

INTRODUCEREA ȘI CERCETAREA PARTICULARITĂȚILOR BIOMORFOLOGICE ALE SPECIEI *PASSIFLORA INCARNATA* L. ÎN CONDIȚIILE GRĂDINII BOTANICE

Maricica COLȚUN, Alina BOGDAN,

„Alexandru Ciubotaru” National Botanical Garden (Institute), Moldova State University

Studiul este consacrat domeniului de introducere, aclimatizare, cercetare și valorificare a plantelor utile, care reprezintă surse nepuizabile de materii prime pentru industria de medicamente, cosmetică și cea alimentară. Pe plan mondial, una din plantele medicinale cu însușiri sedative promițătoare, cu un mare potențial adaptiv este specia *Passiflora incarnata* L., utilizată din antichitate în medicina tradițională a popoarele Americii de Sud și Nord, care poate fi cu succes cultivată în R. Moldova. Lucrarea este axată pe evaluarea particularităților biomorfologice a speciei *Passiflora incarnata* L., ciclul de vegetație, fructificarea și formarea semințelor mature viabile în condițiile țării noastre în scopul introducerii în cultură. Studiile au vizat cercetarea sub aspect sistematic, bioecologic, morfologic, fenologic și tehnologic. Cercetarea metodelor de multiplicare, evidențierea celor mai eficiente și a posibilităților de valorificare a speciei în diverse domenii ale economiei naționale.

Cuvinte-cheie: *pasiflora, introducere, rizomi, medicină naturistă, valorificare.*

INTRODUCTION AND RESEARCH ON THE BIOMORPHOLOGICAL FEATURES OF THE SPECIES *PASSIFLORA INCARNATA* L. UNDER THE CONDITIONS OF THE BOTANICAL GARDEN

The study is devoted to the field of introduction, acclimatization, research and valorization of useful plants, which represent inexhaustible sources of raw materials for the pharmaceutical, cosmetic and food industries. Worldwide, one of the medicinal plants with promising sedative properties, with great adaptive potential is the species *Passiflora incarnata* L., used since ancient times in the traditional medicine of the peoples of South and North America, which can be successfully cultivated in the Republic of Moldova. The work is focused on the assessment of the biomorphological peculiarities of the species *Passiflora incarnata* L., the vegetation cycle, fruiting and the formation of viable mature seeds in the conditions of our country for the purpose of introduction into culture. The studies focused on systematic, bioecological, morphological, phenological and technological research. Researching multiplication methods, highlighting the most effective ones and the possibilities of capitalizing the species in various fields of the national economy.

Keywords: *passionflower, introduction, rhizomes, herbal medicine, usage.*

Introduction

During prehistoric times, guided by instinct and luck, people began to identify plants to feed themselves and soothe their pain or heal some inflammations and wounds. Thus, knowledge about the properties of medicinal plants dates back to the most ancient times through evidence found in all civilizations.

The pedoclimatic conditions of the Republic of Moldova are favourable for the introduction and research of new, non-native species with useful properties for humans. The gene pool of the plant collections created and enriched over the years in the Botanical Garden testifies to this statement. Previous research made it possible to identify valuable species for the manufacture of medicines, cosmetic products and spices, opening up new possibilities in modern therapeutics. This has caused the rapid and explosive expansion of sources of plant raw material. Among the plant species researched in recent years, *Passiflora incarnata* L., also called passionflower, is of particular interest.

