

# The bioecological features of some species of the Cupressaceae introduced in the conditions of Tashkent City, Uzbekistan

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**Abstract.** Temirov EE, Rakhimova NK. 2022. The bioecological features of some species of the Cupressaceae introduced in the conditions of Tashkent City (Uzbekistan). *Biodiversitas* 23: 5532-5538. For the first time, monitoring of the current state of previously introduced 19 species and 10 forms of the Cupressaceae family was carried out. Four species and five forms selected among them are distinguished by high decorativeness. The studied species and forms differ in the duration of the virginal period. Under the conditions of Uzbekistan, in forms of the genus *Platycladus* it lasts 4-5 years, in forms of the genus *Thuja* - 6-8 years, in the genera *Chamaecyparis* and *Juniperus* 6-9 years. The maximum growth and development indices under the conditions of Tashkent were observed in *Platycladus orientalis* f. *compacta* (East Asia), and the smallest ones are found in *Chamaecyparis lawsoniana* (North America) and *Juniperus squamata* (Western China). Seed germination in forms of the genus *Platycladus* under laboratory conditions is 56-78% (optimal temperature 20-22°C), in forms of the genus *Thuja* 31-46%, in *Chamaecyparis lawsoniana* - 21% (optimal temperature 28-29°C), the maximum rate of seed germination in the field was noted in *Platycladus orientalis* f. *compacta* (90-95%), and the minimum is *Chamaecyparis lawsoniana* (6-8%). For the first time, the possibility of vegetative reproduction in open ground with a rooting rate of cuttings up to 95% has been shown. Vegetative propagation gives effective results compared to a seed. For the first time in Uzbekistan, such a study was conducted on conifers, until now, no one has previously studied the biological characteristics of Conifers within the country.

**Keywords:** Annual growth, Cupressaceae, germination, introduction, vegetative reproduction

## INTRODUCTION

Plant biodiversity is of crucial importance in maintaining the sustainability of both individual ecosystems and the biosphere as a whole. Also, biodiversity is one of the main sources of satisfaction for many human needs and serves as the basis for its adaptation to changing environmental conditions. From a practical point of view, biodiversity is an inexhaustible source of biological resources. Many scientists are still engaged in the issues of the biodiversity of forests and plants (Alinsug et al. 2022; Heryandi et al. 2022; Lahallo et al. 2022).

The vast majority of the world's terrestrial biodiversity is concentrated in forests - from boreal forests of the Far North to tropical rain forests. In total, more than 60,000 different tree species grow in the forests. About 60% of all vascular plants grow in tropical forests. Therefore, the preservation of a significant part of the world's biodiversity depends to an absolute extent on how we interact with forests and use them (The state of the world's forests, 2020).

For a wider use of introducers, it is important to study their bioecological features. The stages of ontogenesis of some representatives of the Cupressaceae family, the influence of the environment on their growth and development assessment, as well as seed and vegetative reproduction, germinating seeds in laboratory conditions

have not yet been studied in the climatic conditions of Uzbekistan. It is known that the study of the bioecological features of coniferous introduced species will probably lead to their appearance in landscaping and forestry in the future.

Diez et al. (2012), studied the genome size and ploidy levels in highly fragmented habitats: the case of western Mediterranean *Juniperus* (Cupressaceae) with special emphasis on *J. thurifera* L.; Boratyński et al. (2013) studied the morphological differentiation supports the genetic pattern of the geographic structure of *J. thurifera* (Cupressaceae). Scientific research has also been conducted and is still being conducted abroad on Gymnosperms and some representatives of the family of Cupressaceae: chimiotaxonomie des Gymnospermes (Lebreton 2014). Morphometric variability in *Juniperus* L. seeds (Pinna et al. 2014) and the biogeography and genetic relationships of *J. oxycedrus* and related taxa from the Mediterranean and Macaronesian regions (Boratyński et al. 2014); effect of the Aegean Sea barrier between Europe and Asia on differentiation in *J. drupacea* (Cupressaceae) (Sobierajska et al. 2016). The case of mycorrhizal symbiosis with secular cliff climbing trees (*J. phoenicea* L.) (Sanguin 2016), the influence of natural habitat fragmentation on the genetic structure of Canarian populations of *Juniperus turbinata* (Jimenez et al. 2017). Taxonomic and geographic differentiation of *Juniperus phoenicea* (Mazur et al. 2018); method of integrated

varieties assessment of genus *Thuja* L. (Zaremuk et al. 2018).

