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ONTOGENETIC STRUCTURE OF SPIRAEA HYPERICIFOLIA CENOPOPULATIONS

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Abstract: There is no specific research on the ontogenetic structure of cenopopulations of Spiraea species in Uzbekistan and the assessment of their current status. Our research was conducted in 2015-2019 in different parts of the Turkestan mountain range and studied the ontogenetic structure of 9 cenopopulations of S. Hypericifolia. The study analyzed the age structure of S. Hypericifolia in different cenopopulations. It was noted that the cenopopulations recorded during the study were specific to the left-sided and centralized spectra.

The objects of our study are species of the family Spiraea L. of the family Rosaceae (Spiraea japonica L., S. media Schmid., S. hupericifaolia L., S. piosa Franch., S. salicifolia) distributed in the flora of Uzbekistan.

Preservation of rare plants in the world today and the study of the status of their cenopopulations (distribution, number, density, especially the age composition) allows not only to assess their current status, but also to draw clear conclusions about these species in the future [1].

Cenopopulation studies should be conducted to study the restoration of natural plant cover, methods of adaptation of species to external environmental conditions, the possibility of introducing rare plant species. This results in an opportunity to evaluate the tactics and strategies used by plant populations for survival [5].

Commonly accepted methods were used in the study of the structure of tsenopopulations (TsP) Rabotnov, (1950; [10], Tsenopopulyatsii rasteniy, 1988). The classification proposed by Zhivotovsky (2001) [7]) was used in the study of TsP types. The method of transect throwing (20x1) was used to determine the structure of cenopopulations.

Data on the study of some aspects of the natural populations of species of the genus Spiraea have been recorded in the literature.

In particular, the analysis of specimens collected from natural populations of the species S. alpina, S. aquilegifolia, S. betulifolia, S. chamaedryfolia, S. hypericifolia, S. media, S. pubescens, S. salicifolia, S. trilobata, which have caused a great deal of controversy in Siberia. made.

The results of the study indicate that further studies in nature on S. beauverdiana, S. dahurica, S. elegans, S. flexuosa, S. humilis, S. schlothaurae, S. ussuriensis species are required.

In 2001-2007, T.A. Polyakova studied 19 populations of S. ussuriensis L. under natural conditions, distributed in the Daur part of the Far East. During the study, changes in the morphological characteristics of the species in different cenopopulations were studied. According to the results of the study, this species has a high polymorphism. Several types of branching are typical, especially for representatives of the family [7].

Data on its demographic and vitality structures were used to study the strategy of S. hypericifolia at the population level.

The longest duration of the generative state of S. hypericifolia has an impact on the demographic structure of the cenopopulation. As a result, it was proved when analyzing the demographic structure that the number of generative individuals was the highest in the basic ontogenetic spectrum of all cenopopulations. The age composition of the plants that make up each cenopopulation varies slightly in different years, but the overall structure characteristic of the species remains. From this it can be seen that cenopopulations have a climacteric state and fluctuating dynamics [4].

It should be noted that to date, no specific research has been conducted in Uzbekistan on the ontogenetic structure of cenopopulations of Spiraea species and the assessment of their current status.

Our research was conducted in 2015-2019 in different parts of the Turkestan mountain range. During the study, the ontogenetic structure of 9 cenopopulations of S. hypericifolia was studied. Based on the study of morphological features of the plant, the age composition of the species was studied in 7 stages (j, im, v, g1, g2, g3, s).

During the study, the age composition of S. hypericifolia in different cenopopulations was analyzed. In the noted cenopopulations, very few or no occurrences of j, g3, and s stage tufts were observed. In some cenopopulations, the proportion of tufts in the im stage is low (Table 1.1).

Data from the available literature and the results obtained during field studies suggest that the ontogenetic spectrum characteristic of Spiraea hypericifolia is the centralized spectrum. The longer duration of the middle generative stage (g2) than the remaining stages allows the characteristic spectrum of the species to be centralized [2, 3,9]. This law has also been proven in our research.

