Some aspects of composition dynamics of *Primula farinosa* L. populations

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Three *Primula farinosa* populations were investigated in Šiauliai and Joniškis districts, using the permanent field method. Five age groups of maturity of *Primula farinosa* were established according to the morphological features of the overground parts of the plant. The main distinctive features of maturity are the number, length and width of leaves and generative organs.

Upon investigating the dynamics of individuals of various groups of maturity, it was established that *Primula farinosa* individuals grow very quickly at the early development stages, but later their development becomes slower. One stage of maturity can last several years. The number of dea individuals directly depends on maturity age. Juvenile individuals, especially seedlings, are most vulnerable.

Key words: *Primula farinosa*, age of maturity, death, population ecology

INTRODUCTION

Primula farinosa is a rare, disappearing species protected in Lithuania and in other countries [1]. So far investigations of this plant in Lithuania were limited to registration of localities and characterisation of habitats. However, it is very important to study the biology, distribution and population functioning peculiarities of this species. Such studies would enable to evaluate the present and, to forecast objectively the further status of bird's-eye primrose and to define appropriate protection means for this species.

MATERIALS AND METHODS

Primula farinosa (*Primulaceae*) perennial, herbaceous plant with a short rootstock. Its leaves, forming

Table 1. **Brief characteristic of *Primula farinosa* habitats**

Locality name	Šaukėnai	Žagarė	Jauniūnai
Biotope characteristics	Wet meadow on the bank of the river Ilga	Wet meadow on the slope of the river Švėtė	Meadow under the power line
Coverage (%) of herb layer	60	50	60
Coverage (%) of bryophyte layer	90	80	20
Dominating species	*Schoenus ferrugineus* L., *Primula farinosa* L., *Carex panicea* L., *C. lepidocarpa* Tausch, *Molinia caerulea* (L.) Moench, *Menyanthes trifoliata* L., *Potentilla erecta* (L.) Raeuschel, *Succisa pratensis* Moench	*Epipactis palustris* (L.) Crantz, *Carex flacca* Schreb., *C. lepidocarpa* Tausch, *C.panicea* L., *C. flava* L., *Potentilla erecta* (L.) Raeuschel, *Eriophorum latifolium* Hoppe	*Primula farinosa* L., *Calamagrostis epigejos* (L.) Roth, *Deschampsia cespitosa* (L.) P. Beauv., *Potentilla erecta* (L.) Raeuschel, *Carex flacca* Schreb., *C. panicea* L., *C. flava* L., *Carduus crispus* L.

a basal rosette, are of elongated oval form, tapering to stalk. Edges of young leaves are slightly downturned. Fully formed leaves have finely toothed edges. Flowering scapes are 1–4, leafless. The scapes and the lower side of a leaf have a yellowish-white mealy cover. The inflorescence is a multiflorous umble. The corolla is pink or violet, sometimes white. The fruit is a capsule. The capsule contains 20 to 110 small seeds [2]. It is flowering from May to July. Natural habitats of the species in Lithuania are wet and moist meadows, forest edges. It often grows on slopes of drainage ditches. *Primula farinosa* is included into the Red Data Book of Lithuania as a rare, rapidly declining species [1]. It is more common in the northern and western regions, but very rare elsewhere.

Primula farinosa investigations were carried out in June–July 1998–2000 in Šiauliai and Joniškis districts. A brief characteristic of the habitats is shown in Table 1. *Primula farinosa* individuals were mapped in permanent plots during the investigation period. The plot area was 0.25 m^2. The number, length and width of leaves, flowers, the number of capsules and the length of scape were determined for each *Primula farinosa* individual.

Primula farinosa age groups of maturity were distinguished according to the recommendations for determination of maturity age of herbaceous plants [3, 4]. Measurements of the quantitative features (number of leaves and flowers, length and width of leaves, length of scapes) were carried out.

RESULTS AND DISCUSSION

Age groups of maturity of Primula farinosa

The structure of the underground organs is very important when determining the age of perennial herbaceous plants. Therefore a lot of plants have to be dug out. Such methods are not suitable for *Primula farinosa* research as this species is protected. Therefore the age groups of maturity were distinguished only according to the features of the overground parts of the plants. Five *Primula farinosa* age groups of maturity were distinguished:

Seedlings (pl) – plants still having links with the seed. They have 2–3 very small leaves, but their length does not exceed 0.5 cm.

Juvenile (j) – have no links with the seed. The rosette of 3–5 feeble leaves is formed, their length being 1–1.5 cm and width about 0.5 cm.

