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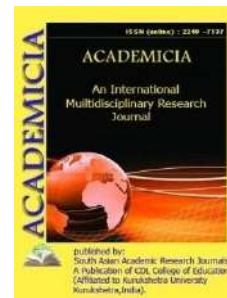
VISION

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**ONTOGENETIC STRATEGIES AND TACTICS BASED ON
 MORPHOMETRIC INDICATORS OF THE STRUCTURE OF LEAVES OF
 THE MEYER LEMON VARIETY**

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ABSTRACT

Currently, serious global environmental degradation, as well as an increased level of human impact on the environment, including flora biocenoses, directly affect the conservation and protection of biodiversity. In this context, it is important to evaluate the survival strategies of plant species dispersed in the Earth's biosphere when determining the degree of adaptation of species to the conditions of their growth environment. The paper claims that the Meyer lemon variety allows one to identify the mechanisms of species adaptation, the type of ontogenetic strategy based on the analysis of morphological indicators in the context of changing growth conditions and, on this basis, species of economic importance depending on the conditions of their cultivation. In the Meyer Lemon variety, survival tactics are defined as a divergent convergent type, in which morphometric indicators of leaf plasticity increase and then weaken under protective conditions.

KEYWORDS: *Biodiversity, Morphological Trait, Convergence, Divergence, Ontogenetic Tactics, Ontogenetic Strategy, Morphometric Index, Flexibility, Species, Flowering, Flowering Period, Leaf Blade, Leaf Shape Index, Meta-Measurement-Parameters.*

INTRODUCTION

In accordance with the morphological nature of plant species, the ontogenetic tactics of convergent, divergent, convergent-divergent and indefinite types differ based on the nature of the variability of adaptation to environmental conditions.

And also in many studies, plants are grouped according to the ontogenetic strategy of stress and protective stress. The ontogenetic stress strategy states that the morphological characteristics of the plant, including the morphometric parameters of the leaf structure, decrease with the deterioration of the growth environment. In this regard, it is noted that this feature is most often observed in succession of species.

The ontogenetic strategy of the protective-stress state establishes a state of stability on the basis of mechanisms aimed at maintaining the integrity of the morphometric parameters of plant leaves under the influence of growth factors.

The ontogenetic strategies of plants are estimated based on morphological indicators by calculating the xenopopulation status index (IVC) and the values of the coefficient of determination of morphometric characteristics (R^2_m).

It is noted that the analysis of the morphological characteristics of plant species in changing environmental conditions allows us to identify the mechanisms of species adaptation, the type of ontogenetic strategy, and, on this basis, to identify commercial species depending on the conditions of their cultivation.

It was also found that the morphometric characteristics of the leaf structure with respect to other plant morphometric parameters reflect a correlation between changes in growth conditions, including the content of humus in the soil. In this regard, it is argued that, based on a study of the morphological characteristics of the leaf structure, an assessment of the state of the plant and its environmental conditions can be considered a relatively adequate method.

It was noted that the influence of growth factors on the ecological and biological characteristics of plant species, as well as the stability of plant species in an anthropogenic environment, endurance characteristics, tactics and survival strategies, as well as xenopopulation characteristics directly provide important information on biological diversity.

THE MAIN FINDINGS AND RESULTS

The research samples were planted in 1985 in a large unheated trench of the central experimental section of the Academician Mahmud Mirzaev Research Institute of Horticulture, Viticulture and Winemaking. The width of the trench is 6 meters, the height is 5 meters, the sidewalls are reinforced concrete, the length is 100 meters, with a steel frame and in winter covered with polyethylene. The trees were planted at a distance of 1 meter from the wall, 2 meters between the rows, 3 meters between the bushes and 3 rows of planted lemon Meyer. The study was conducted on the basis of the "Methodology and program for the study of varieties of fruits, berries and nuts" developed by the All-Russian Research Institute of Fruit Crops (2).

Phenological observations of this variety were carried out in 2015-2019. A variety of Meyer lemons, an average of four years, shows that the branches have three growth periods per year. The first growth period and shoots were recorded on March 14, and the appearance of flowers on April 20. The beginning of the flowering period was observed on May 14, and the flowering

period ended on June 4 with a duration of 22 days. Lemon is nectar and pollen for bees. The flowers are yellowish pink, very fragrant, and bees can collect 0.8-1.9 mg of flowers per 1 flower. Because lemons can bloom 2-3 times a year, they can provide pollen during a nutrient deficiency for bees. In turn, bees increase the yield of lemons by 20-30%.