Table 1.1

Age *structure of S.* hypericifolia cenopopulations

№ *Sp*	Age content, pieces (%)						
	j	*im*	*v*	*g1*	*g2*	*g3*	*s*
1	-	1	7	3	4	1	-
%	0	6,25	43,75	18,75	25	6,25	0

2	-	1	3	2	7	-	-
%	0	7,69	23,07	15,38	53,84	0	0
3	-	-	4	6	11	-	-
%	0	0	19,04	28,57	52,38	0	0
4	1	4	11	5	5	1	-
%	3,70	14,81	40,74	18,5	18,5	3,70	0
5	2	5	7	6	16	2	1
%	5,12	12,82	17,94	15,38	41,02	5,12	2,56
6	3	2	4	6	12	1	1
%	10,34	6,89	13,79	20,68	41,37	3,44	3,44
7	1	-	6	2	4	1	-
%	7,14	0	42,85	14,28	28,57	7,14	0
8	-	-	6	3	12	3	-
%	0	0	25	12,5	50	12,5	0
9	1	3	9	6	12	1	1
%	3,03	9,09	27,27	18,18	36,36	3,03	3,03

Populations in which each age group exists are referred to as full-member cenopopulations, and the absence of certain age groups is referred to as full-member cenopopulations. According to the literature, cenopopulations of invasive or regressive type are completely unorganized, virginil tufts are absent in regressive cenopopulations, and generative and senile tufts are absent in invasive cenopopulations. However, normal cenopopulations can be both full-member and full-member. In this case, the complete absence of cenopopulations is a temporary condition and may be due to various environmental factors. Ecologically, each cenopopulation is characterized by its own numerical indicators, age composition, area of the occupied area and a number of other indicators (Evstigieev O.E., Didenko N.G. 2004).

The area of the habitat depends on the extent of individual activity of the species and the natural conditions in the area. The number of tufts varies in plant populations of different species. The number of tufts in cenopopulations was estimated by a minimum. A decrease in the minimum rate leads to the death of the bushes in certain years or a decrease in their number [6].

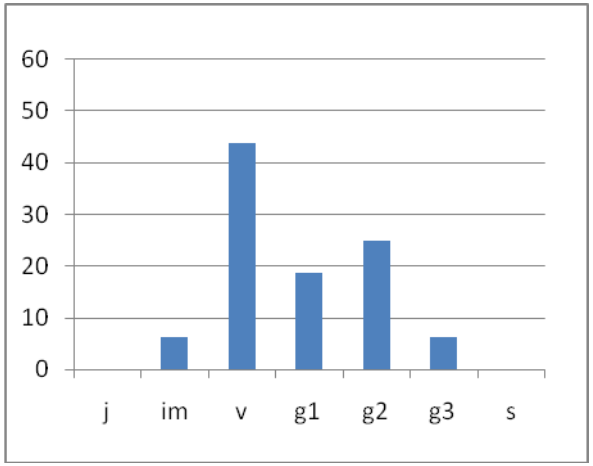
It was noted that the cenopopulations recorded during the study were specific to the left-sided and centralized spectra. No specific cenopopulations of bimodal and right-sided ontogenetic spectra were noted.

Left-sided ontogenetic spectrum. The left-sided ontogenetic spectrum was found to be a peak in most cases, with peak (or peak) virginil stage plants (TsP 1, 4, 7). In these cenopopulations it was observed that the incidence of virginil stage tufts ranged from 40.74 to 43.75%. All cenopopulations characteristic of the left-sided spectrum are incomplete members. In cenopopulations specific to the left-sided ontogenetic spectrum, the value of juvenile also immature stage tufts is not high. This in turn is related to the process of elimination of seeds. Regular grazing of livestock in these areas throughout the year and the separation of cenopopulations from rocky-gravel cenopopulations do not allow seeds to germinate freely. Or this process takes place in difficult stages. The germination of tuple seeds is not always successful in such an environment. The scarcity of grasses in cenopopulations is due to the low rate of seed stock in the soil. The high proportion of tufts in the virginil stage in cenopopulations is directly related to the length of the duration of this stage. The results obtained during the research and the available data in the literature indicate that this phase lasts from 3 to 7 years.

