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FLOWERING BIOLOGY, FRUIT AND SEED MATURATION OF *HYPERICUM PERFORATUM* L

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Pharmaceutic properties and season characteristics of development Hypericum perforatum l Mustanov S.B. Samarkand State University of Veterinary Medicine, Animal Husbandry and Biotechnology, Mirzo Ulugbek street 77 house, Uzbekistan. Email: Maloxat_ begmatova @ mail.ru

Abstract

There is a high demand for raw materials of wild medicinal and food plants in the world. Currently, more than 100 species of medicinal plants are used in medical practice, which is 2.5% of the species in the flora of Uzbekistan, although at least 1557 species of medicinal plants are known to grow in the territory of the republic, and they were used in the medical practice of the peoples of Central Asia and neighboring countries. About 121 wild medicinal plants are included in quota orders by pharmaceutical companies and other nature users every year, including Red Book and endemic species. Therefore, the inventory of common medicinal plants, registration of their reserves, and the search for ways of their sustainable use is a very urgent problem.

Keywords: Morphological Signs, Planting Methods, Cultivation, Vegetative, Generative, Vegetation, Budding, Flowering, Bud, Tuberous Inflorescence, Fruit, Seed, Drug, Synthetic Food, Technical, Raw Material

INTRODUCTION

Assessing the importance of tens of thousands of synthetic drugs created with the help of chemical advances, one should not forget about the negative consequences of chemical addiction. Therefore, despite significant progress in the field of artificial synthesis of organic medicinal substances in chemistry, herbal medicines still play an important role in the treatment and prevention of many diseases. Natural medicines made from medicinal plants have advantages over synthetic medicines. The potential of herbal treatment is huge: after all, almost every plant has different healing properties. In cases where treatment without synthetic drugs is impossible, the use of herbal preparations together with chemical therapeutic agents helps the disease to pass easily and prevents complications.

Despite the long history of medicinal plant collection in Uzbekistan, there is a lack of information on the current state of natural populations of even the most promising medicinal, food, technical and other raw material plants. The analysis of available materials showed the need to establish a wide scientific research program to clarify the current state of stocks of medicinal plants available in nature, to study the rate of recovery (results) of their populations after the collection of raw materials.

In this regard, to substantiate the bioecological properties of Hypericum perforatum, which is considered a promising medicinal plant, seasonal and diurnal flowering biology depending on the stages of ontogenesis, recommendations on seed productivity and quality seed and raw material cultivation have been developed.

The Seybold Report
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MATERIALS AND METHODS

The researches were conducted on the gray soil site of the "Sherzod, Sherkozi, Jamshid Rozievich" farm located in the Urgut district. In order to study the biological and morphological characteristics of the field, experiments were carried out in three different options, i.e. 30x15 cm, 45x15 cm and 60x15 cm planting methods. The experimental area was 16 m2, and each option was carried out in four replicates. In studying the biology of plant flowering, the dynamics of daily and seasonal flowering, A.N. Ponomarev (1960), [1] seed productivity H.Q. Karshiboev et al. (2008), [2] methods were used.

RESULT AND DISCUSSIONS

In order to clarify the phylogenetic status of plants and organize their seed production, the study of flowering biology and determination of seed productivity are of great importance. The flowering process is a characteristic characteristic of a large group of plants, and it is distinguished as a separate period in the ontogeny of flowering plants. Flowering indicates the transition of the plant to the generative stage. Scientific research of the flowering period began at the end of the 18th century and the beginning of the 19th century. In 1793, H. Sprengel published information on the pollination process of more than 500 entomophilous plants. One of the authors of the evolutionary theory Ch. Darwin also addressed this issue in many of his works. His works such as "Pollination of Orchids by Insects" and "Effects of Cross- and Self-Pollination in the Plant World" reveal the biological role of cross-pollination. Ch. Darwin's research provides a strong impetus to the study of the flowering process of plants. It is known that the study of flowering biology of plants is important, it allows to evaluate the level of their resistance to external environmental factors and to make recommendations for the cultivation of introduced plants in large areas. A certain rhythm is observed in the flowering of plants. The flowers of each plant species open at certain hours of the day. This is a biological feature specific to the species of this category, and it helps to determine the type of pollination and the positive effect of the pollination of the flower at what time of the day on the formation of more fruits, and to study the biology of the flower.

