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Cultivation of *Hypericum montanum* and *Hypericum perforatum*

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Abstract

This article presents the results of cultivation methods of *Hypericum montanum* and *Hypericum perforatum* on research areas and the development of methods of cultivation in the laboratory in order to expand the resource base of wild plants.

Keywords: species of the genus *Hypericum*, introduction, cultivation and growing.

1. Introduction

At the present stage of science the relevant is reproduction of endangered species of medicinal plants by creating nurseries, research areas. Vegetable supplies are limited in nature, many plants are rare, and they require protection and reproduction. It is necessary to cultivate the medicinal plants for meeting the needs of the pharmaceutical industry, the study of ecological and biological properties^[1, 2].

For the purposes of scientific research in the Ivano-Frankivsk National Medical University was laid educational and research areas of medicinal plants to which the part of seeds and garden material were collected in natural habitats^[3].

As part of research work "Investigation of some wild and cultivated plants of Western Ukraine and studying the possibilities of creating based on these of medicines" is held introduction and acclimatization of medicinal plants, the definition of plant resources in foothill and mountain areas of the Ukrainian Carpathians and studying of their use in medicine.

It was established the places of growing species of the genus *Hypericum* in the territory of Western Ukraine, were harvested seeds and raw materials, was investigated chemical composition of the aerial parts of the plant.^[4-6]

In mountain massif *Hypericum montanum* forms a rarefied thickets. This is due to edaphic factor – limestone soils. Phytocoenotically *Hypericum montanum* is spread in all plant groupings – from mountain- forest to subalpine meadow of formations zone.

The **aim was** to conduct research of the structure of fruitful and viability of plants in the laboratory and field conditions which is a prerequisite for studying ways to develop methods of cultivation.

2. Materials and Methods

The research from introduction of *Hypericum montanum* and growing *Hypericum perforatum* was conducted on research areas of medicinal plants of Ivano-Frankivsk National Medical University and State Arboretum "Druzhba" named after Zenoviy Pavlik of Carpathian National University named after V. Stefanik with the help of consultative assistance director Kozak Tatyana I.

Experiments were carried out on collection sites of Medicinal Plants Department in the direction of introduction and acclimatization of *Hypericum montanum*.

We investigated laboratory and field germination of *Hypericum montanum* seeds, in the processing by low temperatures in laboratory conditions^[7-9].

3. Results and Discussion

When processing of cultivation conditions *Hypericum montanum* and *Hypericum perforatum* it was determined that the soil cover of research areas represented by sod-podzolic soils, which indicates favorable agronomic conditions areas.

Laboratory seed similarity of *Hypericum montanum* reaches 90 – 95%, wild - 50 – 55%. *Hypericum montanum* seeds were sown stratified (wet sand and *Hypericum montanum* seeds were mixed in a ratio of 1:5 and allowed to stand for - 2.0 – 2.5 months).

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The results of the experiments in the Arboretum and on experimental plots indicated that *Hypericum montanum* seeds harvested from wild plants in normal seeding to the soil had poor and uneven similarity. Analysis of seeds showed its heterogeneity, which has a big difference in size and weight. Study of seed peculiarities began by dividing it into fractions: large, medium, small. Seeds harvested from wild plants had small sizes and big fraction was only 15%, medium – 35% and small – 50%. Weight of 1000 seeds according to fractions was equal to 0.87, 0.73 and 0.56 g. Seeds harvested from nursery collection had a higher weight of 1000 seeds. Great fraction was already 22% of the weight of 1000 seeds 1.0 g, medium fraction of 38% with a mass of 0.73 g, small – 40% of the mass of 0.56 g. Seeds second and third year growing season marked by a high percentage of a large fraction (38 – 44%) and weight of seeds 1,032 – 1,035 g.