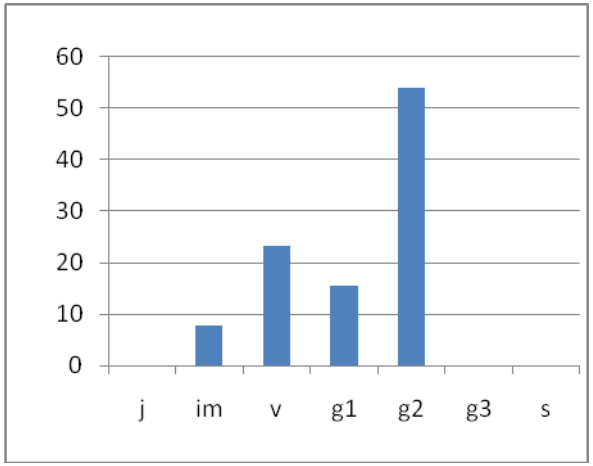
In addition, the foothills of the Turkestan mountain range differ sharply from other ecotopes in their richness in ephemeral and ephemeroids, and the local people prefer to graze their livestock in these pastures in early spring for productive use. This in turn dramatically increases the level of weeding of the studied species.

Centralized ontogenetic spectrum. One of the peculiarities of this ontogenetic spectrum is due to the high proportion of middle-aged generative (g2) and elderly generative (g3) tufts. The characteristic spectrum specific to the representatives of a particular series is the centralized spectrum. Cenopopulations of S. hypericifolia 2, 3, 5, 6, 8, 9 are characteristic of the centralized type, in these cenopopulations it was observed that the tufts of g2- g3 stage are around 39.39 - 62.5%. 50% of cenopopulations are full members (TsP 5, 6, 9) and 2, 3 and 8 cenopopulations are incomplete members (Figure 1.1).

The low number of pre-generative tufts in these cenopopulations is explained by their inability to reach the generative period due to various factors. Although the seed germination of the species under natural conditions is good, their transition to the next stages is one of the most complex processes. Floods that occur after strong winds and rains that blow in the area throughout the year, as well as the dominant species in the area, do not allow young seedlings to develop freely. In addition, as noted above, the fact that the generative period of a species is much longer than before and after it also causes the accumulation of generative tufts in these cenopopulations.



SP-1



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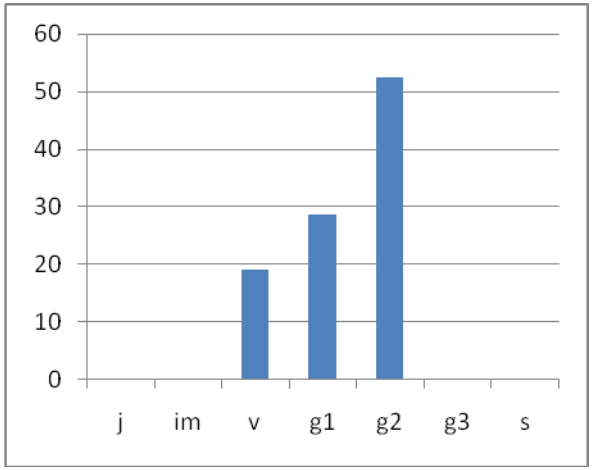
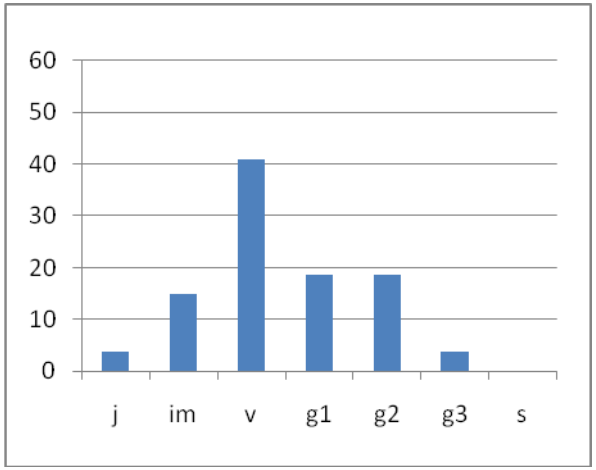