However, there is very little information on the flowering biology of the field plant, which is mainly based on some information about some ecological groups of the plant in the climatic conditions of the Russian Federation. For example, in the observations made in the climatic conditions of the Komi Autonomous Republic of the Russian Federation, field ecotypes bloom in the 7th year under natural conditions, and in the 2nd year under cultivation, from August to September [4.9.10].

Central Asia? In particular, the flowering biology of this plant in the climatic conditions of Uzbekistan has not been studied. G. Kholdorbekova, A. According to Matkarimova's observations (2014), field plant flowers belong to the group of plants that open both during the day and at night. Each flower blooms for 3-4 days. This understanding of the authors does not correspond to our observations [3;]. For this reason, we aimed to study the flowering biology of dalachoe in detail.

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Before studying the rhythms of cutting and seasonal flowering, we paid attention to the structure of the flower and inflorescence. The flower of H. perforatum has a straight (actinomorphic) perianth composed of five members, i.e. 5 lobed non-shedding sepals and 5 fused sepals. Gultoj leaves are light yellow in color, elongated oval in shape, with black-brown dots on their lower part. There are many stamens (40-60) and they are united in 3 balls, the seeds are formed by the union of 3 fruit leaves, and the 3 columns are found in a curved position. The length of the node is 2-4 mm, it is twice as small as the seed column. The flowers are clustered and numerous, combined into a panicle-shaped inflorescence, which is 8-12 cm long and 6-10 cm wide.

Budding is also one of the important periods of plant ontogeny, and their completion has a positive effect on lateral flowering and finally on seed productivity. We carried out the ripening process of the buds on June 8-17, at an air temperature of 29.0 C and a relative humidity of 34.2% in a plant of the 60x15 cm planting method option. The results of the observation are presented in Figure 1. Based on the obtained data, it should be noted that the budding started on June 8, and its size was equal to 1.1 mm. When we observed it on June 10, it was equal to 3.0 mm, and in the following days, its size increased, and after 10 days, that is, on June 17, the average size of the bud was 13 mm, and from that day, one of the flowers began to open. So, the budding period lasted 8-10 days. When we determined the number of buds in a plant by bush, 60.3 buds formed in one bush, and 40.2 of them bloomed.

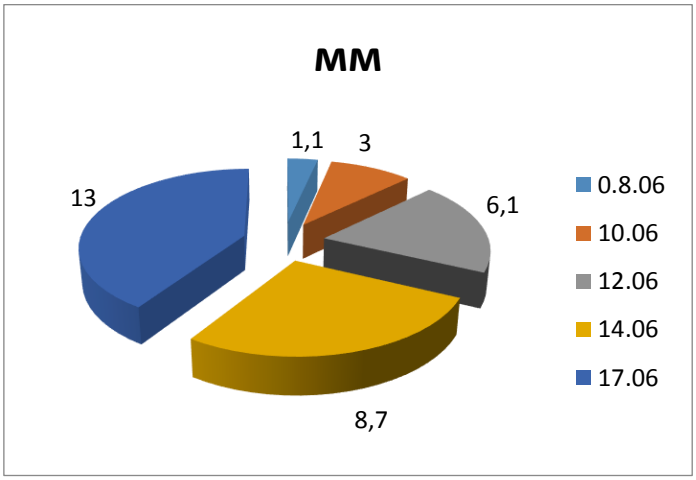

Figure 1: Growth dynamics of H. perforatum buds (mm)

H. perforatum during the general opening period of the flower, the concept may appear that the flower of this plant is continuously open during the day.

