Morpho-biological features of growth and development of golden currant in Tashkent province, Uzbekistan

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Abstract. This scientific article presents the results of a study on the growth and development of varieties of golden currant in order to identify the most promising for cultivation in the conditions of the Tashkent region. Studies have established that, according to the development of shoots in the above-ground part, the varieties Uzbekistanskaya large-fruited and Elixir differ in vigorous growth, in which the height of the bushes by the end of the second year of vegetation reached 109.7-112.5, and in other varieties this figure was in the range of 88.2-97.5 cm. Of the tested varieties of golden currant, the earliest onset of the flowering phase was observed in the Venera variety - March 23, in the rest a little later. The variety of golden currant Rukhshona had the latest start of flowering, in which this phase occurred on March 26, that is, four days later. In the Uzbekistan large-fruited variety, the completion of the flowering phase occurred five days later than in the Uzbek sweet variety. Of the varieties of golden currant, the phase of complete set of berries was observed most intensively within 30 days in the variety Venera. In the Elixir variety, the full set of berries ended two days later, and in the rest within 34-36 days.
Keywords. Berry, growth, development, shoots, flowering, set, variety, assortment, buds, bush, aerial part.

1 Introduction

Golden currant (*Ribes aureum*) holds significant botanical and horticultural importance due to its ornamental value, high nutritional content, and potential pharmaceutical applications. As a deciduous shrub native to North America, golden currant has garnered increasing attention in recent years for its diverse attributes, making it a subject of interest for researchers and horticulturists alike [1, 2].

The growth and development of golden currant encompass a multitude of morpho-biological aspects, influenced by various intrinsic and extrinsic factors [3]. Understanding the intricacies of its growth patterns, vegetative and reproductive development, as well as environmental responses, is essential for optimizing cultivation practices, enhancing its productivity, and exploring its broader potential in various industries [4-6].

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This manuscript aims to provide a comprehensive exploration of the morpho-biological features of golden currant. By delving into the mechanisms governing its growth and development, we seek to shed light on the underlying physiological processes, responses to environmental stimuli, and genetic factors that govern its unique characteristics [7, 8]. Moreover, we endeavor to establish the implications of these insights for horticultural practices, sustainable agriculture, and potential applications in functional foods and medicine.

Golden currant (*Ribes aureum L.*) is a valuable fruit crop with a high quality source of biologically active substances. Regular consumption of golden currant berries by a person serves as a prevention of metabolic disorders, sclerosis, diseases of the cardiovascular system and respiratory viral infections of the respiratory system [9, 10]. Currant berries in their composition contain various organic acids, 8.16-12.29% sugar, 0.73 mg% provitamin A, pectin - 2.84%, mineral salts, tannins and many vitamins that have a beneficial effect on human life [11].

Recently, special attention has been paid to the development of fruit growing in the republic, increasing the range and volume of exports, and the gradual transfer of low-efficient extensive orchards to intensive berry orchards [12, 13]. In this direction, the range of berry crops in the republic is expanding in order to create currant berry plantations.

2 Materials and methods

The experiments were carried out according to the methodology developed in the Department of Fruit and Vegetable Growing and Viticulture. Research on the chosen topic was carried out at the training and experimental station of the “Information and Consulting Center” (Extension center) at the Tashkent State Agrarian University.

As an object of study, five varieties of currants were used - Venera, Rukhshona, Uzbekistan large-fruited, Elixir and Uzbek sweet. Varieties of golden currant on the experimental plot were planted according to the scheme of 2.5x1.0 meters [14, 15].

During the study period, the growth and development of plants were controlled by phenological observations of their passage through the main phases of vegetation, as well as by biometric measurements of the growth of the main structural parts of the aerial part. Experiments on the variety study of golden currant were carried out using the “Program and methodology for the variety study of fruit, berry and nut crops” and “Programs and methods for breeding fruit, berry and nut crops”, “Method of calculations and phenological observations in experiments with fruit and berry plants”, and “Methodology of accounting and observations in experiments with fruit and berry crops” [3, 5, 7].

3 Results and discussion

Currant is a perennial shrub, and this year it began to bloom in the third decade of March. In early spring, pure nitrogen and phosphorus fertilizers are applied under the bushes, row-spacing is plowed to a depth of 25-30 cm, the area around the bush is softened and should be watered during the flowering period.

Golden currant blooms for 10-30 days in April. The flowers are formed in dense, curved, cone-shaped inflorescences. The fruits are round, of different sizes, their length is preserved. The color of the fruit can be orange, brown, and black. The fruits do not ripen at the same time, ripe fruits remain on the bush for a long time, and some varieties do not ripen until August. The flowers are small, tubular, golden yellow, with a strong spicy smell reminiscent of cinnamon [2, 4, 6].