SP-3



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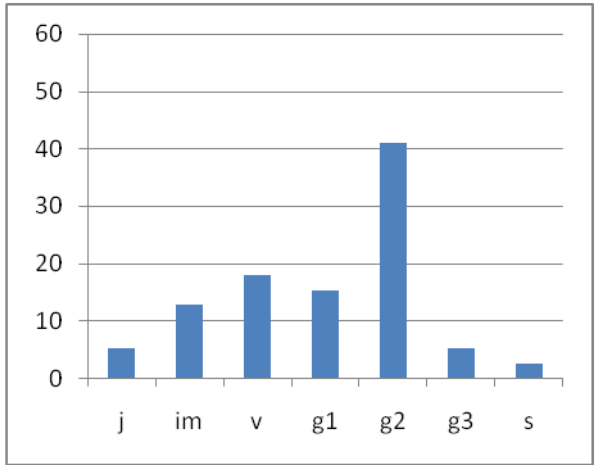
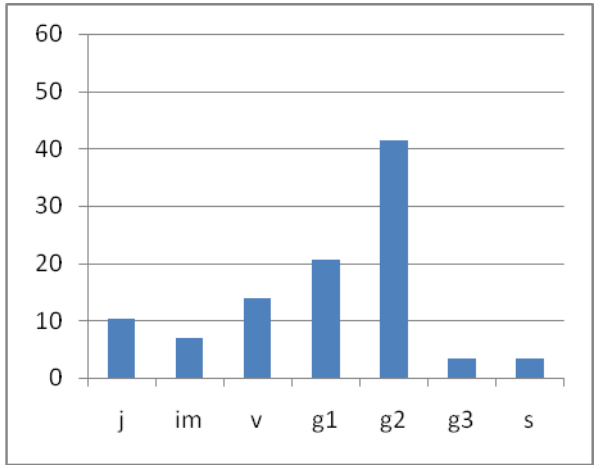


SP-5



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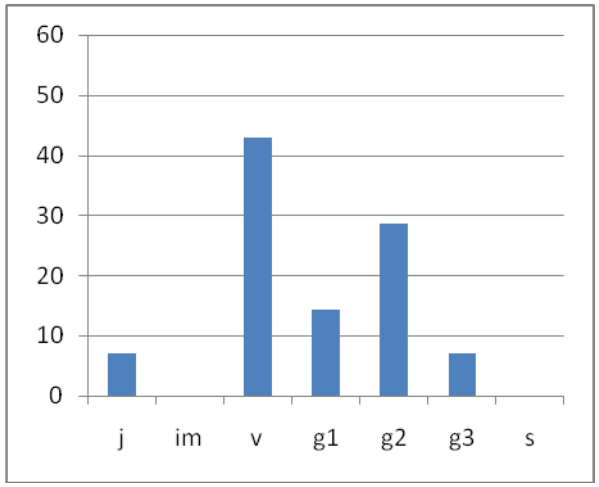

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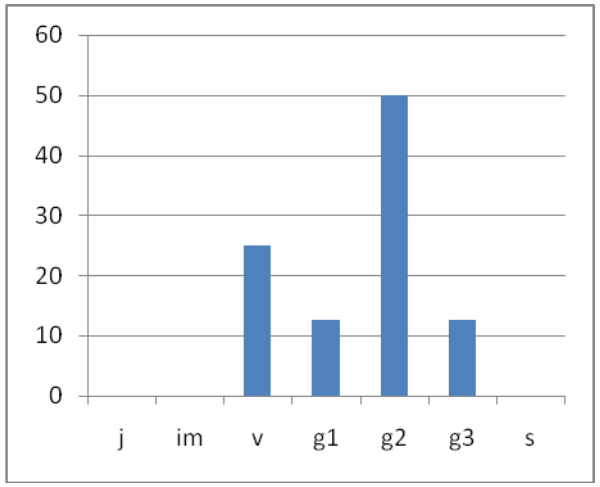
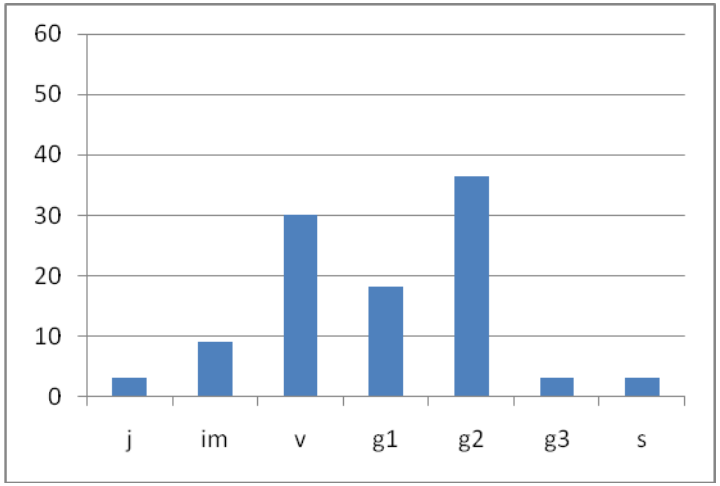