Discovery of *J. sabina* var. *balkanensis* in Albania and relictual polymorphisms found in nrDNA (Adams et al. 2018) and genome size variation and polyploidy in the geographical range of *J. sabina* L. (Farhat et al. 2019); essential leaf oils and their application in the systematics of *Juniperus excelsa* complex in Iran (Hojjati et al. 2019); first evidence for allotriploid hybrids between *J. thurifera* and *J. sabina* in a sympatric area in the French Alps (Kharrat 2020); differentiation of Mediterranean species of *Juniperus* from the *sabina* section as a result of their migrations (Małgorzata 2021); the geographic range of the relict Mediterranean and Macaronesian *J. phoenicea* complex (Montserrat 2021); lectotypification of *Chamaecyparis hodginsii* of the Cupressaceae (Yang et al. 2021); first Record of *Alternaria alternata* causing necrosis of *Thuja* (*Thuja occidentalis*) in Kazakhstan (Smagulova 2022); *Thuja occidentalis*: an Unexplored Phytomedicine with therapeutic applications (Srivastava 2022).

According to Li et al. (2018), 16 out of 125 species belonging to 8 genera of the family Cupressaceae, are endemic species of the flora of the People's Republic of China (Surso 2013) conducted studies on the phylogeny, diversity and biogeographic distribution of species of the genus *Juniperus* and studied the phylogenetic relationship, endemism and use of representatives of the genus in landscaping.

## MATERIALS AND METHODS

The object of the study was 4 species: *Chamaecyparis lawsoniana* (Murr.) Parl., *J. communis* L., *J. oblonga* M. B., *J. squamata* Lamb. and 5 decorative forms: *Platyclusus* (*Biota*) *orientalis* f. *compacta* Unger Beissn., *B. orientalis* f. *aurea* (Dauvesse) Hornibr., *Thuja occidentalis* f. *columna* Spaeth., *T. occidentalis* f. *smaragd* Beissn., *T. occidentalis* f. *aurea spicata* Beissn., belonging to 4 genera of the Cupressaceae family. The materials were collected from collection trees introduced in the Tashkent Botanical Garden.

When determining the species and forms resistant to the harsh continental conditions of the republic and their viability, the methodology of Lapin and Sidneva (1973) was used. The decorative properties of the research objects were determined by the method of Shtonda (2012). When determining the seed germination of plants in the field and the initial stage of ontogenesis, the method (Slavkina 1966) was used. Studies on the seasonal development of adult trees (10-12 years old) were carried out on the basis of the method of Molchanov and Smirnov (1967). The assessment of introduced plants was carried out on the basis of the "Method of the introduction of tree and shrub species" by Mingazheva (2017). The names of genera and species are given according to the International Plants Names Index, The Plant List ([www.theplantlist.org](http://www.theplantlist.org); [www.theplantname.com](http://www.theplantname.com)). The study of the biological characteristics of the objects of the study was carried out according to the method developed by Slavkina (1966).

Accordingly, at the first stage, attention was paid to seed germination at different temperatures, growth energy, seed germination in the field, the influence of sowing dates (spring, autumn), and seed treatment features. At the next stage, the morphobiological features of newly germinated young plants (seedlings) and seedlings were studied: hypocotyl, cotyledon leaf, juvenile needles, true needles, bud, shoot, root system were studied in the first year in species and forms. From the second year during the growing season, the growth rates of seedlings planted from seeds were noted. The studied plants were divided into latent, virginal and generative periods. Below are the results obtained for each type and form.

To determine the germination of seeds under laboratory conditions, 100 seeds of the plant were placed in a Petri dish on filter paper moistened with distilled water. This process according to the method of Slavkina (1966) was carried out in 3 repetitions.

