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Liutenko V.,

Babayeva G.,

Candidate of Agricultural Sciences

Lytvyn V.,

Candidate of Biological Sciences

Voltenko V.,

Khmeleva T.

National Scientific Center "Institute of Experimental and Clinical Veterinary Medicine"

Autonomous apomixis at plants of stem Marus

The purpose. To conduct screening of grades from collection gene pool of mulberry tree of grades *Morus alba* L. and *Morus bombycis* K., and a hybrid on ability to autonomous apomixis, and also to receive experimentally apomictic plants of mulberry tree.

Methods. They placed insulators on branches of female plants of mulberry tree before opening of flower buds to imitate unfavorable natural settings of pollination. Under these conditions ability of grades to produce apomictic seeds was estimated.

Results. Ability of mulberry tree to form apomictic seeds of autonomous type at grades and hybrid of mulberry tree is proved. From seeds they cultivated apomictic plants.

Conclusions. For the first time it is proved experimentally ability of some grades and hybrids of mulberry tree to form viable apomictic seeds.

Key words: autonomous apomixis, plants of mulberry tree *Morus alba* L., *Morus bombycis* K., grade, mass of seeds.

Apamin reproduction of plants through seed provides a stable storage of their outstanding heterozygous characteristics and properties for several generations, now more and more attracts the attention of scientists. On the pages of popular science books, the world is a lively discussion about the prospects of a second "green (apamin) revolution" [11]. We are talking about the creation of highly productive hybrids, able to multiply with the mechanism apaksas, that is, to form seeds asexually. Detailed knowledge about the main features apamin reproduction, its evolutionary significance, classification and distribution in the flora of flowering plants and the rational, the practical use began to accumulate only during the last 60 – 70 years, primarily due to the Russian scientist S. S. Khokhlov [14] and D. F. Petrov [3] students and their academic schools. Many wild plants apamin from nature (dandelion, bluegrass, cinquefoil, etc.), however, among the cultural types of a few of them (some forage herbs, raspberries, strawberries). Only last time, it was managed breeding to improve some apamin fodder grasses and create apomio corn fodder [11]. On the one hand, the lack of in-depth theoretical knowledge of the phenomenon, its forms and varieties, on the other hand, the lack of sufficiently large and comprehensive collections of Apamea species and varieties from cultivated plants is becoming a serious obstacle to the creation of apamin commercial varieties. First we need to identify and understand the diversity of its forms and types, to learn how to manipulate them, to transfer them from

one species to others, combining with the desired characteristics and properties, and to consolidate the valuable combination of characteristics and properties by way of giving them abilities regular apamin reproduction. Until recently apart the development of plants of the genus *Morus* were out of sight of researchers. We know only one literary source [14], in which the spontaneous emergence of triploid plants of mulberry in research H. Seki [12] considered a manifestation of this form Apamea, which, according to the classification of S. S. Khokhlov [14], called aposporous Sigaty (A+Z) belongs to induced apaksas. In the family Moraceae, which belongs to the genus *Morus*, of various shapes apaksas discovered in 14 species of 5 genera [15], in particular in *Cannabis sativa* (hemp), *Ficus carica* (figs), *Humulus lupulus* (hops), etc. Therefore, insufficient study of the various forms and varieties apamin reproduction mulberry does not allow to use its capabilities in breeding and seed production, so the study of this problem is contemporary and relevant. Besides, comprehensive studies apaksi from plants of the genus *Morus* will reduce the cost of mulberry saplings with high productivity sheet, which is an important task in tutuncu to meet the needs of sericulture [1, 7]. The aim of this work is to conduct a screening of the varieties of the collection gene pool of types of mulberry *Morus alba* L. and *Morus bombycis* K. on the ability of Autonomous apaksas and experimentally to apamin plants mulberry. The methodology of research. The ability of mulberry to a standalone apaksas explored in the collection plantations of the mulberry gene pool of the Department of sericulture and entomology, National technical scientific center "Institute of experimental and clinical veterinary medicine" in 2011 – 2014 the Research was conducted with the collection of the gene pool of mulberry: 24 varieties of the species *Morus alba* L. and 3 varieties of the species *Morus bombycis* K. All selected varieties — diploid. The tendency to Autonomous apaksas studied in such classes: Vinnitsa 3, Mutant 2, Mutant 3, South 6, Fruit 3, Fruit 5, 107 Ukrainian, Kharkiv 5, Belisma, Chance, Galina, Pakulska, dashing 1, dashing 4, 5 dashing, Mutator-here, 24 Bulgaria, Bulgaria 106, Jason, Kubota, Crowbar 22, Podlesnaya 3, Hardy, Crowbar 10 (*Morus alba* L.), Jacola, Kokusho 20, 21 Caruso (*Morus bombycis* K.), Ukrainian 7 ((*M. multicaulis* P. × *M. bombycis* K. × × *M. alba* L.) × (*M. alba* L. × *M. bombycis* K.)).