SP-8



SP-9

Figure 1.1. Ontogenetic structure of spiraea hypericifolia cenopopulations

This is directly related to the fact that the duration of the g2 phase is longer than that of other ontogenetic stages. Some literature states that this stage lasts from 10 to 25 years. In addition, the plant becomes more resistant to a number of environmental factors from this period.

The highest percentage of generative tufts was recorded at 8 TsP and was 62.5%. Observations have shown that a high proportion of generative tufts in the cenopopulation (due to the seeds formed in them) does not always lead to a sharp increase in the number of young tufts. Most of the young shoots that develop from seed die during the growing season due to various factors (Figure 4.5). The smallest proportion of tubes in the g2- g3 stage was recorded at 9 TsP (39.39%).

Typically, the final conclusion about the ontogenetic structures of cenopopulations is based on their baseline or mean (if the number of studied cenopopulations is 10 or more) or the average value of real cenopopulations (if the number of cenopopulations is less than 10) and its structure is based on species biology. whether or not it conforms to the set spectrum type.

The mean value of ontogenetic structures of cenopopulations isolated from different ecological-geographical conditions was compared. The results show that the mean value of the ontogenetic structure is centralized and single-celled (the proportion of middle-aged generative tufts is high). The ontogenetic spectrum characteristic of the representatives of the category is centralized. This situation is also reflected in our research. The mean value of the ontogenetic spectrum is a full member, and the proportion of middle-aged generative tufts is 38.20% (Fig. 1.2).

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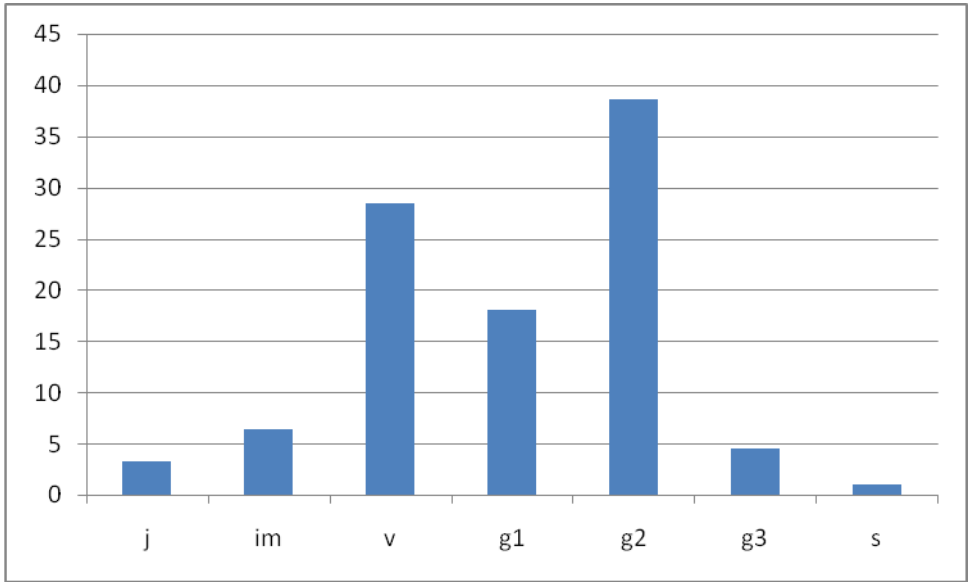

Figure 1.2. Mean value of ontogenetic structures of Spiraea hypericifolia cenopopulations

This, in turn, is due to the fact that this phase lasts longer than the other stages. It was followed by a large proportion of virginil-stage tufts (28.46%).