## RESULTS AND DISCUSSION

### Germination of seeds of research objects in laboratory conditions

To date, 19 species and 10 forms of the Cupressaceae family have been introduced to the Tashkent Botanical Garden. Of the 29 introduced species and forms, 18 were characterized by a constant large number of seed sets, and the seed quality was recognized as high. 11 species and forms did not bind seeds. Furthermore, 12 species reproduce generatively and vegetatively, 9 species-only vegetatively, and 8 species generatively. According to their biological characteristics, these species and forms are grown in 3 different conditions: in sunny, shady, and semi-shady places. Fifteen species from North America, 7 species from East Asia, 6 species from Europe, the Crimea, the Caucasus, and 1 species from Central Asia were introduced. North America (*Chamaecyparis lawsoniana*, *Ch. thyoides*, *Cupressus arisonica*, *C. a. f. sempervirens*, *C. goveniana*, *J. scopulorum*, *J. virginiana*, *Thuja occidentalis*, *T. standishii*, *T. oc. f. compacta*, *T. oc. f. aurea spicata*, *T. oc. f. globosa*, *T. oc. f. ericoides*, *T. plicata*, *T. oc. f. columna*) and species from Europe, the Crimea and the Caucasus (*Juniperus communis*, *J. sabina*, *J. sabina* o. f. *variegata*, *J. sabina* f. *fastigata*, *J. excelsa*, *J. oblonga*) are well adapted to East and Central Asian species.

The introduction assessment of the objects was carried out on the basis of the methodology developed by Lapin and Sidneva (1973), Shtonda (2016). According to the results of the introduction assessment, 4 species and 5 forms were identified as objects of research, promising and decorative for the climatic conditions of the republic. We have studied the initial stages and periods of ontogenesis of 2 forms of the genus *Platyclusus* and 1 species of the genus *Chamaecyparis*. *Platyclusus orientalis* f. *compacta* - seeds of brown color, 0.5-0.6 mm long, 0.2-0.3 mm wide. The average weight of 1000 seeds is 29.6 g. The optimal temperature for seed germination in the laboratory is

+20+22 °C, while the seed germination on the 6th day is 17%, and on the 18th day-78% (Figure 1).

In the field, seeds sown in autumn (October) germinate by 85-90% in mid-March, the seedling forms two cotyledon leaves, and the root deepens by 0.8-1.3 cm. Seedlings at the end of March pass into the juvenile stage, forming 10-14 juvenile needles. In May, the height of juvenile plants is 7-9 cm, and the roots deepen to 15-17 cm. The juvenile stage continues until the end of July. At the end of July, the plant passes into the immature stage, forming real needles and 6-8 primary lateral shoots. At this stage, the height of the plants is 10-15 cm, and the length of the roots is 20-22 cm. The immature stage continues until the end of the first year of vegetation and in the second year, the plant passes into the virginal state.

The number of lateral shoots of biennial plants is 7-9, the length of the lower lateral shoots is 7-9 cm, the middle 12-22 cm, and the upper 7-9 cm. Shoots are formed up to the fourth order: 1-2 orders - the main stem and branches, 3-4 orders - side shoots. The roots also have a 4-order branching, and the main root deepens to 24-26 cm. The largest number consists of roots of 3-4 orders. The height of 3-4-year-old virginal plants is 50-70 cm, the number of lateral shoots is 8-12, and the root system deepens by 25-35 cm. The duration of vegetation of virgin plants lasts from 2 to 5 years. On August 4-5 of the growing season, the formation of a small number of male and female cones begins. At the beginning of March next year, there is dusting and the formation of up to 10 cones. At the beginning of September, seeds ripen inside fully formed cones. In young generative trees, cones are formed mainly in the upper part of the stem.

*Platycladus orientalis* f. *aurea* - brown seeds, 0.5-0.6 mm long, 0.2-0.3 mm wide. The weight of 1000 seeds is 23.7 g. Under laboratory conditions, the optimal temperature for seed germination is +20+22°C, while the seed germination rate is 56% (Figure 2).

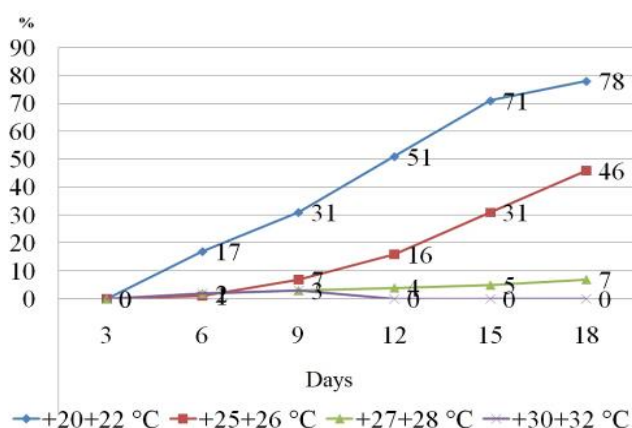
42-48% of seeds germinate in the field. Cotyledon leaves are lanceolate, length 1.2-1.8 cm, width 0.3-0.4 mm. The seedlings pass into the juvenile state after 20-25 days. The height of juvenile plants, unlike *Platycladus orientalis* f. *compacta*, reaches 5-6 cm, and the roots deepen by 7-10 cm. The juvenile stage lasts 3-3.5 months. At the end of July, the plant forms real needles and 4-7 primary lateral shoots, passing into the immature stage with a 12-13 cm height and 15-18 cm root system. The immature stage, as in the above form, continues until the end of the first year. From the second year, the plant passes into the virginal state.

