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Original Research Article

Fitocenological Assesment and Reserve of *Artemisia fragrans* Willd in Shirvan Region of Azerbaijan Republic

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Abstract

Nine populations in fitocenological complex of Shirvan region of Azerbaijan Republic have been selected. The cenological condition, age (Δ) and efficency (ω) indexes of *Artemisia fragrans* Willd species have been estimated and the dynamics of productivity and resources on ontogeny was studied. Three of senopopulations (SP) of *A. fragrans* species are young in Shirvan fitocenological complex. The productivity are high of cenopopulation in ontogenezin phases g_1, g_2 and g_3. In different years fitoweight and biological reserve of *A. fragrans* species changes is depending on microcondition impact. It became clear that, most commonly in ontogeny phase g_1, g_2 and g_3, the productivity was higher in population-6 (94.30-101.97 h/t), medium in populations-2, 3, 4, 5 and 7 (49.34-62.53h/t) and low in populations -1, 8 and 9 (13.15-44.95h/t).

Keywords

Age index

Artemisia fragrans

Efficiency index

Flavored wormwood

Senopopulation

Vegetable stock

Introduction

The modern study of cenological reserve status and at the same time senopopulation (SP) study was to assess the dynamics and productivity in different years. Warmwood is a big genus of intricate flora of *Asteraceae* family and they can be encountered anywhere in the world. In Azerbaijan flora, warmwood type represented by 4 half-breed combining with 42 taxon (Aleskerova, 2014). Although their chemical structure, (Aleskerova and Ibadullayeva, 2011; Aleskerova, 2001) prevalence and reserve in some areas has been studied in plant cover of Azerbaijan but their population structure and fitocenological system not determined.

Among these more interesnting as eitheroil plants and medicines. According to the study the plant cover species of the *Artemisia* L. genus has also played a role especially in the winter when they pose in our flora and senoz are different vegetation types are the basis of pastures. Some medicinal plants from flora and ceonopopulation estimated like the ether oil plant such studied the dynamics of their productivity and the supply of reserves have been set for the phases (Kapten, 1983; Krilova and Schroeter, 1971; Mammadova and İbadullayeva, 2010; Movsumova et al., 2010; Movsumova, 2012). Such studies have been carried out so far for the species of wormwood *A.*

fragrans in Shirvan region - that sweet wormwood as a goal of the evaluation of senopopulation.

The main purpose of the researches is *Artemisia fragrans* Willd species which has been separated in basic fitocenelogical complexes of plants of Shirvan flora of Azerbaijan Republic. *A. fragrans* Willd. is a perennial plant. 25 (in 30-45 sm height) in the beginning of vegetation white, like a felt, and later uncovered part, steep woody root, fruit-bearing in 0,5-1 sm thickness , were a couple of trunks, a little above the middle, branched, stalk leaves on the lower part of the trunk, in 2,5-3,5 sm lenght , divided feather-like, edge split, just off the beaten track in a narrow line of wool or similar shaped parts of the line and blunt-shaped; average leaves of the rack are sedentary, simple, feather-shaped and headphones, flower-side lines is line-shaped or balloon-shaped, standing straight in 3-4,5 mm lengh or collected like a narrow pyramidal shape spaced and broom-shaped, outer covering leaves are short. The blossoms yellow oval, vividly, whitely, fluffy, large in inside, oblong-shaped line, along the wide, open back greenish flowers. Durinn the blossom period is being in IX-X, run to seed in X-XI months. Everywhere in Azerbaijan from the middle of the plain mountain landscapes is encountered sandy place.

Materials and methods

The expeditions carried out in 2013-2014 years covered Ismayilli and Shamakhi (SP-9), Agsu and Agdash (SP-8), Yevlakh (SP-5), Goychay (SP-4), Zardab (SP-3), Ujar (SP-1), Kurdamir (SP-6), Hajigabul (SP-2), Gobustan (SP-7) administrative districts of Shirvan territory. During the study 5 vegetation type (desert, semi-desert, mountain-xerophytes, steppe and gammada) were determined by us . In each 11 districts where the *A.fragrans* species spread was selected 1 natural population. Actually here 3 types of plant in Gray, semi-desert and desert phytocenosis in the first tier, sometimes in the form of patches, formation and associations identified have been identified, the project cover of the areas calculated, was appointed to the abundance (Drude, by 5-point scale). The productivity of the corp was studied in accordance with generally accepted methods (Mammadova and İbadullayeva, 2010; Movsumova et al., 2010). For the study the efficiency of Afragrans type the area of selected coenopopulation field have been at least 40 hectares. Specific areas of distribution of species for the determination of reserve special areas have been denoted and the model samples selected (Buhasheeva, 1973; Vedernikova 2003). For the the calculation of the plant's crude reserves in addition to that in each population 15-20 model plant – *A.fragrans* taken out and shot. During the geobotanical studies in the study of the current state of *A.fragrans* and evaluation of ceonopopulation a number of methods have been used: the writing of fitoshenosis based on Yurseva (1975), in the naming of fitocenotic complex.

