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Phytocenology of *Nigella orientalis* Species on the Territory genja-Gazakh (Azerbaijan)

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A B S T R A C T

Modern condition of population of *Nigella orientalis*L. species distributed on west part of botanical-geographical district of Small Caucaus which regarding to Genja-Gazakh territory of Azerbaijan. Two populations were elected in the territories of each district which *Nigella orientalis* spread, so, cenological situation of 10 populations were assessed and the ontogenesis described, development stages for individuals have been specified. Generally in g_1, g_2, g_3(260-360) phases of the species have been shown that development of populations of *Nigella orientalis* species continues and out of danger of lost within the near future.

Introduction

It is known that information about present situation about the natural populations of the useful plants should be gathered for nature conservation at first, ontogenetic situation of the plants and inhabitant type and bioecological properties should be investigated (Vedernikova, 2013). Population and ontogenetic approaches are widely used for valuing the resources of useful plant recently (İbadullayeva and Movsumova, 2011; İbadullayeva *et al.*, 2013).

Investigations carried out by us in this area implemented in 2009-2014, had exact route and semi-stationary character. Cenological and ontogenetically state of populations spread in the Ganja-Gazakh territory of different grass fodder plants such as *Nigella orientalis*species have been learnt.

It is known as aromatic and fragrant spicy crop a long time. Moreover, a *Nigella orientalis* is a fiber, herb and vitamin plant. It is gathered for its useful features, food and fodder importance. Therefore, it is aimed to learn bioecological properties of *Nigella orientalis* specie spreading in Genja-Gazakh territory.

Material and Methods

The investigation has been carried out in Gazakh, Dashkasan, Gadabay, Samukh, Goranboy, Goygol, Shamkir and Tovuz administrative and geographical regions related to Genja-Gazakh zone of Western part of Azerbaijan with the area of 12.482.000 sq.km.

More than 10 populations built on small areas and installed transect systematically and randomly have been valued in different phytocenosis during investigation.

Development stages of the plant individuals have been defined with help of discrete description conception of the ontogenesis.

Ontogenetically age properties of the plants learnt in researches have been divided into 4 periods.

Latent period - reflects forming of the seed after insemination and its morphological properties;

Virginal period -development and growth changeability's of plants connected with age: germination, juvenile, young and mature vegetative plants (until blossoming);

Reproductive period - it covers young, middle and mature periods it flowers but does not yield fruit, blossoms, but does not set qualities seed, blossoms and sets qualitative seed;

Senile period - reflects changes occurred in the last years of the life cycle of the plants.

The following population parameters were used in integral characterizing of demographical structure of plants, calculations were carried out by using general accepted evaluation measures of ontogenesis (Table 1.), age (Uranov, 1975) and effectiveness (Jivotovskiy, 2001) indexes were calculated, hereby, development stages of plants were completely defined.

During geobotanical researches in populations of modern situation in some populations of species and evaluation of cenopopulations (spelling method of phytocenosis was based on Yurtceva (1975) and nomenclature of phytocenotical complex was based on Beydeman (1974). Plant stocks have been specified (Krilova and Shreter, 1971).

Route and sub-stationary investigations had been carried out exactly, population structure of the studied species, their importance in formation and associations, abundance and the number of individuals included all phase of the ontogenesis have been learnt.

(Δ) -age index (Uranov, 1975);

$$\Delta = \frac{\sum k_i x\ n_i}{N}$$

i - "mark",of the ontogenetical situation - n_i - the number of the individuals, i - state of the population, N - general number of the individuals in the population.

Restoration index (Jukova. 1995) changed by N.V.Glotov (IB), pregenerative individuals is expressed in the form relationship of total of pregenerative and generative (Glotov, 1998).

Aging index (Glotov, 1998)

$$\dot{I}_q = \frac{\sum_{i=9} N_i}{\sum_{i=3} N_i}$$

Effectiveness index (Jivotovskiy, 2001)

$$\omega = \frac{n\, e_i}{\sum N_i}$$

n_i– the number of plants, *i*- condition, e_i– effectiveness of plants.