The height of two-year-old virginal plants by the end of June is 18-25 cm. The number of lateral shoots is 5-8, their length in the lower part of the stem is 4-5 cm, in the middle part 6-9 cm, and in the upper part 5-7 cm. They have shoots up to the fourth order. The root system also has a short branching up to the fourth order. The main root deepens to 16-20 cm, and the roots of 3-4 orders have the greatest branching. The virginal period lasts 1-4 years of vegetation.

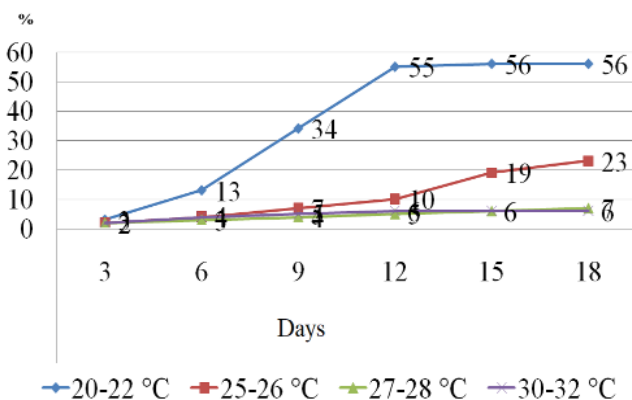
The generative period of this form has been studied in individuals propagated using cuttings. 5-6-year-old young generative plants, like *Platycladus orientalis* f. *compacta*, form a small number of male and female cones. The height

of 14-year-old trees is 2.30-2.60 m, and 35-40 perennial lateral shoots are formed on the main shoot, the length of which varies from 36 to 170 cm, depending on their age. Cones on trees are formed at the height of 50 cm, the number of which per individual is 645-660.

*Chamaecyparis lawsoniana* - seeds are small, light brown, 0.5-0.6 mm long, 0.2-0.3 mm wide. The average weight of 1000 seeds is 2.1 g. Under laboratory conditions, the germination of seeds at an optimal temperature of +28+29°C is 21%. In the field, the germination of seeds sown in November, at the end of March and at the beginning of April of the following year is 6-8%. The seedlings form 2 lanceolate cotyledon leaves 0.4-0.6 mm long, 0.1-0.2 mm wide. The length of the hypocotyl is 1.7-2.1 cm, and the root is 0.4-0.8 mm. The juvenile stage continues until the end of the first year, and the height of plants at this stage reaches 1.5-2 cm (Figure 3). Starting from the second year of growth, the plants pass into the immature stage, forming primary lateral shoots and real needles. The height of the plants is 3.5-5.0 cm, 2 side shoots are formed on the main shoot, the length of the first is 2 cm, and the second is 0.8 mm.



**Figure 1.** Germination percentage of *Platycladus orientalis* f. *compacta* seeds under laboratory conditions



**Figure 2.** Germination percentage of *Platycladus orientalis* f. *aurea* seeds under laboratory conditions

The immature stage continues until the end of the second year. From 3-4 years of vegetation, the virginal stage begins, the height of the plants is 7-8 cm, and the number of lateral shoots is 4-6. The transition of trees to a young generative state was registered in the 8-11 years of vegetation. The height of the plants is 1.40-2.20 m, and the cones mature mainly in the middle part of the trees. It should be noted that the similar course of growth and development at the initial stages and periods of ontogenesis of the two above-mentioned decorative forms of the genus *Platycladus* is explained by their belonging to the same species. At the same time, *Chamaecyparis lawsoniana* enters the generative state somewhat later.