The stages of development have been characterized in plant characters by using from discrete description concept of ontogeny of Rabotnov (1950) and Uranov (1975). The description of *A. fragrans* species ontogeny are shown according to the ontogenic forms status. In immatur (im), virginil (v), the young generative (g_1), the average age (g_2), older generative (g_3), subsenil (ss) and senile (s) are periods of plant have been registered periods. The obtained results were analyzed by comparison criteria χ^2 (Serebriakova, 1976; Zaugol'nova et al., 1988).

Experimental investigation

Areas of study are in different *A. fragrans* popuation in phytocenosis or established under the scattered population and assessed on transekts. The study of population in different phases of ontogeny taken based on the collected material was carried out. 50×50 size of the practice, the number increased from 10 to 150. With the range have been designed study areas and ontogeneticsituation (Tables 1 and 2).

Demographic characteristics of the overall structure of the population data of the plant were used to determine the following:

Age index

The age index was calculated as per Uranov (1975).

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

Where,
i-ontogenic status k_i – "mark"
n_i -number of individuals
i-status of population
N- general number of individuals in population

Table 1. Structure of ontogenesis (for 2013 year).

SP / Ont. period.	1	2	3	4	5	6	7	8	9	∑	%
j	-	-	9	-	-	3	3	2	2	19	4.52
im	-	-	5	3	-	8	3	8	3	30	7.14
v	5	7	10	3	6	15	9	2	7	64	15.24
g_1	3	8	6	5	8	13	7	3	3	56	13.33
g_2	18	14	4	16	12	9	7	5	2	87	20.72
g_3	10	16	2	5	17	26	-	-	-	76	18.1
ss,s	9	10	17	20	8	12	12	-	-	39	20.96
∑	45	55	53	52	51	86	41	20	17	420	100

Table 2. Structure of ontogenesis (for 2014 year).

SP / Ont. period.	1	2	3	4	5	6	7	8	9	∑	%
J	6	8	4	-	-	5	5	3	2	33	8.2
Im	3	5	4	6	-	7	6	5	1	37	9.3
V	5	7	15	5	4	10	5	5	4	60	14.3
g_1	7	13	13	7	5	14	7	7	3	76	18.1
g_2	9	17	8	11	19	16	7	5	2	94	22.4
g_3	11	7	5	8	15	28	15	2	-	91	21.66
Ss,s	-	-	2	12	2	13	-	-	-	27	6.43
∑	41	57	51	49	45	93	45	27	12	420	100

The efficiency index

The efficiency index was calculated as per Zhivotovsy (2001).

$$\omega = \frac{\sum n_i \, xe_i}{\sum N_i}$$

n_i- number of plants, i-status , e_i – the efficency of plant.

Results and discussion

During 2 years distribution of *A. fragrans* vegetation types (semi-desert, desert steppe), and semi-desert in each set transects 3, in the desert–4, steppe is released in 2 population. Decades of research has been conducted on July 2nd. Areas close to each other that were chosen distance between the regions for points. The role of vegetation type and structure of *A.fragrans* fitocenologic have been studied and it was found that this plant area of Shirvan, in particular, environmental groups and semi elements of xerophytes. According to the investigation of biological and ecological characteristics of expeditions *A.fragrans* plant formations created variety of herbs and xerophytic plants. Major associations, *A. fragrans* composition, abundance, and their project sites cover distribution are provided in Table 3. Certain demographic characteristics of *A.fragrans* integrated structure, age (growth) rates and efficiency were studied, evaluated and ontogeny SP are shown in Table 4.

As seen from the table in the population found all groups of plant ontogeny , but at 1, 2 and 5 phases they were not found , in the 4 population during the immatur, in the 7 at the phase of elderly population, in 8th, 9th at phase of senior generative, in the sinil and subsinil groups were found differences. 3 and 6 populations are full. Inother words, at different stages of ontogeny found populations (Figs. 1, 2), but here it is necessary to take into account the impact on the microstructure of populations.

Therefore, in different years was calculated the mass of plants at all stages of ontogeny and was indicated the action of environmental factors (Table 5). That is, in comparison with 2013 year, abundant of rainfall in 2014 had a positive impact on phytomass of plants. One of the main problems in the study of ecological systems of vegetation is

to determine mixed relationship between vegetation and environmental factors. Environment factors, making positive or negative impact on structure of ontogenesis, can receive different results in an assessment of senopopulyation. Apparently from the figures, in 2, 4, 5, 6 populations quantity of individuals is big and it proves that the ecological environment of distribution of vegetation of this population is more favorable for fertility of the soil.