Passiflora incarnata L. (passionflower) native to North America is one of the plants used in folk medicine. Being a polymorphic species and with an impressive adaptive potential, its cultivation has been attempted in several countries in the temperate and Mediterranean area (Italy, Spain, Germany). Currently, it is

also widely cultivated in Europe, Asia, Africa and Australia, as a medicinal plant, food and as an ornamental shrub, for its spectacular flowers. As a medicinal plant, it is used against insomnia, epilepsy, persistent and severe states of anxiety. It has calming effects that induce sleep and relieve muscle spasms. Unlike synthetic sleeping pills, this plant induces restful sleep. Besides, *Passiflora* preparations are used to treat gastritis, colitis and neuralgia. Studies have shown that the presence of glycosides stimulates breathing and helps lower blood pressure. It is recommended for heart palpitations, asthma or menopausal disorders. The plant-derived product has papaverine-type spasmolytic action induced by flavonoids, sedative-tranquilizing and anticonvulsant action due to maltol and flavonoids. [4].

For this reason, it is intensively used in naturopathic medicine for nervous exhaustion and attention deficit disorders [1]. Passionflower baths have a calming effect and help relieve anxiety and insomnia. If applied locally, it helps to calm haemorrhoids. The food and beverage industry uses plant extract as flavouring. It is also popular in the cosmetic industry, as an ingredient in hair care (shampoos, conditioners) and body care products, especially for small children. The skin-care products containing passionflower extract products suitable for dry, cracked skin, having a strong emollient effect. They prevent dehydration and have anti-aging effect [2]. Passionflower has acclimatized to the conditions of the Republic of Moldova, and it is able to complete the entire cycle of development [3].

Materials and Methods

The seeds were received by International Seed Exchange from the „Pavel Covaci” Botanical Garden, Macea, Romania. The research was carried out during the years 2020-2023 in the Collection of aromatic plants, within the „Plant Resources” Laboratory. The plants were obtained from seeds.

The plants were grown in plots, on an open field with southern exposure, under ecologically balanced conditions, on a general agrotechnical background, where they were trained on special supports. Phenological observations were made according to the method elaborated by I.N. Beidemann, during the entire growing season [5]. Observations were made on the reaction of plants to late spring frosts, resistance to low temperatures, the influence of light intensity, insufficient and excess atmospheric precipitation, resistance of plants to diseases and pests.

Results and Discussions

Passiflora incarnata L. is a vine that grows up to 5 m long, with longitudinally striated, grey-purple stems with thin, smooth tendrils. The leaves are alternate, petiolate, glabrous, 3-lobed, with a finely serrated edge, the middle lobe being better developed, of intense, bright green colour. The flowers are long-pedunculated, white, large and fragrant, with pink or purple centre. The fruit is an ovoid, greenish-brown, edible and aromatic berry, with smooth surface and yellow, gelatinous pulp.

The received seeds were sown in the greenhouse, in the first days of April. The seeds germinated well at moderate humidity and temperature of +22+24°C, within 10-12 days. To speed up germination, the seeds can be scarified, by gently rubbing the seeds on both sides with sandpaper, until a change in colour is observed. In addition, they were placed in a glass of water for 24 hours, and the next day they were sown in a prepared substrate. After the appearance of the first buds, the plants needed to be exposed to rather strong light. At the end of May - the beginning of June, when the seedlings had reached 15-17 cm in height, the seedlings were transplanted in the field, in ordinary chernoziom. The formation of axial shoots with 6-7 new leaves was noted at the end of June. In the middle of July, the first buds appeared and the budding stage occurred. At the end of August, the flowering stage began (Figure 1.). We observed that the flowers opened in the morning, at 9-10 a.m. and closed after sunset. Full flowering occurred at the end of August. The beginning of the fruiting stage was observed in the middle of September. The showy flowers, the fragrance and the juicy fruits are characteristic of this plant (Figure 1).