Effective of biological density of population (M_e) accoring to Jivotovskiy (2001) was defined

$$M_e = \sum n_i \cdot \omega_i$$

n_i – the number of plants, i – condition, ω_i- energeticeffectiveness of plants.

Experimental part

During investigation, expedition and field treats were carried out in Genja-Gazakh territory, it was defined that *Nigella* L. (*Ranunculaceae*) one of the 2 species of the - *Nigella orientalis* L.

Investigations have been carried out in spring-fall seasons, in all phases.

Role of *Nigella orientalis*species in the vegetation and phytocenological system learnt, it turned out that, the plant especially involves mesophyte ecological group and is one of meadow, flood-lands elements. It has been determined during expeditions that it covers in local form among different grass and shrubs, blackberry shrubs, sandspur's and barley in mountain dark gray-brown soils of the Goygol district of the Genja-Gazakh territory, in structure of different grass in shrumbs, forest, and meadow of the Dashkasan district, inclinated slopes of Gadabay, in gray-meadow soils of Gazakh district where cultivated lucerne, durra, plantain, sandspurs etc., in meadow-gray soils of inclinated lowland of Tovuz district with freckles plantain, liquorices, etc., alluvial meadow-forest of the Goranboy district.

Ontogenesis of *Nigella orientalis*has been described and development stages of plant individuals have been specified in 2009-2014. Compare criteria of plants introduced by taking notes in periods of Immature (im) virginil (v), young generative (g_1) middle age period (g_2), mature (g_3), subsenil (ss) and senil (s).

In the result, senological state of 10 populations being 1-2 population from each district in Genja-Gazakhterritory were assessed by methods systematically and randomly in different phytocenoses (Table 2). Based on investigation method, structure of their ontogenesis has been learnt by materials gathered from different phases of the ontogenesis (Fig. 1).

Individuals in generative development phase (g_1-g_3 4sp. 5sp 6sp) of the ontogenesis is mostly characteristic for all populations as shown from table and diagram and at the same time the number of the individuals is 2-3 times more than other periods. in some populations for example in 3, 6 and10th populations juvenile phase were not defined and even in the 3rd and 6th populations the number of subsinil and sinil individuals were more (23 at the 3rd and 43 at 6th). However, being more g_1, g_2, g_3 (260–333) shows that, development in *Nigella orientalis*populations continues and cannot be at risk of extinction within near future.

Although *Nigella orientalis* specie is used as food, fodder and medicinal plant by local communities, it is not at risk of diminishing. Age and efficiency indexes of ontogenesis of *Nigella orientalis* cenopopulations were calculated and illustrated in the table 3.

Table.1 General accepted evaluation measure in the ontogenesis

Index of the Ontogenetical situation		Agemark
se	Seed	0.0025
p	Sproud	0.0067
j	Juvenil	0.0180
im	Immature	0.0474
v	Virginil	0.1192
g_1	Younggenerativ	0.2700
g_2	Maturegenerativ	0.5000
g_3	Oldgenerativ	0.7310
ss	Subsenil	0.8808
s	Senil	0.9529

Table.2 Structure of the ontogenesis of the *Nigella orientalis* species in Genja-Gazakh region (Small Caucasus -Azerbaijan)

Period		Thenumberofcenopopulation										Total	
		1	2	3	4	5	6	7	8	9	10	∑	%
1	j	13	16	10	12	19	10	14	15	11	17	147	10,02
2	im	3	11	7	27	21	0	0	11	43	21	144	9,81
3	v	6	17	8	16	17	18	13	11	7	29	142	9,67
4	g1	11	23	11	12	45	32	23	37	32	34	260	17,72
5	g2	14	32	16	23	54	15	28	46	59	45	333	22,69
6	g3	17	19	13	19	39	36	25	39	56	46	309	21,06
7	ss, s	2	3	23	4	11	43	8	5	11	23	133	9,06
∑		66	121	88	113	206	150	111	164	223	225	1467	100

