VACCINIUM MYRTILLUS L. POPULATIONS IN THE FORESTS OF THE NORTH-EAST OF UKRAINE

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Abstract. Forests of the North-East of Ukraine have long been subjected to various anthropogenic impacts: industrial timber harvesting, amelioration, berry picking, mushroom gathering, recreation. In 1999, Desnyansko-Starogutsky National Nature Park with an area of 16 hectares was created in the North-East of Ukraine. Cenosis forming plants of the lower forest layers carry these loads. One of these plants, common in the forests of the North-East of Ukraine, is *Vaccinium myrtillus* L. It is known that in the forests of Ukrainian Polissya, where litter is accumulated, partial bushes of *V. myrtillus* completely die, because its roots are located in the litter thickness. When the soil density is more than 60 kg/cm^2, the number of partial bushes is reduced by 2.2 times, and the growth of shoots is lowered by a factor equal to 5 [7].

Therefore, it is important to study characteristics of *V. myrtillus* populations in forest areas transferred from the mode of economic use into the conservation one. Data on *V. myrtillus* population condition in the forests of the North-East of Ukraine will allow to put in perspective (by subsequent phytopopulation monitoring) recovery of the live ground cover and dynamics of population processes after the removal of the main anthropogenic load from the forest communities.

KEY WORDS: *Vaccinium myrtillus*, population, clone, vitality.

Аннотация. Леса северного востока Украины длительное время испытывали разнообразные антропогенные влияния: промышленной заготовки древесины, мелиорации, заготовки ягод и грибов, рекреационные нагрузки. В 1999

году на северном востоке Украины был организован Национальный природгый парк «Деснянско-Старогутский», площадью 16 тыс. гектар. В наибольшей мере такие нагрузки воспринимали ценозообразовательные растения нижних ярусов лесов. Одним из таких растений, распространенных в лесах северного востока Украины, является *Vaccinium myrtillus* L. Известно, что в лесах Украинского Полесья, где накапливается лесная подстилка, парциальные кусты *V. myrtillus* полностью отмирают, потому что ее корневища располагаются именно в более толстые подстилки. При увеличении плотности почвы более за 60 кг/см^2 количество парциальных кустов уменьшается в 2,2 раза, а прирост побегов – в 5.

Поэтому актуальным является изучение особенностей популяций V. myrtillus в лесных массивах, переведенных из режима хозяйственного пользования в режим заповедности. Данные о состоянии популяций *V. myrtillus* в лесах северного востока Украины позволят объективно оценивать (последующим фитопопуляционным мониторингом) процесс возобновления живого надпочвенного покрова и динамику популяционных процессов после снятия основных антропогенных нагрузок из лесных массивов.

КЛЮЧЕВЫЕ СЛОВА: *Vaccinium myrtillus*, популяция, клон, виталитет

Material and research methodology

Vaccinium myrtillus is quite well studied from the botanical and environmental perspective [1, 23, 4, 17, 12]. It is dwarf subshrub which is characterized by vegetative reproduction, and forms clones. Morphostructural unit of clone formation is a partial bush.

Our objective was to study the age-related and vitality condition of *V. myrtillus* populations in forest types with its predominance in the lower layer, and to define the structural features of clones. In 1999-2000, the standard geobotanical pictures were

made, the partial bushes morphometry was carried out, as well as a full mapping of clones by laying plots of the size 50 x 50 cm with fixation of the partial bushes condition and position and the placement of underground plant parts was performed for this purpose in the habitats of the species. More than 500 morphometric measurements were made, and the mapping of 11 sample clones was conducted. Evaluation of the age-related and vitality condition of *V. myrtillus* populations corresponds to specific clones. The age-related condition of populations was analyzed according to the methodology of phytodemographic research [8], vitality condition – by the method of Yu. A. Zlobin [21]. The names of associations of forest phytocenoses are given according to the "Prodromus of the vegetation of Ukraine" [14].

Research results and their discussion

Vaccinium myrtillus is dominant in the forests of the North-East of Ukraine in the associations of *Pinetum myrtillosum* and *Betuletum myrtillosum*; it is co-dominant of *Pinetum myrtilloso-hylocomiosum, Pinetum myrtilloso-moliniosum, Betuletum myrtilloso-moliniosum, Querceto-Pinetum myrtilloso-convallariosum*, and it is also found in certain other cenoses: I. Pinetum myrtilloso-hylocomiosum, II. Pinetum molinioso-myrtillosum, III. Querceto-Pinetum myrtillosum, IV. Betuletum molinioso-myrtillosum, V. Betuleto-Pinetum franguloso-myrtillosum.

The canopy of *V. myrtillus* in these forests, as a rule, has a clonal structure. This arrangement of bilberry canopy is especially typical for cenosis of *Pinetum myrtilloso-hylocomiosum* and *Querceto-Pinetum myrtilloso-convallariosum* associations. However, clonal structure of *V. myrtillus* cover was not observed on all forest plots. In most of the phytocoenoses with dominance and co-dominance of species in the lower layer, they form somewhat like a single clone-field as a result of mutual overlapping of clones [22].

Structure of bilberry canopy largely depends on the time of the last clear cutting of the forest stand.

Periodization of *V. myrtillus* ontogenesis was first made by Yu. A. Zlobin [23]. This issue was also studied by some other authors [16, 19], but our periodization was conducted only for partial bushes of vegetative origin. In order to make periodization of full *V. myrtillus* ontogenesis, we have developed the following scheme (Fig. 1).