The method of vegetative propagation by rooting cuttings was also tested. Passionflower has no dormant period, so cuttings can be taken at any time of the year, but spring is recommended. Thus, the shoots were cut at 4-5 cm below the bud, leaving 1-2 buds per shoot. Buds should be well developed, selecting the cuttings without any mechanical damage. Better results were obtained when the cuttings were taken from

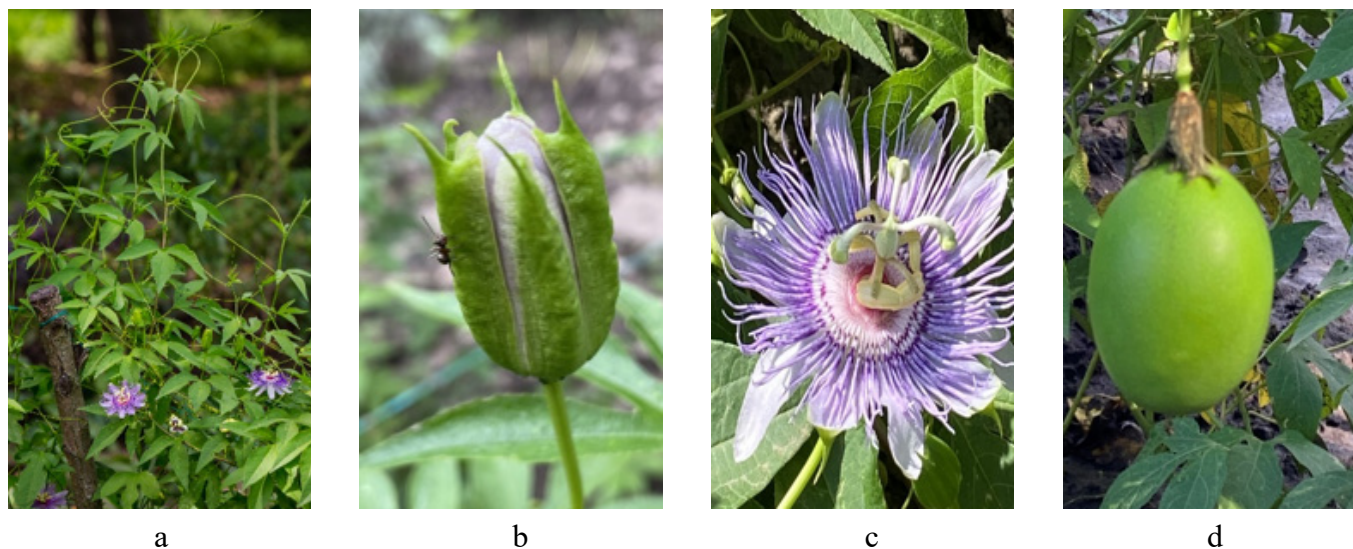
the middle of the shoot. For rooting, they were planted in the substrate at approximately 2-2.5 cm deep, the soil being moistened and covered with film. The rooting period lasted 25-35 days. When the roots appeared, after a period of acclimatization, the cuttings were transplanted into the field.

In the second year of vegetation, *Passiflora incarnata* plants emerged at the end of spring and grew rapidly, reaching under the climatic conditions of our country 3-5 m in a single season, but under its natural growth conditions it usually reaches 8-14 m. Most of the rhizomes during winter are located under the frozen layer of the soil. Most of those that remain on the surface freeze. The root system is initially a taproot, but if the plants are obtained through transplanted seedlings, after transplanting it becomes fibrous, developing under the root collar and from the nodes of the multiple rhizomes. The basal part of the stem becomes lignified, but the middle and apical part is herbaceous. The leaves are simple, long petiolate, 3-lobed or 5-lobed, deeply serrated. A tendril is formed on the opposite side of each leaf on the stem. The leaves are alternate, about 12-18 cm long. From mid-summer to late autumn, at the base of the stem, starting with the 5-7th leaf, at its axil, buds are produced (Figure 1.b), which within 9-14 days reach the full flowering stage. The flowers are solitary, bisexual, with a double calyx of 5 sepals each (Figure 1.c). It typically has creamy, lavender or pink-purple petals and corollas with filaments that appear daily and are sweetly scented. The ovary is superior, unilocular, from which the fruit develops – a yellowish-green berry (Figure 1.d). The fruits ripen at the end of October. The growing season of the plants obtained from seeds lasts for 200 days, and in the 2nd-3rd year of vegetation it may last up to 148 days. *Passiflora incarnata* L. needs sufficient light and abundant irrigation from early spring to late autumn. The plant needs constant spraying throughout the spring-summer period and it is necessary to protect the microdrops of water, which appear immediately after spraying, from direct sunrays.