Scheme of the experiment provided: selection of raw material of mulberry; manufacture and installation of insulators; phenological monitoring of the development of plants; collecting the adolescent mulberry; obtaining seed from an adolescent; determination of biological indices of obtained seeds; seeding of sprouted seeds in the soil. Phenological observations were carried out by establishing the date of the development of mulberry on the basis of the method of state variety testing [5] and the method of examination of mulberry varieties for difference, homogeneity and stability [7]. The method of detecting regular autonomous apomixis involves the establishment of isolators before the flowering of buds on mother plants to prevent the flowering of female inflorescences from male plants from the plantation. Insulators were made in size 90 × 30 cm² and installed on 4 pcs. on the branches of female plants of each variety. They looked like bags, the inner part of them was made of gauze, and the outer one was made of parchment paper. At the beginning of the maturity, the sustenance of the insulators was removed from the parchment, leaving only a sack of gauze to protect the pregnant woman from losses [5]. Collected the compatibility of experimental and control variants at the end of their mass ripening. Determination of biological indices obtained from the offspring of seeds was carried out according to the methods of famous scientists [8, 13]. Studied the purity of seeds,%; its laboratory similarity,%; weight 1000 pcs seed, mg; average seed calm, days; germination energy,%; economic suitability,%. The control in the experiment was the seed obtained in the variants of free pollination experiment. Germinated seeds, obtained from isolated inflorescences, and control were planted in polyethylene tubes for further study of morphological parameters of apomicts. The morphometric indices were recorded at the end of the vegetation on the Ukrainian 7 variety in 7 plants. The height of the plants and the length of the roots in the variants of experiments were determined by the ruler, and the diameter of the barrel - a caliper. The

research was conducted in accordance with the recommendations developed for the conditions of Ukraine [10]. They were caring for plants in accordance with the recommendations developed for the vegetative experiment [6]. Statistical processing of the obtained results - according to generally accepted biometric methods [2, 4]. Research results. The obtained results indicate that 4 varieties (Mutant 3, Lichy 4, Lichy 5, Kirovabad 22) of the species *Morus alba* L. and the genus *Ziotsola* of the species *Morus bombycis* K. do not form an adjunct, therefore, they do not form apomictic seeds. The Mozatari variety here only forms parthenocarpic stem without sowing. The high ability to form apomictic seeds was found in Fruit 3 varieties from the isolator (3375 pcs.), Southern 6 (2660 pcs.), Kirovabad 10 (2269) and Ukrainian 7 (1805 pcs.). To assess the ability to apomagic development, it is suggested to use an indicator based on the amount of viable seeds per 100 pcs. isolated mulberry mulberry. Spotting under laboratory conditions highlighted apomictic varieties. Thus, the high ability to form a viable apomictic plant was found in Pidkumska variety (13.2 pc. / 100 inflorescences), Chance (11.7 pc. / 100 inflorescences) and Kubota (9.4 pc. / 100 inflorescences) belonging to *Morus alba* L. It is established that 19 varieties produce seeds without pollination, while 2 varieties form non-viable seeds. The results of researches show that almost all indicators of biological signs of seeds in the experimental version (except for germination energy) are likely ($P < 0.01$) less than control. So, the weight of 1000 pcs. the seeds in the experiment amounted to 588.3 - 1888.9 mg, which is an average of 79.2% of the same indicator in the control. The laboratory similarity of apomictic seeds varied from 0% (in the Pidysnaya 3 variety) to 100% (in the Galina variety) (35.4% on average, which is 23.8% less than control ($P < 0.01$)). An even greater difference (30.9% ($P < 0.001$)) was determined by the index - economic suitability of the seeds. Kirovabad 10 and Ukrainian 7 had a large number of seeds with a low laboratory similarity (1 - 1.1%) and the smallest weight of 1000 pcs. seed (588.3 mg and 625.9 mg, respectively).