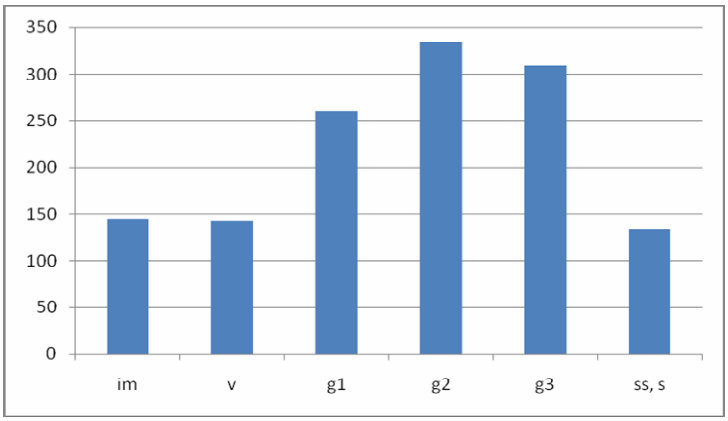
Table.3 Age structure of *Nigella orientalis* populations

SP	SP type	Growth phases of the ontogenesis, general %							Indexes	
		j	im	v	g_1	g_2	g_3	ss, s	Δ	w
1 2 8	Completely mature	8,4 4,5 6,2	12,3 20,9 10,4	9,8 19,1 16,7	27,2 21,27 16,7	26 33,1 18,8	33,3 17,6 31,8	7,7 5,6 25	0,58 0,53 0,44	0,42 0,61 0,54
3 9	Mature	0 0	6 20,9	6,7 12,1	12,7 22,3	13,6 11,6	19,0 6,2	18,2 11,4	0, 43 0, 28	0,22 0,21
4 5 10	Transition	50,2 63,8 14,1	20,5 13,7 10	11 6,9 26,2	8,6 4,2 19,0	6 7,8 11,7	2,2 3,6 12,1	1,5 2,3 6,9	0,28 0,29 0,27	0,22 0,21 0,46
6 7	Young	41,1 18,9	24,6 64,6	20,1 0,9	4,5 4,6	6 7, ,8	2,2 3,2	0 0	0,08 0,09	0,71 0,77

Table.4 Productivity of the *Nigella orientalis* species in different phases of the ontogenesis (ha/kg, wet weight)

SP	Districts	Youngperiod	Matureperiod
1	Goygol	312,1 ± 40,9	421,1± 40,2
2	Goygol	260,1 ±28,9	340,00± 20,10
3	Gadabay	165,00 ± 10,00	255,20 ±23,30
4	Goranboy	164,5 ± 21,5	196,45 ±19,9
5	Dashkasan	164,12 ±16,8	178.00 ±14,67
6	Gazakh	146,30 ± 8,44	268. 30±25,3
7	Shamkir	117, 4±11, 33	190.00 ±15,38
8	Samukh	116,6 ±11,33	124.6 ± 21.,45
9	Tovuz	98,00 ±10,18	154.00 ±13,19
10	Tovuz	95.78 ± 10,60	110.40 ±16,58
Total		1475,75±80,67	2238,05± 230,08

Fig.1 Ontogenetic state in the population



As it seen from the table, all groups of the ontogenesis of the populations are common, they are 6-7 young populations and have high effectiveness index (ω=0,71–0,77). 3-9 cenopopulations are mature (□=0,28–0,43) efficiency is weak. In transition cenopopulations (4, 5, 10) parameters (10-63.8 %) of j, im and v phases are more than generative phase (2,2–12,1%), there are also individuals in senile phase (1,5–6,9%). Therefore, effectiveness of the population is not high (0,21–0,46).

However, continuation and effectiveness of the population are visible in the future.

It is possible to get complete information about plant resources thanks to learning the economical importance of plant stock and cenopopulation. As rosette leaves of the investigated plant are used as food, budding and mature phases have comprehensively learnt (table 4).

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