Table 3. Fitocenological structure of *A. fragrans* type in different population (2013-2014).

No.	Vegetation type and formations	The compoisitin of association (main species shown)	The cover of plant (%)	Productivity of species
I	Semidesert	SP 1: *Callycephalus nitens + Atriplex turcomanica+ A.fragrans*	30	Cop_3
Formations	1.Artemisieta-*Callycephaletaes*	SP 2: *Efemeretum + Camphorosma lessingi+ A.fragrans*	30	
	2. Artemisieta- *Xeranthemumetaes*	SP 3: *Xeranthemum cylindraceae + Cousinia macroptera+ A.fragrans*	40	Cop_2
II	Desert	SP 4: *Artemisia fragrans + Hordeum leporinum + Stipa capillata + Bothriochloa ischaemum*	30	Cop_2
Formations	3. *Artemisieta*	SP 5.: *A.fragrans+A.scoparia+Salsola nodulosa*	40	Soc
	1. Artemisieta –*Suaedeta dendroides*	SP 6: *Suaeda dendroides + Atraphaxis spinosa+ A.fragrans+ A. szowitsiana*	50	
	5. Artemisieta	SP 7: *Herbosum + Salsola dendroides + A.fragrans*	35	Cop_3
III	Grey	SP 8: *Stipa capillatae + Atraphaxis spinosa + Herbosum+ A.fragrans*	25	Sol
	6. Artemisieta -*Stipeta capillatae* 7. Artemisieta -*Atraphaxeta spinosae*	SP 9: *Atraphaxis spinosa + Caragana grandiflora+ A.fragrans+ A. spicigera*	20	Sp

Table 4. Assessment of *A. fragrans* ceonopopulation.

No. SP	SP type	Growth phases of ontogeny, common with %							Index	
		j	im	v	g_1	g_2	g_3	ss, s	Δ	ω
8	Young	10	40	10	15	25	0	0	0.19	0.28
9		11.76	17.65	41.2	17.65	11.76	0	0	0.16	0.17
2		0	0	12.73	14.55	25.45	29.1	18.2	0.55	0.30
1	Transition	0	0	11.1	6.7	40	22.2	20	0.41	0.24
5		0	0	11.76	15.7	23.53	33.3	15.7	0.43	0.32
3	Ripe	17.1	9.43	18.87	11.32	7.55	3.77	32.1	0. 46	0.49
7		7.32	7.32	21.95	17.1	17.1	0	29.3	0.56	0.45
4	Fully mature	3.5	9.3	17.4	15.119	10.5	30.2	14	0.57	0.52
6		0	5.77	5.77	.62	30.77	9.62	38.46	0.59	0.63

Taking into account the evaluation of the age and efficiency index, it becomes clear that, 2, 8 and 9 SP are young (Δ=0.16-0.55; ω=0.17-0.30), 1, 5 SP is characterized by periods of transition age (Δ=0.41-0.43; ω=0.22-0.32), SP 3 and 7 are adult populations (Δ=0.46-0.56; ω=0.45-0.49), 4 and 6 SP are full adult populations, here the index of age and efficiency reached a maximum (Δ=0.57-0.59; ω=0.52-0.63).

Table 5. The phytoweight of *A. fragrans* species at various stages of ontogenesis.

Stages of ontogeny	On 2013 (wet weight in grams)	On 2014 (wet weight in grams)
im	9.5 ± 0.93	11.6 ± 0.52
v	18.77 ± 3.56	21.36 ± 1.53
g_1	228.0 ± 37.5	285 ± 21.27
g_2	420.3 ± 45.3	561 ± 37.33
g_3	261.0 ± 42.6	381 ± 37.2
ss	55.0 ± 11.7	72.45 ± 17.2
s	36.0 ± 11.2	27.47 ± 9.35

Fig. 1: Dynamics of ontogenesis of a type of *A. fragrans* species in 2013.