Studies have shown that the intensity of flowering and the setting of berries are directly

dependent on the varietal characteristics of plants. Of the varieties of golden currant, the phase of the beginning of flowering in the variety Venera, compared with other varieties of the collection, occurred on March 23, that is, one or two days earlier than in other varieties.

The intensity of the flowering phase was also observed in correlation with the varietal characteristics of plants. For example, in the Venera variety, the mass flowering phase of 75% occurred on April 10, in the Uzbek sweet variety on April 20, that is, 10 days later, which is five days in comparison with the Uzbek large-fruited variant (Table 1).

Table 1. Intensity of flowering varieties of golden currant, 2022.

Varieties	Beginning of flowering	Bloom intensity					
		after bud break, days	25% color, date	after bud break, days	50% color, date	after bud break, days	75% color, date
Uzbekistan large-fruited	24/III	8	30/III	16	7/IV	24	15/IV
Venera	23/III	8	26/III	15	2/IV	23	10/IV
Uzbek sweet	25/III	8	30/III	19	10/IV	29	20/IV
Rukhshona	26/III	7	29/III	17	7/IV	27	17/IV
Elixir	25/III	9	28/III	19	7/IV	27	15/IV

The set of golden currant berries is one of the main factors in the productivity of varieties. Golden currant is practically a self-fertile plant (on average no more than 15%), and in order to set berries, cross-pollination is necessary. That is why, in order to obtain a good harvest, it is inapplicable to grow several varieties at once. When self-pollinated, the ovaries fall off.

From the studied varieties of golden currant in the conditions of the Tashkent region The earliest and most intense berry set was observed in the Venera variety, where the berry set phase ended by April 18. And in the Uzbek sweet variety, a later setting of berries was observed. In addition, they had a longer period of berry infestation, which ended on April 25, that is, seven days longer than that of the Venera variety (Table 2).

Table 2. Intensity of the set of berries of golden currant varieties, 2022.

Varieties	Beginning of flowering	Berry set					
		From the beginning of flowering, days	25% berry set, date	From the beginning of flowering, days	50% berry set, date	From the beginning of flowering, days	75% berry set, date
Uzbekistan large-fruited	24/III	25	18/IV	27	20/IV	31	24/IV

Venera	23/III	18	10/IV	23	15/IV	26	18/IV
Uzbek sweet	25/III	21	15/IV	26	20/IV	31	25/IV
Rukhshona	26/III	22	17/IV	26	20/IV	28	22/IV
Elixir	25/III	23	17/IV	24	18/IV	26	20/IV

Golden currant is a powerful upright tall, deciduous shrub, up to 2-3 meters tall. It has a rounded, beautiful crown. Plants can have different shapes: compact, slightly spreading and sprawling, and therefore it is often formed in the form of a small shrub-tree. In this case, the plant is well lit.

A bush of golden currant is formed from numerous basal shoots of renewal, which are formed from underground adventitious buds on a long rhizome and consists of 15-20 branches of different ages. From adventitious buds on the roots, shoots are formed. The shoots of the golden currant are thick, straight, without thorns. In terms of growth strength and longevity of branches (8-10 years), it significantly exceeds black and red currants.

Uzbekistan large-fruited varieties stood out , in which this growth parameter reached 117.5 and 119.7 cm. The intermediate position was occupied by the varieties Venera (97.5 cm) and Rukhshon (88.2 cm). C ort Uzbekskaya sweet was less tall with a height (85.5 cm) of the aerial part (Table 3).

Table 3. Growth of the vegetative part of plants of golden currant varieties, 2022.

Varieties	**The height of the main shoot, cm**	**The number of side shoots in the bush, pcs**	**Total length of lateral shoots, cm**	**Number of internodes on the central shoot, pcs**	**The length of the internodes of the central shoot, cm**
Uzbekistan large-fruited	119.7	9.5	516.3	12.0	5.0
Venera	97.5	9.0	465.0	10.5	3.4
Uzbek sweet	85.5	9.5	462.5	9.5	3.0
Rukhshona	88.2	7.25	132.3	9.5	4.9
Elixir	117.5	10.25	547.5	9.5	3.5

4 Conclusions

1. According to the development of shoots in the aerial part, variety an Uzbekistan large-fruited and Elixir, in which the height of the bushes by the end of the second year of vegetation reached 119.7-117.5 cm.

2. Of the tested varieties of golden currant, the earliest onset of the flowering phase was observed in the variety Venera - March 23.

3. The phase of mass flowering (75%), as well as its beginning, occurred the earliest and most intensively in the Venera variety, 10 days later in the Uzbek sweet variety.

4. V grade an Uzbekistan large-fruited, the completion of the phase of mass flowering (75%) occurred five days later than in the variety Uzbekskaya sweet.

5. Of the varieties of golden currant, the phase of complete set of berries was observed most intensively within 30 days in the variety Venera.

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