The influence of environmental factors on the growth and development of the studied species and forms and their relation to external factors are also studied. The beginning of growth of *P. orientalis* forms (*compacta* and *aurea*) begins in mid-March, the average air temperature at this time is +13.8°C, the relative humidity is 60-65% and the illumination of the day is 12,000 lux. From the beginning of budding to the opening of the buds, 7-14 days pass, and the sum of the effective temperatures is equal to +225 +241°C.

#### The sum of effective temperatures during the growth and development of research objects

In the interval of this time, the dusting phase of megastrobiles ends. Intensive growth is observed in May-June at an average air temperature of +21+26.7 °C and 45-50% relative humidity, and the height of plants under such conditions reaches 20-26 cm. In July-August, there is a slowdown in the growth of plants, whose height is 24-34 cm. The average air temperature at this time varies from +29.6 to +34.7°C, the relative humidity of the air is 38-40% and the illumination of the day is 19000-22000 lux. The formation of cones on trees was registered at the end of August. The formation of microstrobiles continues until the first decade of September, the sum of the effective temperatures at which is equal to +528 °C. The growth of shoots is observed until September. The duration of the growth period of the annual shoot in these forms is 232-240 days, and the sum of the effective temperatures is +6206 +6670°C.

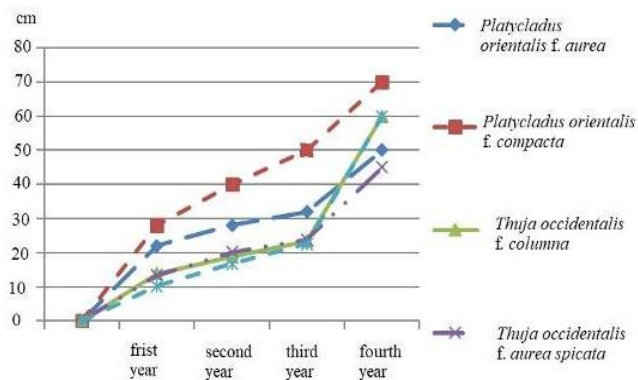
Both forms grow well in illuminated places, begin to grow early and do not lose their decorative effect. Individuals of *Platycladus orientalis* f. *compacta* are relatively hard to grow in semi-shaded places. The slowing down of the growth of shoots and the weakening of decorative properties in the shady places of both forms indicates the light-loving nature of these trees. The beginning of the growth of three decorative forms of the genus *Thuja* begins in the third decade of March, the air temperature at this time is noted in the range of +24 + 25°C, and the relative humidity of the air is 50-55%. The process of dusting male cones in all forms ends in early March. The opening of the buds, the separation of needles, and the growth of new shoots is observed in mid-April and intensive plant growth begins. The division of needles in *Thuja occidentalis* f. *aurea* spicata is observed in early

April, and in *Thuja occidentalis* f. *columna*, *Thuja occidentalis* f. *smaragd* - in mid-April. In the third decade of August, male cones appear, the average air temperature at this time is +29.6°C, and the relative humidity is 26-28%. The height of 3-year-old plants reaches 30-40 cm (Figure 3).

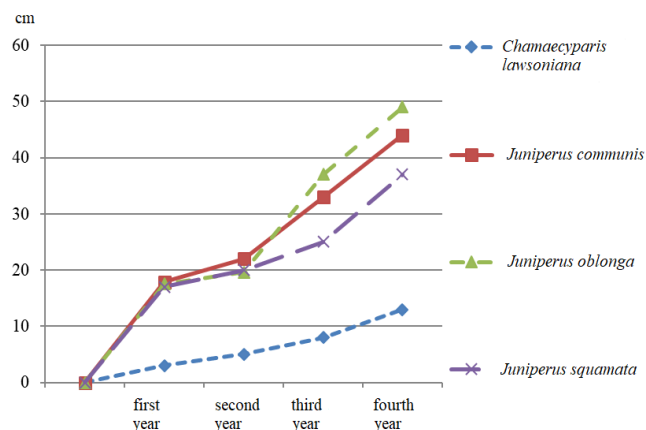
The duration of the vegetation of the forms is 200-210 days, the sum of the effective temperatures is within +5900 +6300°C. *Thuja occidentalis* f. *solumna*, *Thuja occidentalis* f. *aurea* spicata is well adapted to environmental conditions and can bear fruit every year. In *smaragd*, microstrobils are formed, but megostrobils are not formed. It was also revealed that *Thuja occidentalis* f. *smaragd*, compared with *Thuja occidentalis* f. *columna* and *Thuja occidentalis* f. *aurea* spicata, is not resistant to drought and the main factors for its successful growth and development are daylight and relative humidity.