Immature (im) – similar to fully-grown plants but slightly smaller. They have 5–8 leaves, their length is 2–3.5 cm and width 0.6–0.8 cm.

Virginal (v) – fully-grown plants, but without generative organs. They have a large fully formed rosette of 7–12 leaves 4–7 cm long, width about 1 cm.

Generative (g) – plants that have reached the highest stage of development. Their rosette consists of 7–17 (24) leaves 2 to 7 cm long and 0.5–1.5 cm wide. Plants have 1–4 scapes with 2–20 flowers.

The identification of *Primula farinosa* juvenile individuals is quite difficult because of a great similarity to plants of some other genera, for example *Prunella vulgaris* L., *Polygala amarella* Crantz, *Leucanthemum vulgare* Lamk. The only appropriate distinctive feature is a whitish mealy cover on the lower side of *Primula farinosa* leaves. However, this feature is hardly visible on the plants of seedling and juvenile stages. Therefore species of such individuals sometimes can be reliably established only after an additional checking next year.

Development of Primula farinosa individuals

Plant development rate of the species is different at various age groups of maturity (Table 2). The development of younger individuals is faster. More than 80% of individuals of juvenile plants entered the higher age group of maturity, while less than 60% did the same from the immature group. On evaluating the development rate of juvenile individuals, it was established that 43% of these plants entered the next stage of development, 25.4% of plants went over two and 13.2% over three stages of development. Thus, seedlings of bird's eye primrose can reach the generative age no sooner than in two years. The development of fully-grown plants slowed down. Most of them stayed at same age group of maturity. Less than 30% of virginal individuals became generative next year. These results enable to conclude that *Primula farinosa* individuals develop very quickly at the early stages of development, but later their development gets slower. The plants remain in one stage of maturity for several years.

The opposite pattern was observed as well, *i.e.* repeatedly checked individuals entered the lower age group of maturity. 4.5% of such plants were observed in the group of immature individuals, about 6% in the group of virginal individuals, and even 24% in the group of generative individuals. 17% of these plants were ascribed to the group of immature plants. None of these plants flowered repeatedly, probably because of the use of a lot of nutritive reserves for flowering and fruit ripening. Unfavourable environmental conditions could play a roles too.

Death of Primula farinosa plants

Quite a lot of individuals of this species die every year (Table 2). The number of dea plants is different in various groups and directly depends on age.

Table 2. **Dynamics of *Primula farinosa* population individuals during two years of investigations**

Age groups of initial maturity	Initial number of individuals	Number of survived individuals	% of survived individuals	Age groups of maturity of the second year				
				pl	j	im	v	g
pl	45	7	15.6	2	1	3	1	
j	56	24	42.9		4	13	4	3
im	64	44	62.5		2	16	15	11
v	24	17	70.8			1	11	5
g	53	42	79.2			7	3	32
Total	242	130	53.7					

The largest number of dead individuals was in the juvenile group: 84.5% of marked individuals disappeared from the seedlings group, 57.1% from the juvenile group, 37.5% from the immature group. Fully-grown plants are more resistant. They comprised 29.2% to 20.8% of dead individuals. Thus, the younger the individual, the higher the probability of its death. The reasons of plant death were not investigated. Unfavourable environmental conditions (lack of moisture, high or low temperatures) could be most important factors.

Our investigations showed that it is possible to distinguish *Primula farinosa* age groups of maturity. Seedlings and juvenile plants are the most dynamic age groups of maturity. On average 50% of *Primula farinosa* individuals die every year. It is necessary to study the reasons of death of this protected plant.

References

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E. Meškauskaitė, J. R. Naujalis

KAI KURIE *PRIMULA FARINOSA* L. POPULIACIJŲ SUDĖTIES DINAMIKOS ASPEKTAI

S a n t r a u k a

Pastovių laukelių metodu ištirtos 3 *Primula farinosa* populiacijos Šiaulių ir Joniškio rajonuose. 5 *Primula farinosa* brandos amžiaus grupės nustatytos pagal antžeminių dalių morfologinius požymius. Pagrindiniai brandos amžiaus grupių skiriamieji požymiai yra lapų skaičius, ilgis ir plotis bei generatyviniai organai.

Ištyrus įvairių brandos amžiaus grupių individų dinamiką, nustatyta, kad ankstyvose raidos stadijose *Primula farinosa* individai vystosi labai greitai, o vėliau jų raida sulėtėja, vienoje brandos amžiaus stadijoje augalai išbūna kelerius metus. Žuvusių individų skaičius tiesiogiai priklauso nuo brandos amžiaus, daugiausia išnyksta jaunatvinių individų, ypač daigų.