup> will receive:

- a) corn + (soybeans + maize straw + grass straw) – 431,0 food unit (30,7 kg crude protein);
- b) From mulberry plantations: corn + soybean seed + straw + branches and leaves roughened in autumn – 248,0 kg of feed unit (56,0 kg crude protein).  
(Growing of mulberry variety "triploidi 13" will significantly increase the

overall income).

Live cocoons will be received 32,0 – 35,0 kg x 6,0 GEL = 192,0-210,0 GEL.

Thus, the total income from 500,0 m<sup>2</sup> of mulberry plantation will be 510,8 GEL; while on free area of 500,0 m<sup>2</sup> where there is grown maize + soybean total income will be 300,8 GEL, which is 210,0 GEL less. *The case of using area between the rows of mulberry plantation is more advantageous and is about 60% more than free plot using indicator.*

According to the above mentioned issues the base for sericulture development is creating of silk homestead farms which will correspond to market economy principles.

*How many plants should be built in Georgia in order to employ 10 thousand people? Or how much investment would be required for it? We should think about and does not even have to wait for the market to regulate the crisis, but we must do everything to ensure the growth of the sericulture. Especially need to pay attention to improve egg production and selection of varieties.*