



GROWTH AND DEVELOPMENT CHARACTERISTICS OF WEIGELA FLORIDA AT DIFFERENT ONTOGENETIC STAGES UNDER THE CLIMATIC CONDITIONS OF THE ANDIJAN REGION

Jalolov Komiljon Baxromovich
Andijan Branch of Turon University
Email: komiljon.jalolov.1987@gmail.com

Abstract

This article analyzes the introduction history of *Weigela florida* and the characteristics of its growth and development at different ontogenetic stages under the climatic conditions of the Andijan region. The study examines the dynamics of the vegetation period, including the onset of vegetation, the phase of active growth, leaf formation and their morphometric parameters, as well as leaf fall processes. In addition, scientific data on the morphological features of the root system, the stages of budding and flowering, fruit formation, and ripening are presented.

Based on the obtained results, the adaptive characteristics of the species to local climatic conditions are evaluated, and the prospects for its use in landscaping are substantiated.

Keywords – *Weigela florida*, ontogenesis, growth and development, introduction, adaptation, landscaping, latent stage, virginal stage, generative stage.

Аннотация

В данной статье проанализированы история интродукции вида *Weigela florida*, а также особенности роста и развития на различных этапах онтогенеза в климатических условиях Андижанской области. В исследовании рассмотрена динамика вегетационного периода растения,



включая начало вегетации, фазу интенсивного роста, формирование листьев и их морфометрические показатели, а также процессы листопада. Кроме того, приведены научные данные о морфологических особенностях корневой системы, фазах бутонизации и цветения, формировании плодов и их созревании.

На основе полученных результатов дана оценка адаптационных особенностей вида к местным климатическим условиям и обоснованы перспективы его использования в озеленении.

Ключевые слова – *Weigela florida*, онтогенез, рост и развитие, интродукция, адаптация, озеленение, латентная стадия, виргинильная стадия, генеративная стадия.

АНДИЖОН ВИЛОЯТИ ИҚЛИМ ШАРОИТИДА WEIGELA FLORIDA БУТАСИ ОНТОГЕНЕЗИНИНГ ТУРЛИ ФАЗАЛАРИДА ЎСИШ ВА РИВОЖЛАНИШ ХУСУСИЯТЛАРИ

Аннотация

Ушбу мақолада *Weigela florida* турининг интродукция тарихи ҳамда Андижон вилояти иқлим шароитида онтогенезининг турли босқичларида ўсиш ва ривожланиш хусусиятлари таҳлил қилинган. Тадқиқотда ўсимликнинг вегетация даври динамикаси, жумладан вегетациянинг бошланиши, интенсив ўсиш босқичи, барглarning шаклланиши ва морфометрик кўрсаткичлари, уларнинг тўкилиши жараёнлари ўрганилган. Шунингдек, илдиз тизимининг морфологик хусусиятлари, ғунчалаш ва гуллаш фазалари, мева ҳосил бўлиши ҳамда уларнинг пишиб етилиши жараёнлари бўйича илмий маълумотлар келтирилган.

Олинган натижалар асосида турнинг маҳаллий иқлим шароитига адаптация хусусиятлари баҳоланган ҳамда уни кўкаламзорлаштиришда қўллаш истиқболлари асослаб берилган.

Калит сўзлар: *Weigela florida*, онтогенез, ўсиш ва ривожланиш, интродукция, адаптация, кўкаламзорлаштириш, латент, виргинил, генератив босқичлар.



Introduction

Since ancient times, humans have utilized plant resources for various purposes, including food, medicinal use, and ornamental applications. Over time, plant species considered valuable have been introduced to different geographical regions and adapted to new climatic conditions. One such ornamental plant is *Weigela florida*, which is widely appreciated for its декоратив qualities and long flowering period, making it important in landscaping practices. Studying the ontogenetic stages of this species during its adaptation to new environmental conditions has significant scientific and practical importance.