But in fact, the study of diurnal rhythms of flower opening shows that flowers mostly start to open from 400 am. When counting the flowers that opened every two hours for 5 days in the bush of 20 studied plants, it was found that their opening starts at 400 hours and ends at 600 hours. The obtained data are presented in Table 1. Analysis shows that over five days, total opening of flowers was 15% at 400 hours, while total opening was 95.0% at 500 hours, when the air temperature was 19 oC and the relative humidity was 55, observed in 3%. By 600 hours,

The Seybold Report
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there was no flower opening at all. In Dalachoy plant, similar to some other plants, the process of closing the leaves of gultoji was not observed. Gultoji leaves change their color to light yellow in the afternoon, and in the evening at 2000 - 2100 - Gultoji leaves begin to dry slowly when they are open. So, it was determined that the relative humidity during the flowering period of the field is 55.3% and the temperature can be 19oC.

So N. perforatum flower's optimal opening time is 500 am in the first half of the day.

As we know, the flowering process of plants is considered one of the biological characteristics characteristic of the family. We can also see the results of similar observations in the observations of some scientists on the Katron kochi plant, on the example of large-grain semi-desert plants, on the one-year-old plant species [5; 6.7.8.11.].

Seasonal flowering of H. perforatum was carried out in 20 plants and then their average was calculated. On the first day, on July 10, one flower opened in all the bushes, the air temperature was 35.0oC, and the relative humidity was 27.2%. On the first day of observing the seasonal flowering process of H. perforatum (July 11), an average of 1.7 flowers were formed per bush, and the air temperature was 34.3oC and the relative humidity was 28.1%. the number increased to 4.6 units on July 14 and 12.9 units on July 18 (Fig. 2).

The number of opened flowers increased more and more, and the highest number of opened flowers was on July 22nd, 24.3 flowers opened. Air temperature was 32.3oC, and relative humidity was 28.6%. In the following days, the blooming of flowers decreased and by July 30, the flowering of flowers ended. We did not find any scientific works devoted to monitoring the ripening process of H. perforatum fruit, not only in the climatic conditions of Uzbekistan, but also in foreign literature. Plant fruit sizes, one plantinformation on the number of fruits formed on the bush is described in the part of this work devoted to the study of seed was morphology.

Figure 2: Initiation and total flowering of H. perforatum

The Seybold Report
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Table 1: Seasonal flowering dynamics of H. perforatum flower (n=20)

Days	Hour	Number of opened flowers %	Air temperature°S	Relative air humidity %
10.07.-15.07.	8^{00}	-	21,3	50,4
	10^{00}	-	25,5	35,6
	12^{00}	-	31,6	30,4
	14^{00}	-	35,3	28,6
	16^{00}	-	33,4	27,6
	18^{00}	-	31,6	30,2
	20^{00}	-	24,3	37,4
	22^{00}	-	23,5	38,1
	24^{00}	-	19,3	54,9
	02^{00}	-	18,5	56,4
	04^{00}	15,0	18,7	56,3
	04^{30}	60,0	18,3	56,3
	05^{00}	95,0	19,0	55,3
	05^{30}	-	19,3	55,5
	06^{00}	-	20,3	50,4

We observed this indicator on October 15, 2016 in 60x15 cm planting methods in the first, second and third growing year of the field, that is, from the second decade of August of 2017-2018-2019.

The process of fruit ripening was carried out in 10 plants. It is clear from the data in the table that when we measured this indicator on August 10, the average size of the fruit on 10 plants was equal to 0.1 cm. As the days passed, the process of ripening and growing of the fruits was observed. For example, if the size of the fruit produced on August 10 was 0.1 cm on average, this indicator was 0.2 cm on August 12, i.e. 2 days later, 0.3 cm on August 14, 0.4 cm on August 16, and On August 18, it was equal to 0.6 cm. At the end of our observation, the highest indicator was observed on August 18, that is, it was found that the size of the fruit was 6 times larger than on the first day of our observation. So it took 9 days from the beginning of field fruiting to full formation.