The high proportion of tufts at this stage is due to the fact that the virginil phase lasts longer than the juvenile and immature phases. Heavy rainfall and winds throughout the year prevent the free development of tuffs in the immature and juvenile stages. In addition, S. hypericifolia is a growth in a rocky-gravel environment, mainly among large boulders. The germination of tuple seeds is not always successful in such an environment.

During the study, the demographic indicators of S. hypericifolia in cenopopulations were analyzed. S. hypericifolia was not reported as dominant or subdominant in the reported cenopopulations. The number of tufts in cenopopulations is one of the main criteria in assessing their condition. During the study, the general and ecological density of the tufts in S. hypericifolia cenopopulations were studied.

Their number in cenopopulations ranged from 13 to 39. In cenopopulations, the density of the tufts was determined by the transect throwing method. In particular, the density of bushes per 1 m2 was 0.65-1.95, while their ecological density was in the range of 0.81-2.29.

The analysis of their recovery and aging indices is of great importance in assessing the demographic status of cenopopulations. The rate of species recovery is assessed by the proportion of generative tufts in cenopopulations (Glotov, 1998; Ishbirdin, 2004). The highest rate of species

recovery was recorded in cenopopulations 3 and 8, with species recovery rates ranging from 3 to 4.25. It was noted that the share of tufts in the generative stage in these xenopopulations, which are characteristic of the centralized spectrum, is around 75-80.95%.

It was noted that the recovery rate of cenopopulations 1 and 7 was 1.0. In macular cenopopulations characteristic of the left-sided ontogenetic spectrum, it was observed that the number of tufts in the generative period and in the generative period was equal (50%).

In all cenopopulations studied, the aging index is almost zero (0-0.3), due to the fact that most of the tufts die during the generative period (Table 1.2).

Table 1.2

Demographic indicators of spiraea hypericifolia cenopopulations

№SP	Density of tubes, $1m^2$	P_{ecol} , $1m^2$	Total number of tufts	$I_т$	$I_к$
1	0,8	1,06	16	1,0	0
2	0,65	0,81	13	2,25	0
3	1,05	1,23	21	4,25	0
4	1,35	1,68	27	0,68	0
5	1,95	2,29	39	1,71	0,02
6	1,45	1,81	29	2,11	0,03
7	0,7	0,82	14	1,0	0
8	1,2	1,5	24	3	0
9	1,65	1,94	33	1,36	0,03

Изох: P_{Ecol} – ecological density**,** $I_т$ – recovery index, $I_к$ – aging index

It is known that data on the types of S. hypericifolia cenopopulations are not recorded in the literature. During the study, types of cenopopulations were identified using the delta-omega classification [7] (Table 1.3).

Table 1.3

Type of S. hypericifolia cenopopulations

№SP	Delta (Δ)	Omega (ω)	Type of SP
1	0,27	0,64	It is being done
2	0,34	0,77	It is being done

3	0,36	0,82	Mature
4	0,22	0,56	age
5	0,33	0,67	It is being done
6	0,34	0,68	It is being done
7	0,28	0,63	It is being done
8	0,40	0,80	Mature
9	0,31	0,66	It is being done

Note: Δ – age coefficient, ω – efficiency coefficient.

According to Zhivotovsky's (2001) classification, tsenopopulations are divided into 6 types. The study of types of cenopopulations allows us to draw definite conclusions in the future on the distribution of special, rare and endangered plants in a particular area. The delta-omega classification, which indicates the age status of the tubers and its efficacy, indicates that the majority of cenopopulations (TsP 1, 2, 5, 6, 7, 9) are specific to the remaining type (TsP 3, 8) and age (TsP 4). . In these cenopopulations it was observed that the delta (Δ) is in the range of 0.22-0.40 omega (□) 0.56-0.80 (Figure 1.3).

