The method of obtaining the original material for the selection of yellow clover under the conditions of the Stavropol Territory

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Abstract. The paper presents the studies on the original material of yellow clover fodder legumes of VIR (VIR plant genetic resources gene bank) for the fodder mass productivity with low coumarin content. The results of the best varieties of clover are given in terms of green mass and hay yield. A selection material was obtained for getting new varieties for the conditions of the Stavropol Territory.

1. Introduction
The specific nature of the Stavropol Territory climatic conditions can be distinguished by the presence of a significant amount of leached chernozem and saline soils, most of which are involved in arable land. The circumstances indicate the need for a differentiated approach in the selection of high-yielding leguminous crops that can not only increase the content of digestible protein to animal zootechnical standards - 105-110 g, but also improve the condition of leached chernozem and saline soils.

Bean forage culture clover yellow (MelilotusofficinalisL. Desr.) has valuable biological qualities. The results of the assessment of the salt tolerance of the clover of seed germination in salt solutions showed a high resistance of the clover to chloride salinity [1-3]. Melilotus nutritional value is not inferior to the most important feed grasses - alfalfa, clover and sainfoin. According to N.S. Chukhlebova [4], 1 kg of clover hay contains 0.71 feed units and 178.0 g of digestible protein. The clover is a biological phytomeliorator, its powerful root system penetrates up to 2.5 m., disinfects and improves the soil structure, enriches it with bound nitrogen [5]. In the extremely arid zone of the Stavropol Territory, the sweet clover, under the cover of winter wheat, provides 300 canters per hectare of green mass; and it is a good predecessor, like soybean [6,7], for the most important crops [8,9]. To create new varieties, methods are needed for selecting the original material [10].

2. Materials and methods
The aim of our research is to use the classical method of breeding - the mass selection of samples of the yellow clover, which ensures maximum yield of forage with a low coumarin content. Experiments on the study of variety samples of the clover of the VIR yellow collection were conducted at the experimental station of the Stavropol State Agrarian University.

32 varieties of the yellow clover of VIR collection served the object of the research. The placement of plots in the experiment is systematic in two tiers with splitting plots. Plot area was 4.2 m². The
standard was sown in every 10 samples. The repetition of the experiment is fourfold (VIR Method, 1979).

The soils of the experimental site belong to meadow-leached chernozem, in the arable horizon there is low content of easily hydrolyzed nitrogen of 9 ... 17 mg; reserves of mobile phosphorus were 15 ... 19 mg, potash provision reached 294 ... 326 mg per 1 kg of soil. Sowing was carried out in the third decade of April.

3. Results and discussions

Research has shown that the low field germination of seeds is a biological feature of the clover. Under optimal moisture conditions, with proper cultivation technology, with the use of scarified seeds, field germination of varietal samples was 32–48%. Seed longitudinal leaves of clover appeared 11-15 days after sowing, 3-4 days later the first simple leaf appeared. The first ternary sheet develops at 6-8 days after germination.

In the first year of life, the best variety samples of clover formed 6.2–7.5 pcs. of stalks in the bush, in the second year of life - 20.6-27.3 pcs. of stalks in the bush. The maximum number of buds of renewal on the root collar and later on of the stems (27.3 pcs.) was formed by K 36680 sample (USA), which 6.7 pcs. stems in the bush is less than the standard. A sample from the Astrakhan region (K 13294) had 21.3 pieces of stalks in the bush. The minimum number of stems (17.0 pieces) was formed by K38925 sample (USA). Samples from Canada (K 32834) and the USA (K 36679) by the number of stems in the bush were at the level of the standard Alsheevsky variety (20.6 pcs.).

In the first year of life the growth and development of yellow clover varieties are characterized by slow rates during the first 36-49 days. The average daily increase in the height of plants of samples is 0.4-1.0 cm, and if there is not enough precipitation, it can be reduced by 2 times. In the given period of growth and development of clover plastic substances formed in the process of photosynthesis, aimed at the formation of the root system that can penetrate to a depth of 2 meters or more. In the first year of life the maximum daily increase in variety samples of the sweet clover was observed in the period from the 2nd decade of June to the 2nd decade of August, and it was 1.1-2.2 cm of the stems. Samples from the USA (K 36680, k 38925 and K 36679) differed in high rates of growth during this period. The daily increase in standard and sample from the Astrakhan region was 0.8 cm.