The beginning of the second growth period of branches was observed on June 1, and the end of the second growth period on June 20. The third ripening period began on August 15, and on September 8 it turned out to be the third. The total length of the annual branches is 35 cm during the growing season. The number of branches per year was 74. Maturation began on October 30 (Fig. 1).

Common biometric tree parameters have also been identified. At the same time, using a measuring tape, the trunk of a lemon tree (horn) was measured in height (calculations were carried out with an error of 1 cm). The rotation of the upper part of the seedlings was determined using a Stengent Circulus.

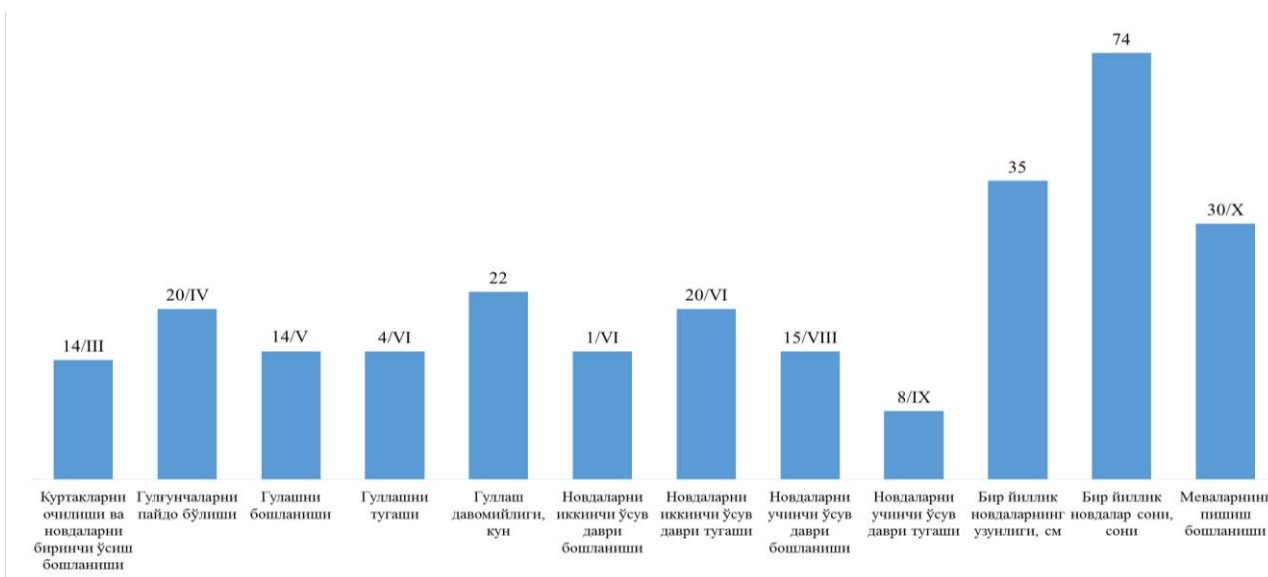
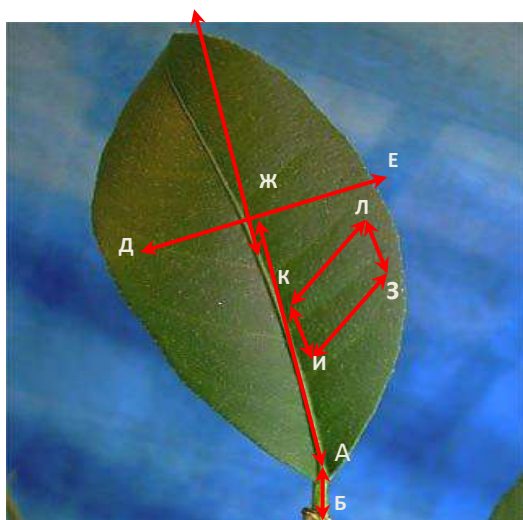


Figure 1. Phenological phases of Meyer lemon variety

Based on the results, it was found that the average height of the Meyer lemon variety is 2-2.5 meters, and 8 indicators of the morphological formation of the leaf structure were studied. These include sheet length (AB), sheet length (AV), sheet width (DE), distance from the end of the sheet to the widest part of the sheet (VJ), sheet value index (VJ / AV), sheet sheet. The index value (IZ) represents the length value (IK) between the left and right leaf veins, as well as the distance (ZL) between the dichotomous points of the leaf veins that are adjacent to each other. These morphometric measurements were performed using the method described in R.Rahmangulov [7].