The beginning of growth in *Chamaecyparis lawsoniana* was noted in the third decade of March. The buds open at a temperature of +24+25°C and relative humidity of 50-55%. It takes 6-8 days before the needles are separated. The sum of the effective temperatures is + 108 + 134 °C. The time from the separation of needles (12.04) to the decomposition of +23°C (19.04) was 7-8 days, and the sum of temperatures required for this phase was + 156+192 °C. The growth period of the plant ends with the maturation of seeds and the cessation of the growth of new shoots (September). The duration of growth in 2018 lasted 180-190 days, and the sum of the effective temperatures at the same time was +5563°C. Only in this species, the formation of megastrobiles was observed in the spring and their maturation in the same year. The plant grows well in sunny and semi-shaded places. There was a slight sunburn of new shoots of young seedlings.

Important environmental factors for this species are illumination, humidity, and soil fertility. In the saline soils of the southern regions of our republic, the growth and development of plants proceed slowly. In the shade, the growth of annual shoots slows down, which leads to a loss of decorative plants.



**Figure 3.** Annual growth of some forms of the Cupressaceae family



**Figure 4.** Annual growth of some species of the Cupressaceae family

In species of the genus *Juniperus* (*J. communis*, *J. oblonga*, *J. squamata*), the beginning of growth was observed in mid-March. At this time of the year, the average temperature was +13.8 °C, and the relative humidity was 70-75%. The shortest period of transition from one phase to another is noted in *Juniperus communis*. Before the opening of the kidneys, 4-5 days pass, and the sum of the effective temperatures is +73+94°C. This indicates rapid growth and development in comparison with other species (Figure 4).

The opening of the kidneys was observed at a temperature of +20 + 21°C and a relative humidity of up to 55-60%. Megastrobiles of species of the genus *Juniperus*, in contrast to the above forms, are formed in the spring, and mature in the autumn of the following year. Their growth duration is 193-210 days, and the sum of effective temperatures varies from 5400 to 6300°C.

In species and forms belonging to the same genus, the annual growth period is almost the same. The difference in this process is manifested only in the transition from one phase to another, depending on weather conditions. In all the studied objects of the study, the growth period is observed in March.

### Results on vegetative and seed reproduction of research objects

We also studied seed and vegetative reproduction, diseases, pests and methods of combating them, as well as the introduction assessment of the studied research objects.

When studying the germination of seeds in the laboratory, germination was not observed in species of the genus *Juniperus*. For forms of *Platycladus orientalis*, the optimal temperature for seed germination is +20 +22 °C. Under these conditions, the seed germination reached: in *Platycladus orientalis* f. *compacta* - 78%, *Platycladus orientalis* f. *aurea* - 56%. For the genera *Thuja* and *Chamaecyparis* at an optimal temperature of + 28 +29 °C, the germination of seeds of *Thuja occidentalis* f. *columna* was - 31%, *Thuja occidentalis* f. *aurea spicata* - 46%, *Chamaecyparis lawsoniana* - 21%.

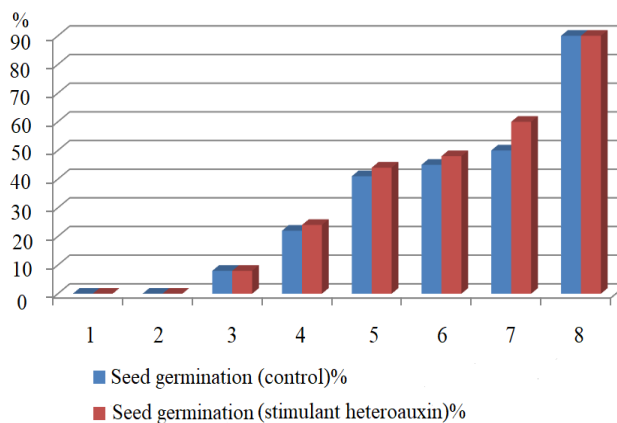
In the field conditions, in the control variant, the seed germination was 50-60% in *Juniperus communis*, 40-44% in *Juniperus oblonga*, 23-24% in *Juniperus squamata*, 85-90% in *Platycladus orientalis* f. *compacta*, 42-48% in *Platycladus orientalis* f. *aurea*, 6-8% in *Chamaecyparis lawsoniana*.