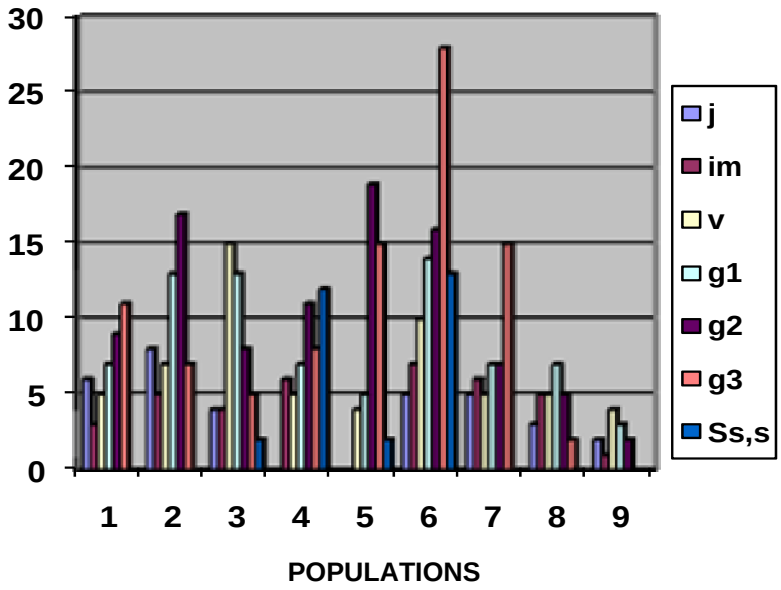
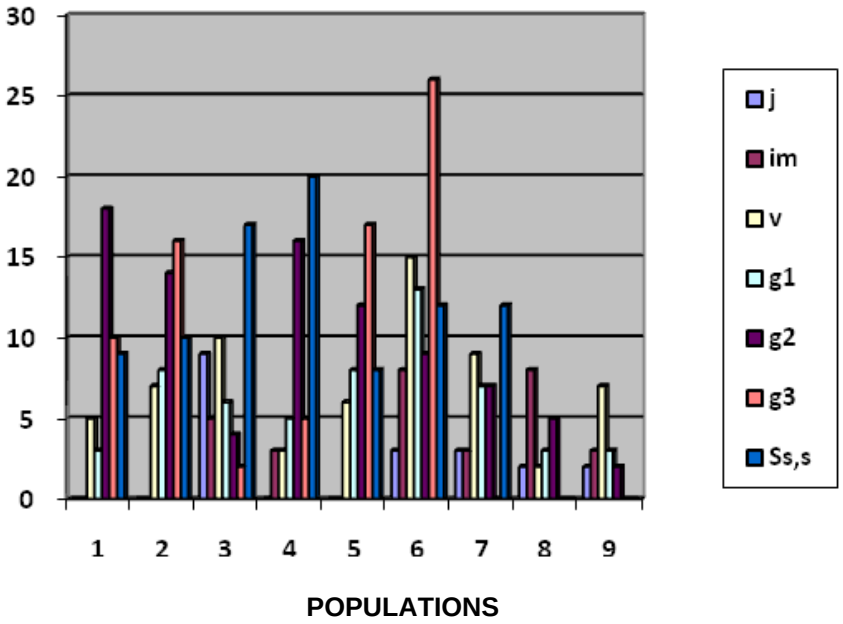


Fig. 2: Dynamics of ontogenesis of a type of *A. fragrans* species in 2014.



In accordance with the richness of plant mass when taken into account on the position of ontogenesis, at the stage of generative development should be explored for the resources of coenopopulations. In view of the fact that elevated part studied also important as herb, which was studied only as superficial phases of reserve unit of ontogenesis g_1, g_1 and g_3 (Table 6).

As it becomes clear, on the ontogenesis phases g_1, g_2 and g_3 on 6 populations (94.303-101.979 ha/t) the crop was received, and can be connected with high rates of an index of age and efficiency of the studied population (Δ=0.59; ω=0.63), at 2, 3, 4, 5 and 7 were averages (49.34-62.50 h/t), at 1, 8 and 9, the productivity was poor (13.15 - 44.95 ha/t).

Table 6. Resources of *A.fragrans* species in different years (ha/t, wet weight).

SP No.	2013		2014	
	Quantity of individum	Biological resources	Quantity of individum	Biological resources
1.	45	44.95 ± 4.12	41	51.55 ± 5.14
2.	55	62.50 ± 5.76	57	60.32 ± 6.31
3.	53	55.92 ± 5.23	51	58.11 ± 5.92
4.	52	53.73 ± 5.12	49	57.02 ± 5.56
5.	51	49.34 ± 4.89	45	55.92 ± 5.23
6.	86	101.97 ± 8.45	93	94.30 ± 7.89
7.	41	49.34 ± 4.51	45	44.95 ± 4.23
8.	20	29.60 ± 2.45	27	21.93 ± 2.17
9.	17	13.15 ± 1.57	12	18.64 ± 1.91
Total	420	411.624 ± 40.89	431	462.84 ± 46.67

Apparently from the table, in 2013 biological resources of plants (411 624 ha/t), was higher than in 2014 (462. 849 ha/t).Though a stock of plants in the same SP are studied, but it is possible to observe some distinctions in different years. It is the answer to environment factors from vegetable resources, number and efficiency. In 2014 environment factors, especially abundance of rainfall, temperature influences on the productivity of plants.

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