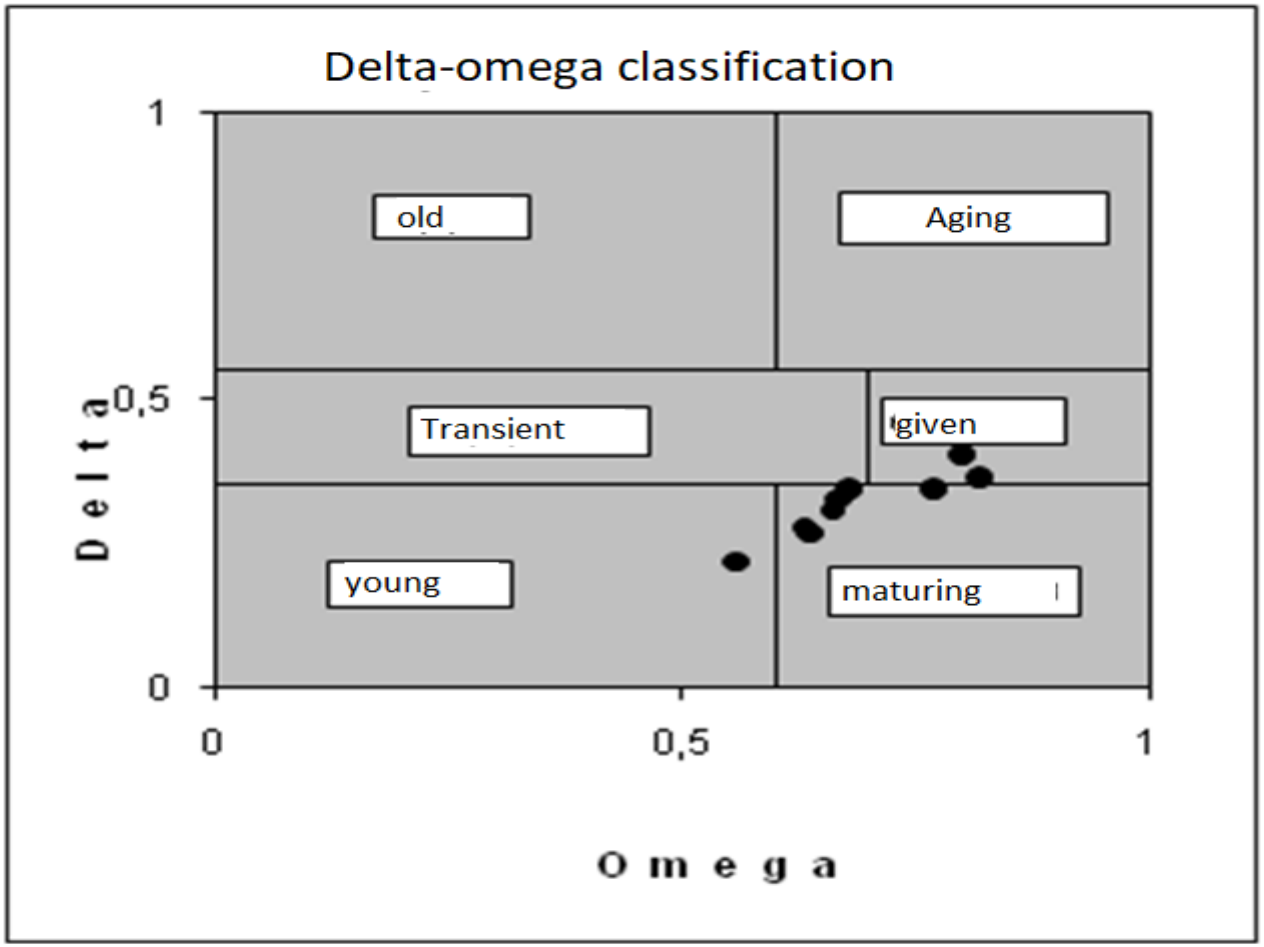

Figure 1.3 Type of S. hypericifolia cenopopulations

The research was conducted in different eco-phytocenotic conditions of the Turkestan mountain range. The results of the noted study suggest that the presence of S. hypericifolia as a dominant or subdominant in cenopopulations was not noted. The ontogenetic structure of the species suggests that most of the cenopopulations studied (TsP 1, 2, 3, 4, 7, 8) are incomplete members. Only 3 cenopopulations (TsP 5, 6, 9) are full members. This

condition also showed that the cenopopulations were not in a normal state. It was observed that 7 of the cenopopulations were specific to the given type (Figure 1.3).

Accurate presentation of the geographical coordinates of the studied TsPs will be important in future monitoring of these cenopopulations.

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