The germination rate of seeds treated with a stimulant (Ribav extra) was: *Juniperus communis* - 60-70%, *Juniperus oblonga* - 50-60%, *Juniperus squamata* - 23-24%, *Platycladus orientalis* f. *compacta* - 85-90%, *Platycladus orientalis* f. *aurea* - 40-45%, *Chamaecyparis lawsoniana* - 6-8% (Figure 5).

The autumn months are the optimal time for sowing, while freshly harvested seeds can be sown without stratification. Of the studied species, only the species of the genus *Juniperus* have a rest period of one and a half years in the soil. Seed germination was not observed in the forms of the genus *Thuja*. Seeds of species and forms of the genera *Chamaecyparis* and *Platycladus* sown in autumn germinate in the spring of the following year.

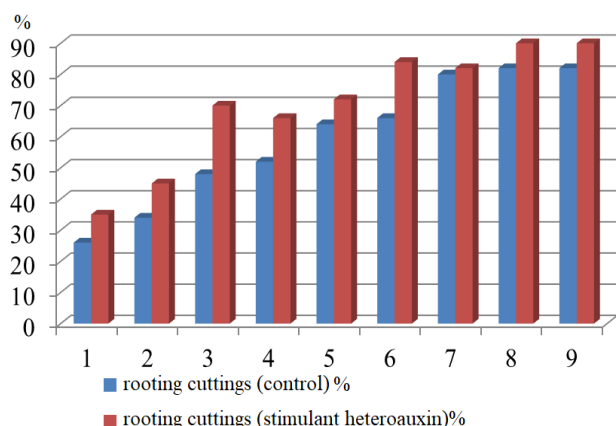
Vegetative reproduction in all species and forms was carried out in the open ground. To increase the rooting indicators, stimulants (kornevin, heteroauxin, ribav extra) were used. Cuttings are taken of different lengths depending on the types and shapes.

In the species of the genus *Juniperus*, the following results were obtained during vegetative reproduction with stimulant treatment: *Juniperus communis* - 60-70%, *Juniperus oblonga* - 68-72%, *Juniperus squamata* - 40-45%.



**Figure 5.** Germination percentage of seeds of research objects in the field

1. *Thuja occidentalis* f. *columna*
2. *Thuja occidentalis* f. *aurea spicata*
3. *Chamaecyparis lawsoniana*
4. *Juniperus squamata*
5. *J. oblonga*
6. *Platycladus orientalis* f. *aurea*
7. *J. communis*
8. *Platycladus orientalis* f. *compacta*



**Figure 6.** Indicators of rooting of cuttings of species and forms of the Cupressaceae family during vegetative reproduction, percentage

1. *Chamaecyparis lawsoniana*
2. *Juniperus squamata*
3. *J. communis*
4. *Platycladus orientalis* f. *aurea*
5. *J. oblonga*
6. *Platycladus orientalis* f. *compacta*
7. *Thuja occidentalis* f. *smaragd*
8. *Thuja occidentalis* f. *columna*
9. *Thuja occidentalis* f. *aurea spicata*

Rooting indicators in the control variant: *Juniperus communis* 46-48%, *Juniperus oblonga* 61-64%, *Juniperus squamata* 32-34%. The rootability indicators of *Chamaecyparis lawsoniana* when treated with the Ribav extra stimulant is 30-35%, and in the control variant 23-26%. When using stimulants, rooting in *P. orientalis* f. *compacta* is 80-84%, *Platycladus aurea* - 68-72%, in the control variant in *Platycladus orientalis* f. *compacta* 62-66%, *Platycladus orientalis* f. *aurea* - 56-58%.

The rooting rate in the forms of the genus *Thuja* was: in *Thuja occidentalis* f. *columna* - 85-90%, *Thuja occidentalis* f. *aurea spicata* - 85-90%, *Thuja occidentalis* f. *smaragd* - 86-89%. In the control variant: *Thuja occidentalis* f. *columna* - 78-82%, *Thuja occidentalis* f. *aurea spicata* - 78-82%, *Thuja occidentalis* f. *smaragd* - 74-78% (Figure 6).