The complex of favorable features is distinguished by varieties of Pidkumskaya, Kubota and Chance. Apomictic seeds of mulberry varieties (Ukrainian 7 and Kirovabad 10) were planted for sprouting into a Petri dish. Its laboratory similarity to the Ukrainian 7 variety was 17.2% (88% control) and 0.0% (66% control) in the Kirovabad 10 variety. According to morphometric indices, no significant difference was found between the control and the experiment on the seedlings of the variety Ukrainian 7 (table). Experimental studies have shown that plants of the *Morus* genus can be proliferated by seeding even in the absence of pollination because of unfavorable meteorological factors or the remoteness of the pollen, using the mechanism of autonomous apomixis. It is likely that pollination of seeds is the main mechanism for the formation of a viable seed, and apomictic - a reserve. Consequently, under conditions of insufficient concentration of pollen in the air, on the mulberry plant, seeds can be formed both as a result of pollination and apomictic. Detecting this distribution will allow you to broaden your understanding of how mulberry breeds grow in nature.

Conclusions

For the first time, the ability of some varieties and hybrids of mulberry to experiment with the formation of a viable apomictic seed has been experimentally proved. Of the 24 studied species of *Morus alba* L., only 14 showed a tendency to autonomous apomixis, of 3 varieties of the species *Morus bombycis* K. - 1, as well as the hybrid Ukrainian 7. From apomictic seeds of Ukrainian 7, seedlings were obtained in laboratory and field conditions, whose morphometric indices were at the control level.

Bibliography

1. Bogach A.I. Exploitation of forage plantations of varietal mulberry of compact design / AI Rich // Silkworm: Intermediate. thematic sciences save - Kh., 2007. - Vip. 26. - P. 21 - 28.
2. Armor B. A. Field experiment technique / BA Armor - Moscow: Agropromizdat, 1985. - 352 pp.

3. Zakharov I.K. 100 years since the birth of Dmitry Fedorovich Petrova / I.K. Zakharov // Vestnik VOGiC. - 2010. - T. 14, No. 1. - P. 172 - 184.
4. Lakin G.F. Biometrics: study. allowance / GF Lakin - M.: Vyssh. pc., 1990. - 352 pp.
5. The method of state varietal testing of agricultural crops. - Moscow, 1983. - 184 pp.
6. Method of field and vegetation experiments with fertilizers and herbicides. - Moscow: Nauka, 1967. - 62 p.
7. Oleksiychenko N.O. The mulberry gene pool in Ukraine and the prospects for its use / N.O. Oleksiychenko, O.V. Galanova - K.: NSC IAE, 2008. - 140 p.
8. Oleksiychenko N.O. Selection of mulberry in Ukraine / N.O. Alekseychenko - K.: VTS KNLU, 2007. - 306 p.
9. Pavlyuk N.V. Methodology of examination of mulberry varieties (*Morus L.*) for difference, one-niceness and stability / N.V. Pavlyuk - K.: UIESR, 2007. - P. 441-450.
10. Practical Guide to the Silkworm: Directory / IO. Kirichenko [and others]. - K.: Harvest, 1991. - 144 pp.
11. Sokolov VA Will the next "green revolution" be? / VA. Sokolov // Science and life. - 2003. - No. 3. - P. 7 - 15.
12. Sechi H. Cytological study of mulberry. - Ch. I. Polyploidy in mulberry, in particular the spontaneous appearance of triploid plants / X. Secchi // J. Fac Text and sericult. Shinshu Univ. - 1959. - No. 20. - P. 58 - 59 (quotation on RZhB 1961-14A-160).
13. Fedorov A.I. Tutovodstvo / A.I. Fedorov - M.: Selhozgiz, 1947. - 343 pp.
14. Khokhlov SS Apomixis: Classification and Distribution at Angiosperm Plants / S.S. Khokhlov // Advances in modern genetics. - 1967. - Issue No. 1. - P. 43 - 105.
15. Khokhlov S.S. List of species of flowering plants in which apomixis / S.S. Khokhlov // Identification of apomictic forms in the flora of flowering plants of the USSR: Program, methodology, results / SS. Khokhlov, MI Zaitseva, P.G. Kupriyanov; ed. SS Khokhlov - Saratov: Izot Sarat. Un-tha, 1978. - p. 24 - 87.

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