Observation of growth and development stages during plant ontogenesis allows for a comprehensive understanding of their biological characteristics, adaptability to environmental conditions, and reproductive potential. In particular, during the growth phase, an increase in the quantitative development of vegetative organs is observed, whereas during the development phase, qualitative changes and structural improvements occur. In introduced ornamental shrubs such as *Weigela florida*, incomplete progression or weakening of certain ontogenetic stages may limit their large-scale propagation and stable cultivation.

Therefore, studying the growth and development characteristics of *Weigela florida* under the climatic conditions of the Andijan region is considered an important scientific task.

Literature Review

Weigela florida is a perennial ornamental shrub belonging to the Caprifoliaceae family. According to scientific literature, its natural distribution area covers East Asia, including China, Korea, and Japan. In these regions, the species occurs as part of the native flora and has later been widely introduced into ornamental horticulture worldwide due to its high decorative value.

Numerous studies highlight the significant ornamental qualities of *Weigela florida*, particularly its prolonged and abundant flowering period, as well as its relative resistance to various environmental factors. According to several sources, species of the genus *Weigela* were introduced to Europe in the 19th century and subsequently spread to other regions through botanical gardens. This has led to



its recognition as an important subject in studies of plant introduction and acclimatization.

In Central Asia, including Uzbekistan, *Weigela florida* has also been introduced for ornamental landscaping purposes. Scientific reports indicate that the species was initially tested in botanical gardens and experimental plots. The results of these studies show that the plant demonstrates a moderate level of adaptability to local climatic conditions.

However, literature sources also note that low winter temperatures and hot, dry summer conditions may negatively affect the growth and development dynamics of *Weigela florida*. In particular, extreme climatic conditions can limit the formation of generative organs and the full maturation of seeds.

Thus, the analysis of available scientific literature indicates that studying the ontogenetic stages of *Weigela florida* under specific regional conditions, particularly in the Andijan region, is of considerable scientific and practical importance. Such studies provide a basis for evaluating the adaptive potential of the species and for its effective use in landscaping.

Materials and Methods

The research was conducted in the nursery of ornamental plants belonging to the Andijan branch of Turon University.

During the study, *Weigela florida* was investigated over the period of 2024–2026, and the presented data tables were compiled based on two years of observations. Ontogenetic stages were studied according to the method of F.N. Rusanov [8], with observations carried out at intervals of every 3–5 days. In each replication, 10 plants were examined, with a total of four replications.

Phenological observations and the study of biometric parameters were conducted using the method of I.N. Baydeman [1]. In this process, both vegetative and generative phases were recorded. During the vegetative period, the onset of growth, active growth phase, leaf emergence, their size, and leaf fall were observed. During the generative period, plant height growth, budding, flowering, fruit formation, and their maturation were systematically monitored.

The obtained data were processed using the statistical method proposed by D.A. Dospekhov [3].



Results and Discussion

In the experiment, seeds of *Weigela florida* were sown under both laboratory and field conditions, and the ontogenetic stages of the plants were studied.

During the generative stage, fruit formation in *Weigela florida* is represented by a dry, capsule-type fruit. The fruit is typically a bilocular capsule rather than a legume. Its average length ranges from 1.5 to 2.5 cm and contains numerous small seeds. Each fruit may produce approximately 80–120 seeds. Upon maturation, the capsule dries and splits into two valves, releasing the seeds into the surrounding environment.

The ontogenetic stages of the plant were classified into latent (se), virginal (v), and generative (g) periods. During the latent stage, it was determined that seeds of *Weigela florida* can retain their viability for 1–3 years under appropriate storage conditions. The seeds are small, oval in shape, and vary in color from light brown to dark brown. The seed coat is relatively hard, which contributes to the slow germination process under natural conditions.

Observations revealed that germination rates under natural conditions are relatively low, and in some cases, the hard seed coat acts as a mechanical barrier, limiting embryo development. Therefore, in laboratory conditions, the application of seed pretreatment methods such as stratification or short-term soaking in warm water significantly accelerated seed swelling and increased germination rates.