In the territory of our republic, we did not find the results of scientific research on the size of field fruit in the literature. However, this topic has been studied in foreign countries. For example, the ripening of dalchoi fruit grown in the botanical garden of Saratov State University coincided with the end of July and the beginning of August, and it was observed that 3 to 193 fruits were formed in one flower. The length of field fruit cultivated in the north-eastern part of Russia was 0.5-0.8 cm and the width was 0.3-0.5 cm. From 51 to 136 fruits were formed in one generative branch. One fruit contained 84-107 seeds and 1000 seeds weighed 0.11 g [14.].

Field fruit size, seed quantity per fruit, and seed weight planted on October 15, 2016 were monitored for 2017, 2018, and 2019. The results of the observation are presented in Table 2.

As can be seen from the table, there are obvious differences in the length and width of the field plant fruit in different variants. For example, in the 30x15 cm planting method, the length of the fruit was 0.4 cm, and the width was 0.3 cm, while in the 45x15 cm planting method, this

The Seybold Report
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indicator was 0.5; 0.4 cm and 0.6 in 60x15 cm planting methods; It was 0.5 cm. Relatively larger fruit was observed in 60x15 cm planting method. It was observed that there was a sharp difference in the number and weight of seeds formed in one fruit. The mass of seeds in the fruit was weighed on an analytical balance. For example, 48.0 seeds were formed in one fruit in the 30x15 cm planting method, and their weight was equal to 0.0050 g. In the 45x15 cm planting method, this indicator was proportionately 50.1 seeds and its weight was 0.0068 g. The highest indicator in this area was observed in the 60x15 cm planting method, and it was found that 80.0 seeds were formed in one fruit, and their weight was equal to 0.0087 g [12.13].

So, it was observed that the number of seeds produced by planting 60x15 cm was 32.0 more than that of 30x15 cm and 2.1 more than that of 45x15 cm. In terms of seed weight, the weight of seeds produced in one fruit in the 60x15 cm planting method is greater than in the 45x15 cm planting method.

Table 2: H. perforatum fruit size 2017-2019. (n=10)

Planting methods	Fruit size sm			
	length	width	In one fruit:	
			In one fruit:	Seed weight gr
30x15	0,4±0,06	0,3±0,05	48,0±1,58	0,0050
45x15	0,5±0,07	0,4±0,06	50,1±2,20	0,0068
60x15	0,6±0,08	0,5±0,07	80,0±2,56	0,0087

compared to 0.0018 g and 0.0037 g compared to 30x15 sm. It is important to study the morpho-biological characteristics as well as seed productivity when cultivating wild plants. Because determining the seed quality and productivity of plants before planting them is considered one of the agrotechnological elements of plant cultivation. Therefore, when we determined the seed productivity of H. rerforatum plant by year, it was observed that there was a difference in the number and productivity of flowers, fruits and seeds formed per plant bush by the years of planting. For example, in the first year, the number of flowers produced by planting 60x15 cm was 40.2 pieces, the number of fruits was 30.1 pieces, the number of seeds in each fruit was 38.3 pieces on average, and the seed productivity was 95.2%. 50.3; 40.2; 46.7 and 92.8; was equal to 70.9 in the third year; 60.3; It was equal to 72.2 and 101.8%. The average number of flowers produced on one bush for three years is 53.8; fruits 43.5; seeds 52.4; It was observed that the seed productivity was 96.3%. (Table 3)

So, here the highest indicator was observed in the third vegetation year, in which it was observed that the seed productivity was 7.3% more than in the first vegetation year. This indicator is a maximum indicator and may change depending on the characteristics of climatic conditions and the age of the plant that occur in different years. The large variability in seed yield indicates that there is great potential for breeding.