Morphometric indicators of the structure of lemon leaves (*Citrus L.*)

To measure meta-measurement parameters, it consists of two mixed vessels and is calculated as a module with the distance from the base of the base to the dichotomy point.

The values of the morphometric index of the leaves of the variety Meyer lemon ($M \pm m$)

№	Барг морфометрик кўрсаткичлари	Иссиқхона шароитида ўстирилувчи
		ЛИМОН НАВИ «Мейер»
1	Барг банди узунлиги (мм)	$5,3 \pm 0,2$
2	Барг пластинкаси узунлиги (мм)	$87,5 \pm 2,2$
3	Барг пластинкаси кенглиги (мм)	$42 \pm 1,3$
4	Барг учки қисмидан барг пластинкасининг энг кенгайган қисмигача бўлган масофа (мм)	$37,5 \pm 1,2$
5	Барг шакли индекси қиймати	$5,37 \pm 0,2$
6	Барг пластинкаси индекси қиймати	$4,22 \pm 0,3$
7	Чап ва ўнг барг томирлари ўртасидаги узунлик қиймати (мм)	$5,31 \pm 0,4$
8	Ўзаро қўшни ҳолатда жойлашган барг томирлари дихотомик нукталари масофаси (мм)	$5,2 \pm 0,2$

The average length of the leaf blade of the Meyer lemon variety was 87.5 ± 0.7 mm, and the width of the leaf blade was 42 ± 0.9 mm.

In the Meyer lemon variety, survival tactics are diverging - converging, with morphometric properties of leaf plastic that increase with worsening conditions and then increase protection.

Stress components in the ontogenetic strategy were also recorded in all studied lemon varieties. That is, when the growth conditions worsen, the value of the degree of morphological integrity of

the leaf blade structure of lemon varieties generally decreases. At the same time, a decrease in the leaf morphology index by an average of 0.55-0.16% was found for the studied lemon varieties.

The results of biometric measurements of the Meyer lemon variety are shown in the table below.

General biometric indicators of the Meyer lemon tree

№	Дарахт баландлиги (см)	Дарахт танаси диаметри (см)	Ён новдалари диаметри (см)	
			Биринчи тартибдаги	Иккинчи тартибдаги
1	230,4	3,56	1,5	0,7
2	174,2	6,8	3,2	1,8
3	334,5	4,13	2,2	0,5
4	312	8,43	4,3	0,8
5	290,2	5,7	2,5	1,1
6	255,8	3,62	1,4	1,3
7	265	4,5	2,6	0,6
8	284	7,6	1,8	1,2
9	260,3	4,5	2,6	1,5
10	312	7,1	2,17	1,9
Ўртача	271,84±26,3	5,59±0,6	2,42±0,2	1,14±0,1

This lemon variety blooms May 14 throughout the year. Small flowers are white and bloom earlier than other varieties. In our study, Meyer fruits were noted in various forms, including elongated, round or pearl forms. It was noted that 10 fruits collected from the Meyer lemon variety weigh 93.2 grams. The fruit shell is smooth, 1.9-2.7 mm thick, orange in color, fragrant. The flesh is sour. It is estimated that an average of 6 to 10 seeds are present. In the trench of the Academician Mahmud Mirzayev Research Institute of Horticulture, Viticulture and Wine, located in the Zangiata district of the Tashkent region, it was discovered that the fruits of the Meyer lemon variety will ripen in October.

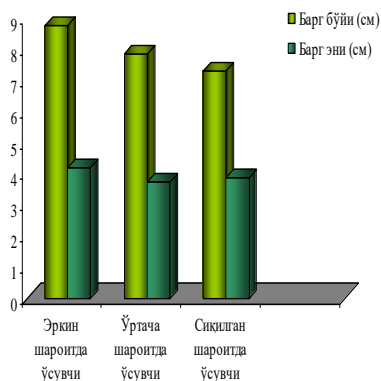
The following table provides morphometric measurements of the height and width of the leaves of the Meyer lemon variety grown in the trench.