For laboratory experiments, 100 seeds were selected and sown in Petri dishes filled with sterilized river sand, with four replications conducted. As a result, the germination percentage and seedling development dynamics were recorded. The obtained data indicate that while *Weigela florida* seeds exhibit relatively low germination under natural conditions, their germination capacity significantly improves under optimal agrotechnical treatments.

Results and Discussion (continued)

The ontogenetic development of *Weigela florida* during the virginal period was studied by dividing it into four stages: p — seedling, j — juvenile, im — immature, and v — virginal stages.



p – stage (seedling stage).

Under laboratory conditions, seeds of *Weigela florida* sown in Petri dishes began to germinate on the 5th day at a temperature regime of 25°C. By the 8th day, all physiologically viable seeds had germinated. The overall germination rate averaged 86%, indicating a high level of viability under controlled conditions.

In contrast, seeds sown under field conditions exhibited slightly lower germination rates due to the influence of environmental factors such as temperature fluctuations, unstable moisture levels, and the mechanical composition of the substrate. Under these conditions, germination averaged 78–80%. This demonstrates that seeds of *Weigela florida* are sensitive to environmental factors during the initial ontogenetic stages.

Table 1 Germination rate of seeds under laboratory conditions (%)

№	Replications	Sowing date	13.03.2025	14.03.2025	15.03.2025	16.03.2025	17.03.2025	18.03.2025	19.03.2025
1	I Replication	09.03. 2025 y	40	50	60	70	70	75	83
2	II Replication		-	-	30	60	70	80	85
3	III Replication		-	-	40	50	80	80	87
4	IV Replication		10	30	60	80	90	90	91

Seedlings of *Weigela florida* can be sown under field conditions during both autumn and spring seasons throughout ontogenesis. In autumn sowing, seeds are typically placed into the soil without any предварительное treatment. In contrast, for spring sowing, seeds are предварительно soaked in warm water to enhance germination. This agrotechnical method softens the seed coat and accelerates the germination process.

In spring, depending on climatic conditions, the optimal sowing period for *Weigela florida* ranges from the second half of March to the first half of April. Under these conditions, seeds germinate within 7–8 days, breaking through the seed coat and emerging above the soil surface. During the initial stage of development, cotyledons appear whitish in color, but within 2–3 days they turn light green due to активация of chlorophyll synthesis.



Morphologically, cotyledons are elliptical or ovate in shape, with an average length of 1.5–1.9 cm and a width of 1.0–1.5 cm. This stage represents the transition of the plant to autotrophic nutrition.

j – stage (juvenile stage).

By mid-April, the formation of the first true leaves is observed in *Weigela florida* seedlings. The first true leaves reach an average length of about 3.5 cm and consist of 9–10 leaflets. Subsequent leaves develop a more complex structure, reaching up to 4.5 cm in length and comprising 30–32 lateral leaflets.

During ontogenesis, leaves progressively increase in size from the lower to upper parts of the plant, accompanied by an increase in the number of leaflets. Cotyledons begin to yellow at the edges by mid-April and gradually abscise. The total duration of the juvenile stage in *Weigela florida* averages 40–45 days.

im – stage (immature stage).

By mid-July, seedlings of *Weigela florida* exhibit intensive vegetative growth. During this period, the stem length reaches an average of 90–100 cm, while the number of compound leaves increases to approximately 70–80. As a result of the актив development of vegetative organs, second-order lateral branches are formed. This contributes to the expansion of plant biomass in both horizontal and vertical directions.

v – stage (virginal stage).

At this stage, the primary root system deepens, and second-order lateral roots develop intensively. The improvement of root architecture enhances the plant's ability to absorb water and mineral nutrients, thereby providing a physiological basis for the transition to the generative stage.

g – stage (generative stage).