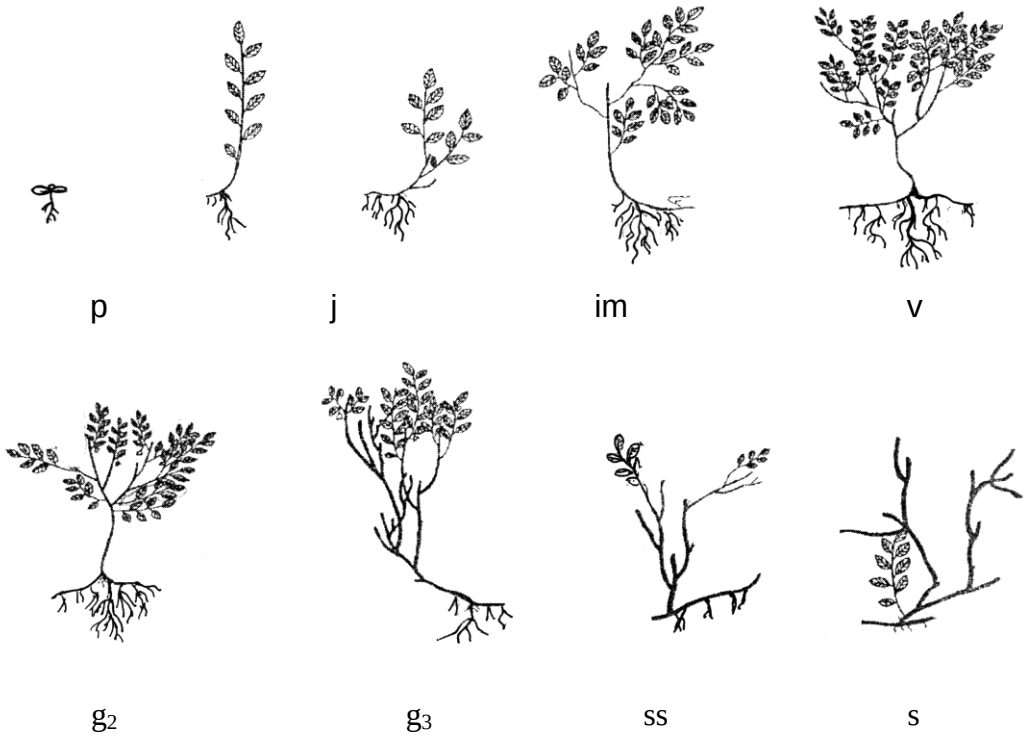

Fig. 1. Stages of *Vaccinium myrtillus* ontogenesis: p – seedling, j – juvenile; im – immature; v – virginal; g_1 – young generative; g_2 – average generative; g_3 – old generative; ss – subsenile; s – senile

By the ratio of partial bushes of different age-related condition, the studied clones can be reduced to the three main categories: young, middle-aged and old. These categories of clones were differed by the ratio of partial bushes along the radius of clone from the centre to the periphery [2].

Immature and vegetative partial bushes prevailed in the central part of the young clones with a small number of bushes of g_1 and sometimes g_2. Intermediate and peripheral zones of these clones were little differentiated with the absence of generative partial bushes. These clones were typical for *Pinetum myrtilloso-hylocomiosum*.

By contrast to this, partial bushes of g_3 and *ss* age-related condition were the basis of old clones of both central and intermediate zones, and in the center of the clone – even *s* age-related condition. These clones rarely occur in the forests of the North-East of Ukraine, only on some plots of *Pinetum myrtillosum* association.

The ratio of partial bushes of different age-related condition mostly varied in the middle-aged clones. All three zones were clearly differentiated. The old generative and subsenile bushes had the largest share in the central part, average generative ones in the intermediate zone, and younger bushes – in the peripheral zone. These clones are typical for most forests of the North-East of Ukraine with *V. myrtillus* in the lower layer. In middle-aged clones, there is regular reduction in the number of partial bushes per unit of area and projective cover of *V. myrtillus* from the center to the periphery of clone. The bulk of the new shoots of species dissemination is laid down in the central and intermediate zones of clones [5, 6].

Vitality of *V. myrtillus* partial bushes was evaluated for g_2 age-related condition, which was largely an indicator of the general condition of the species. Vitality was determined on the basis of the three characteristics: size of leaf surface, the values of annual growth of shoots and number of fruit.

The highest quality of *V. myrtillus* populations was seen in the coenosis of *Pinetum myrtilloso-moliniosum* association: Q = 0.41. This is largely in line with the observation of Moshchynska [11] in Poland, where the optimum for *V. myrtillus* also occurs in pine forests with *Molinia coerulea (L.)* Moench. The populations of *Pinetum myrtillosum* and *Betuletum moliniosum* are close to them, where depending on the

forest stand condition vitality population structure is assessed by the quality index Q = 0.39. In *Betuletum myrtillosum-moliniosum, Betuletum myrtillosum* and *Pinetum myrtilloso-vacciniosum* associations the index of quality of V. myrtillus populations is respectively: 0.38, 0.32 and 0.28. *V. myrtillus* is in a depressed state in *Pinetum myrtilloso-hylocomiosum* (Q = 0.12) [13, 20].

Comparing the quality of *V. myrtillus* populations with the main features of the forest ecosystem, it can be observed that the value of the index Q decreases: a) with reduction in the forest stand density from 0.75 to 0.45; b) with reduction in the forest stand age from 82 to 48 years; c)with reduction in the forest stand height from 27 to 19 m.

In general, the better living conditions of *V. myrtillus* partial bushes and clones were observed in aggregations with a sufficiently formed closed forest stand of 70-85 years old. The best growth and development of the species in mature conifer forests were depicted by Mazna [9, 10]. Under the conditions of North-Eastern Ukraine the optimum for *V.myrtillus* is also observed in mature birch forests. Further dynamics of the species populations in the forests of the region will be determined by the development of the forest stand in the absence of clear cutting, as well as changes in the general hydrological and radiation regime of the territory [3, 15, 18].

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