Morphometric indicators of the leaves of the Meyer variety, grown under different conditions in lemons at the R.R.Schroeder Research Institute of Horticulture, Viticulture and Winemaking

№	Яхши шароитда (эркин ҳолатда) ўсувчи		Ўртача шароитда ўсувчи		Ёмон шароитда (сиқилган ҳолатда) ўсувчи	
	Барг пластинкаси бўйи (см)	Барг пластинкаси эни (см)	Барг пластинкаси бўйи (см)	Барг пластинкаси эни (см)	Барг пластинкаси бўйи (см)	Барг пластинкаси эни (см)
1	11,5	6	12	5,8	9,5	5
2	11,2	5,8	11,5	5,5	9,4	5
3	11	5,8	11,2	5,3	9,3	5,9

4	11	5,5	11	5,5	9	5,5
5	10,9	5,5	10,8	5	9	5,2
6	10,8	5,4	10,5	4,8	8,8	5
7	10,7	5,3	10,2	4,9	8,5	4,8
8	10,5	5,2	10	4,6	8,2	4,5
9	10,3	5	9,8	4,5	8	4,2
10	10,1	4,8	9,5	4,4	8	4
11	10	4,6	9	4,5	7,8	4
12	10	4,5	8,5	4,2	7,8	3,9
13	9,8	4,6	8	4,1	7,7	3,9
14	9,5	4,8	8	4	7,6	3,9
15	9	4,6	7,8	3,9	7,5	3,9
16	8,9	4,4	7,5	3,6	7,4	3,8
17	8,6	4,5	7,4	3,5	7,2	3,7
18	8,4	4,2	7,2	3,2	7	3,6
19	8,2	3,9	7	3,5	6,9	3,5
20	7,9	3,8	6,8	3,3	6,7	3,4
21	7,6	3,5	6,5	3,2	6,6	3,3
22	7,4	3,4	6	3	6,4	3,2
23	7	3	5,8	2,8	6,2	3,1
24	6,8	2,8	5,4	2,6	6	3
25	6,5	2,5	5	2,5	5,9	2,8
26	6,2	2,2	4,8	2,5	5,8	2,7
27	6,1	3	4,5	2	5,6	2,6
28	5,8	2,5	4	1,9	5,5	2,5
29	5,6	2,5	3	1,5	5	3,5
30	5	2,4	3,5	1,5	4,5	3
Ўрт.	8,75±0,9	4,2±0,3	7,85±0,7	3,72±0,2	7,29±0,7	3,88±0,4

The diagram below shows the average (n = 30) morphometric measurements of the Meyer lemon variety by height and width of the leaf.



The average morphometric size (n = 30) of the Meyer Lemon variety in height and width.

Cases of an ontogenetic strategy have been identified for the general and individual components of the structure of the morphological formation of the value of the elastic potential of the leaf of the Meyer lemon variety. Through the concept of ontogenetic strategies, changes in growth (stress) conditions are represented by legitimate changes in the morphological parameters of the leaf structure. In particular, there are four types of ontogenetic strategies for lemon plants:

1. Protective strategy - Under the influence of a stress factor, the coordination of the plant improves, that is, the structure of the leaf seeks to maintain its morphological integrity. As a result, the sheet remains in its proper condition. This indicates increased coordination in the plant.

2. Stress strategy - when the reaction to stress increases, the coordination of plant development slows down, which means that the morphological integrity of the structure of the leaves of the plant decreases. As a result, the size of the leaves of the plant decreases.

3. Protective stress strategy – when the response to stress increases, the morphological integrity of the leaf structure increases and then decreases.

4. However, in a stress protection strategy, the morphological integrity of the leaf structure decreases and then increases with increasing stress factor.

The ontogenetic approach represents the direction (CV – coefficient of variation) of the morphological features of the leaf structure towards differences in growth and development in the event of deterioration of plant growth conditions.

Yu. Zlobin [13] described four ontogenetic tactics with the most probable possibilities, including:

- 1) stabilization tactics (when character variation stabilizes);
- 2) convergence tactics (character variation is reduced);
- 3) divergence tactics (increase character variation);
- 4) Tactics of uncertain variability (indicators are changed in an uncertain direction).

CONCLUSION

The xenopopulation population status index index (IVC) was used to assess xenopopulation viability.

In the Meyer lemon variety, the survival tactics are different - it converges, the morphometric values of leaf plasticity increase with the deterioration of environmental conditions, and then the protection increases.

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