In *Weigela florida*, intensive growth is observed during the early years of development. It was found that the majority of planted seedlings entered the generative phase already in the first year. The generative shoot is formed at the



apical meristem of the stem, which leads to the cessation of apical growth, while further development continues through the elongation of lateral shoots.

The budding stage was observed at the end of June, and flowering began in mid-July. The period from bud formation to full flower development averaged 14–15 days. Inflorescences are dense and develop in a pyramidal form. The flowers are yellow in color, with red stamens extending beyond the corolla, which enhances the ornamental value of the species.

The flowering period continues until the onset of cold weather. Seeds formed during the main flowering period reach full maturity; however, in flowers that open in late autumn, incomplete seed maturation may occur.

By the end of the first vegetation year, seedlings of *Weigela florida* reach an average height of 120–130 cm. The root collar diameter ranges from 0.7 to 1.2 cm, the total root system length is 90–100 cm, and the primary root length is 25–35 cm. These показатели indicate that the species possesses a relatively stable adaptive capacity under local climatic conditions.

Conclusions

Based on the conducted observations and analyses, it was established that the ontogenetic stages of *Weigela florida* seedlings proceed consistently and relatively stably under the climatic conditions of the Andijan region. The germination rates under laboratory and field conditions differed, with higher values recorded under laboratory conditions. This confirms the significant influence of environmental factors on the early stages of plant development.

During the virginal period, intensive development of both root and aboveground organs was observed, accompanied by the formation of morphological structures. In the immature stage, enhanced vegetative growth, formation of lateral branches, and increased biomass accumulation were recorded. In the virginal stage, deepening of the root system and development of lateral roots significantly improved the plant's ecological adaptability.

The early onset of the generative phase demonstrated that *Weigela florida* possesses a high biological potential. Budding, flowering, and fruit formation processes occurred within a relatively short period, confirming the high ornamental value of the species. However, incomplete seed maturation under late



autumn conditions indicates that reproductive processes are strongly influenced by climatic factors.

Overall, the obtained results confirm that *Weigela florida* exhibits a moderate level of adaptation to the conditions of the Andijan region, with stable vegetative and generative development. This indicates that the species is promising for use in landscaping and ornamental horticulture.

References

1. Bean W.J. Trees and Shrubs Hardy in the British Isles. – London: John Murray, 1970. – 900 p.
2. Dirr M.A. Manual of Woody Landscape Plants. – Champaign: Stipes Publishing, 2009. – 1325 p.
3. Huxley A. The New RHS Dictionary of Gardening. – London: Macmillan, 1992. – 3500 p.
4. Krüssmann G. Manual of Cultivated Broad-Leaved Trees and Shrubs. – Berlin: Paul Parey, 1984. – 442 p.
5. Rehder A. Manual of Cultivated Trees and Shrubs. – New York: Macmillan, 1949. – 996 p.
6. Sokolov S.Ya. et al. Woody Plants of the USSR. – Leningrad: Nauka, 1977. – 500 p.
7. Бейдеман И.Н. Изучение фенологии растений// Полевая геоботаника.М.; Л.;1960, Т.2.С. 333-336.
8. Доспехов Б.А. Методика полевого опыта (с основами статической обработки результатов исследований). 5 – е изд., доп. И перераб. М.: Агропромиздат, 1985. – 351 с.
9. Ёзиев Л.Х. Интродукция древесных растений Ирано-Туранской флористической области в условиях Южного Узбекистана. АН Руз. 1986 г. № 1, с. 53–55.
10. Ибрагимов А.И. Манзарали ўсимликлар биологияси ва интродукцияси. – Тошкент: Университет, 2015. – 210 б.
11. Русанов Ф.Н. Еще об основных понятиях интродукции растений// Бюл. Глав. ботан. Сада. Фып.67. 1967, С 3-8.
12. Ўзбекистон Республикаси Флораси. Т. 6. – Тошкент: Фан, 1963. – 400 б.