The maximum daily increment of plants of the early-ripening K 36680 sample in the second year of life falls on the second and third decade of May; it is 1.0-3.5 cm, per day. A peak daily increment (3.5 cm.) is observed during the interphase “branching-budding” period, and by the beginning of flowering the daily increment decreases.

For economic use in the conditions of the Central Ciscaucasia, early-ripening samples are most acceptable, capable of generating a crop of green mass before the onset of a summer drought. In addition, the early-vacated field will allow preparing the soil for sowing of winter wheat, which is very important for crop rotation.

The yield of clover forage mass is one of the main indicators of the economic value of the forage crop, this indicator varies greatly and depends on the genetic characteristics of the variety samples and the specific soil and climatic conditions of cultivation. In the first year of life, the clover was mown on the green mass in the first decade of August, since when the clover was mowed in September-October, the nitrogen content in the above-ground mass can decrease by 1.5 times. In addition, the early mowing of clover allows the plants to have time to grow and accumulate the necessary plastic substances before leaving in the winter.

In the first year of life the yield of green mass of the best samples exceeded the standard by 22.3 ... 74.2%. The best results on the yield of green mass were obtained from K 36680, K 36679 and K 38294 samples, which amounted to 19.09, 18.70 and 16.70 respectively. The yield increase of the green mass of these samples turned out to be significant and amounted to 8.13; 7.74 and 5.74 t/ha respectively, with HCP05 = 3.4 t/ha (table 1).
Table 1. The yield of green mass of the best varieties of yellow clover, t/ha.

| Samples          | Origin     | First year of life | Green mass | Second year of life | Amount for two years | % to standard |
|------------------|------------|--------------------|------------|---------------------|----------------------|---------------|
|                  |            | % to standard       | % to standard |                     |                      |               |
| Alsheevsky, st   | Bashkir    | 10.96              | -          | 25.21               | -                    | 36.17         |
| K-38925          | USA        | 16.70              | 153.2      | 31.78               | 126.1                | 48.48         |
| K-13294          | Astrakhan region | 13.52     | 123.4      | 29.05               | 115.3                | 42.57         |
| K-36680          | USA        | 19.09              | 174.2      | 41.71               | 165.5                | 60.80         |
| K-32834          | Canada     | 13.40              | 122.3      | 32.40               | 128.5                | 42.80         |
| K-36679          | USA        | 18.70              | 170.6      | 38.34               | 152.1                | 57.04         |
| HCP05            |            | 3.4                | -          | 6.4                 | -                    | -             |

Economic values and breeding interest are the samples of clover capable of forming high yields of forage, both in the first and in the second year of plant life.

The formation of green mass and hay harvest in the second year of the clover was influenced by such indicators as bushiness and plant height at the time of mowing - the budding-beginning of flowering phase. In addition to the variety samples shown in the table, which are characterized by stable productivity over the years of research, there are tributaries of the crop in the second year of life with little productivity in the year of sowing, and vice versa, samples that are distinguished by high yields of fodder in the first year of life.

The yield of green mass, the studied samples of the clover of the second year of life increased by 1.5 ... 2.4 times in comparison with this indicator of the first year of life, and it amounted to 25.21 ... 41.71 t/ha. The samples of the sweet clover that was distinguished by the yield of green mass exceeded the standard by 15.3 ... 65.5%. K-36680, K-36679 and K-38924 samples had maximum yield of green mass, which exceeded the standard by 16.50, 13.13 and 6.57 t/ha respectively, with HCP05 = 6.4 t/ha. These samples had a maximum yield of green mass in the amount of two years of life.

Similar results were obtained for hay yields. The percentage of hay output was within 23.8 ... 25.9%. The maximum percentage of the air-dry mass output of the clover was shown by the following variety samples: K-38924 (25.9%), K-32834 (25.5%), K-36679 (25.0%) and K-36680 (24.8%). The minimum yield of hay was obtained from a sample from the Astrakhan region K-13294 (23.95%) and varieties Alsheevsky (23.8%).

4. Conclusion

The clover grown on the leached chernozem of the Central Ciscaucasia forms high yields of green mass and hay. Selection interest and economic value show K-36680, K-36679, K-38925 (USA), K-32834 (Canada) samples of the yellow clover, exceeding the yield of green mass in the total of two years, the Alsheevsky variety by 18.3 ... 68, 1%, according to the hay yield by 26.4 ... 74.8%.

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