The laboratory studies have shown that the mass of 1000 seeds collected from wild plants, an average per years of research was only 0.89 g, while harvested from collection nursery of the second year of growing season – 1.08 g, and the third year of growing season – 1.30 g. Laboratory seed similarity selected for planting individual fractions was different. Thus, the seeds of wild plants had 22.8% laboratory similarity at 18 °C and 36.4% with increasing temperature to 28 °C. Seeds of collection nursery slightly increased rate of similarity, which at 18 °C it was 28.6%, and at 28 °C – 37.4%. Seeds of the third year growing season had higher laboratory similarity, respectively 29.3 and 42.0%.

Stratification of seeds greatly contributed to improving laboratory germination. Stratified seeds accelerate germination of and emergence. Similarity of prepared seeds on the sixth day was 88%. The optimum is sowing for the winter because shoots appear on 8 – 10 days earlier than spring sowing. Germination of seeds begins at 4 – 6 °C, the optimum temperature - 18 – 20 °C.

The shoots of *Hypericum montanum* develop very slowly and crops overgrow by weeds or die from soil crusts. In the first year of vegetation they create socket. For the second year *Hypericum montanum* in conditions of culture will soon grow to form generative organs. The phase of flowering occurs in late June. Duration of flowering from blooming of the first flower is 24 days. Seeds ripen at the beginning of August.

First seeds of central tassels ripen and then the lateral tassels - the second and third order. As ripening seeds shower and easily carry by the wind. The best seed yield obtained in 2 – 3 years of age. The duration of *Hypericum montanum* life lasts 5 – 6 years. At the end of growing season the whole of the ground stems die annually.

Study fruitful structure and viability of plants in the laboratory and in the field conditions is a prerequisite to learn how to develop methods of cultivation.

Cultivation of Hypericum perforatum. Considering that *Hypericum perforatum* - perennial crops in rotation for one field it is grown 3 – 5 years. To do this, choose plots without weeds and shadeless areas. Best predecessors - grain spiked culture, pure steam [5-7].

The main cultivation of the soil, depending on its condition and its predecessors, is to conduct manufacturing operations of normal, semi-steam system and improved its cultivation. Pre-cultivation envisages cultivation, alignment of the area, breaking clods, and if it is necessary -to smooth ground.

Terms of sowing - for the winter or early spring with delusional culture. For the winter are sown normal seeds and in spring – stratified seeds. The best results are obtained when the seeds are sown for the winter, because spring shoots appear

in 2 – 3 weeks after mass germination of weeds. The method of sowing - row spacing of 45 cm. Norm of sowing seeds - 3 – 4 kg / ha. Seeding depth - superficial seeding for the winter to 0.5 cm in spring. To ensure the uniform sowing the seeds were mixed with granulated superphosphate (1:10).

The period of germination of stratified seeds at sowing in spring – about 1 month, and this is caused the need for adding seeds of delusional culture. When are sown in spring not stratified seeds the mass shoots appear only next year.

In the first year shoots develop very slowly, and so on weed control pay special attention. To create optimal conditions for growth after germination in rows is formed density (the distance between plants 15 cm) and weed them out. Row spacing is loosen by hand for destruction of weeds and improve soil aeration. On the second and next years in early spring is harrowed the soil for mulching and removal of dead stems and regularly during the growing season is carried out the destruction of weeds and loosening of rows.

Harvesting is carried out in June – July. A month and a month and a half after the first hay crop the vegetation is repeated and the plants bloom a second time. Under favorable meteorological conditions on one area of the raw materials is harvested twice.

The harvest of the herb *Hypericum perforatum* is 15 - 20 quintals per hectare on the second year of the plant growth and 30 - 40 quintals per hectare - on the third year; the Harvest of conditioned seeds - 2 - 3 quintals per hectare.

4. Conclusion

It was established optimal growing conditions of *Hypericum perforatum*, indicating the possibility of cultivating it in order to expand the resource base of wild plants. Past studies of the introduction of *Hypericum montanum* indicate to the need of work towards the conservation, restoration and increased populations of *Hypericum* at the collection area.

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