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Table 3: Seed productivity of H. perforatum 2017-2019. 60x15 planting method in one bush (n=100)

Years	Number of flowers produced PUM	Number of fruits	The number of normally developed seeds in the fruit, pcs RUM	Seed productivity coefficient % UMK
2017	40,2±1,58	30,1±1,52	38,3±1,55	95,2
2018	50,3±1,52	40,2±1,48	46,7±1,58	92,8
2019	70,9±1,55	60,3±1,55	72,2±1,55	101,8
M+m	53,8±2,05	43,5±2,12	52,4±1,52	96,3

CONCLUSIONS

The opening time of the field flower depends on climatic factors, all the flowers on one plant bloom for 15 days. The general opening period of the flowers was noted to be 350-32.3oS, relative humidity 26.8-28.6% on July 21-22. When we determined the seed productivity of the H. rerforatum plant by year, it was observed that there was a difference in the number and productivity of flowers, fruits and seeds formed on one plant bush, and the seed productivity was higher in the third year.

References

1) Понамарёв А.Н. Изучения цветения и опыления растений// Полевая геоботаника. М. – Л.: Наука, 1960.- С.9-19.

2) Қаршибоев Х.Қ., Ашурметов О.А. Қаршибоев Ж.Ҳ. “Ўсимликлар репродуктив биологияси” фанидан илмий-тадқиқот ишларини ўтказишга оид методик кўрсатмалар. Гулистон, 2008. 24-б.

3) Холдорбекова Г., Маткаримова А.А. ЎзМУ Ботаника боғи шароитида Hypericum perforatum L. нинг гуллаш биологияси. Ботаника соҳасидаги илмий- амалий ютуқлар ва долзарб муаммолар. Республика илмий-амалий конференцияси материаллари. Самарқанд: 2014 й “СамДУ”.105 б.

4) Худякова Л.П. Особенности цветения и семеной продуктивности зверобоя продырявленного (*Hypericum perforatum L.*)// Экология цветения и опыления у растений: Межвуз. Сб.науч.тр. пермь, 1989. С. 120-128.

5) Эчишвили Э.Э., Портнягина Н.В. Хозяйственно-ценные признаки и продуктивность зверобоя продырявленного (*Hypericum perforatum L.*) при выращивании в подзоне средней тайги Республики Коми // Эколого-популяционный анализ полезных растений: интродукция, воспроизводство, использование: Матер. X Междунар, симпоз. Сыктывкар, 2008. С.246-248.

6) Азимов Б.Ж. Азимов Б.Б. Тажриба натижаларининг статистик тахлили ўқув қўлланма, Т. 2006. 126 б.

7) Бадридиннова Р.С. Ритм и экология цветения некоторих растений Крупнозлековой полусованны. К. Вопросу антэкологии. Материалы К сымпозиму по антэкологии 20-30 моя Изд.”Наука” Лениград. 1969.с.10

8) Никайоров. Н.В. Суточной ритм цветения некоторқх однолетников видов рода Bromus I. К.вопросу антукалогии, Материала к симпозиму по антэкологии 20-30мм. Изд.”Наука” Ленинград. 1969. С.26-27.

9) ФармановУ.Файзуллаев. М.Бегматова Далачой (hypericum perforatum l.)ни дориворлик хусусиятлари ва кимёвий таркиби Science And Education Scientific Journal

ISSN 1533-9211

DOI 10.5281/zenodo.8246120

10) Khamrayeva M, Begmatova M**.** Healing properties and biometrical indicators of chelidonium majus l., introduced in Uzbekistan oriental renaissance: innovative, educational, natural and social sciences scientific journal 2022 yil fevral.

11) Hamroyeva M.Q., Begmatova M.X. Samarqand viloyati sharoitida introduksiya qilinayotgan qonchoʻp (Cheledonium majus l) ning gullash biologiyasi. fan, ta'lim va amaliyot integratsiyasi: muammolar va innovatsion yechimlar. toshkent-2022.

12) Begmatova M.Kh. Effects of hyperium perforatum ning growth and development methods.262 b. food safety: global and national problems. Samarkand-2022y

13) Boboeva Kh.B., Begmatova M.Kh. Medicinal properties of origanum vulgare l., promising medicinal plant 266-b. Food safety: global and national problems. Samarkand-2022 y.

14) Бегматова М.Х. Тешик баргли далачой (биологик хусусиятлари, кимёвий таркиби, етиштириш технологияси). Монография. СамДЧТИ. Самарқанд-2022