To get a high yield, the flower must be pollinated with pollen from the flower of another plant. Therefore, it is necessary to grow as many plants as possible in the same area. Harvesting is carried out in the stages of full flowering (leaves) and fruit development (fruits). During this period, the plants form a biomass, which occupies the entire surface of the soil with growing shoots, with thick foliage and reproductive organs – from the buds to mature fruits. Harvesting is done by cutting the shoots at a height of 15-20 cm above the ground. Harvested plants are dried in the shade, in a ventilated room, at ambient temperature. Under the conditions of the Republic of Moldova, the structure of the harvest is about 55% leaves, 26% stems and 19% fruits at a single cut per season.

During the growing season, if necessary, the plants are irrigated and weeds are removed. In 2021, due to the large amounts of precipitation, the plants went through the entire development cycle without irrigation.

Figure 1. *Passiflora incarnata* L. plants: a) full flowering stage, b) bud, c) inflorescence d) fruit.



The research carried out demonstrates that the species *Passiflora incarnata* L, although it is native to subtropical and tropical regions, has a great adaptive potential and can be successfully cultivated under the climatic conditions of the Republic of Moldova, being propagated by seedlings, grown initially in the greenhouse,

and by rhizomes. Plants go through the entire development cycle, producing viable seeds. Rhizomes can serve as planting material for the creation of new plantations. In areas with subtropical climate, passionflower is mainly propagated by rhizomes. During the years 2020-2023, under the conditions of our country, the plants developed rhizomes located deep in the soil. In late autumn, the plants, being covered at the soil surface, did not freeze. In spring, the plants regenerate from the rhizome buds at a depth of 20 cm. The first plants sprout from the apical buds and usually occupy the free soil in rows and between rows. That is why, in the second and subsequent years of vegetation, passionflower spreads over the entire surface of the plot.

The research confirms that the species *Passiflora incarnata* L. is characterized by great vitality, strong regenerative abilities and fast growth. The plants are well adapted to the pedoclimatic conditions of our country and are highly appreciated for their chemical composition being recommended in cosmetics and medicine.

Conclusions

- The pedoclimatic conditions of the Republic of Moldova are favourable for the growth and development of the species *Passiflora incarnata* L. Observations on the seasonal rhythm have proven that the species has a stable type of phenological development. They are able to complete a full ontogenetic cycle.

- Plants can be propagated both vegetatively, by rhizomes and cuttings, and generatively, by seedlings grown in the greenhouse.

- The growing season of the plants obtained from seeds lasts 185-200 days, and – of 1-2-year-old plants lasts 142-150 days.

- The species *Passiflora incarnata* L. introduced and researched in the National Botanical Garden as a medicinal and ornamental plant, can serve as a source of native raw material for the production and diversification of the range of pharmaceutical and phytocosmetic products.

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Note: The research was carried out with the support of the Research Subprogram no. 010101 „Ex situ and in situ research and conservation of plant diversity in the Republic of Moldova”.

Date about authors:

Maricica COLȚUN, PhD in biological sciences, head of the „Plant Resources” Laboratory, „Alexandru Ciubotaru” National Botanical Garden (Institute), Moldova State University.

ORCID: 0000-0001-8470-3616

E-mail: mcoltun@mail.ru

Alina BOGDAN, researcher, „Plant Resources” Laboratory, „Alexandru Ciubotaru” National Botanical Garden (Institute), Moldova State University.

ORCID: 0000-0002-2069-0454

E-mail: alina.bogdan777@mail.ru

Presented on 17.09.2024