Rooting indicators in the control variant: *Juniperus communis* 46-48%, *Juniperus oblonga* 61-64%, *Juniperus squamata* 32-34%. The rootability indicators of *Chamaecyparis lawsoniana* when treated with the Ribav extra stimulant is 30-35%, and in the control variant 23-26%. When using stimulants, rooting in *Platycladus orientalis* f. *compacta* is 80-84%, *Platycladus aurea* - 68-72%, in the control variant in *Platycladus orientalis* f. *compacta* 62-66%, *Platycladus orientalis* f. *aurea* - 56-58%.

The rooting rate in the forms of the genus *Thuja* was: in *Thuja occidentalis* f. *columna* - 85-90%, *Thuja occidentalis* f. *aurea spicata* - 85-90%, *Thuja occidentalis* f. *smaragd* - 86-89%. In the control variant: *Thuja occidentalis* f. *columna* - 78-82%, *Thuja occidentalis* f. *aurea spicata* - 78-82%, *Thuja occidentalis* f. *smaragd* - 74-78% (Figure 6).

Rooted cuttings after the third year of vegetation can be transplanted to the nursery for growing. Their use in landscaping is recommended from the 4th-5th year of

vegetation. In the course of studies, the disease of young seedlings of *Platycladus orientalis* f. *compacta*, *Platycladus orientalis* f. *aurea* with fusarium and death as a result of root rot was observed. A positive result against this fungal disease was obtained when using the drug "Fitosporin".

Infection of some forms of the genus *Thuja* with the pest of the mealyworm (*Planococcus vovae* Nass.) was also noted. Currently, this pest is widely distributed throughout the republic. In addition, in the spring months, forms of the genus *Platycladus* were infected with the aphid pest. In the fight against pests and diseases, the use of insecticides produced in recent years is recommended.

The assessment of the success of the introduction was carried out on the basis of the method of Lapin and Sidneva (1973). According to this method, when evaluating the success of the introduction of trees and shrubs, from 2 to 7 criteria are taken based on 9 indicators. We have added another indicator to this scale - the resistance of species and forms to pests and diseases. The maximum result for the added item was noted in species of the genus *Juniperus*. According to the scale of the introduction assessment, 8 objects showed positive results - 80-90 points, which indicates their prospects for further introduction. Only *Thuja occidentalis* f. *smaragd* turned out to be less promising (72 points). The reason for the low results of the research objects using this method is the minimum indicator - "self-propagation", which does not correspond to the introduction of coniferous trees in the weather conditions of our republic.

Among the studied objects, the promising group includes *J. communis*, *J. oblonga*, *P. orientalis* f. *aurea*, *P. orientalis* f. *compacta*, *J. squamata*, *Chamaecyparis lawsoniana*, *Thuja occidentalis* f. *aurea spicata*, *Thuja occidentalis* f. *columna*; however, *Thuja occidentalis* f. *smaragd* is in a less promising group.

In conclusion result of the conducted research on the study of the bioecological features of some species of the family Cupressaceae introduced in the conditions of the city of Tashkent, the following conclusions are presented: For the first time, the current state of the previously introduced 19 species and 10 forms of the Cupressaceae family was monitored, 4 species and 5 forms selected among them are highly decorative (i). The studied species and forms differ in the duration of the virginal period. In the conditions of Uzbekistan, it lasts 4-5 years in the forms of the genus *Platycladus*, 6-8 years in the forms of the genus *Thuja*, 6-9 years in the genera *Chamaecyparis* and *Juniperus* (ii). The maximum indicators of growth and development in the conditions of Tashkent were noted in *Platycladus orientalis* f. *compacta* (East Asia), and the minimum in *Chamaecyparis lawsoniana* (North America) and *J.s squamata* (Western China) (iii). Seed germination in the forms of the genus *Platycladus* under laboratory conditions is 56-78 % (the optimal temperature is 20-22°C), in the forms of the genus *Thuja* 31-46 %, in *Chamaecyparis lawsoniana* - 21% (the optimal temperature is 28-29°C), the maximum seed germination rate in the field is noted in *Platycladus orientalis* f. *compacta* (90-95%), and the minimum is *Chamaecyparis lawsoniana* (6-

8%) (iv). For the first time, the possibility of vegetative reproduction in open ground conditions with a rooting capacity of cuttings up to 95% is shown. Vegetative reproduction gives effective results in comparison with seed reproduction (v). Fusariosis was detected during the germination of young seedlings of species and forms, and pests were observed in representatives of the genera *Juniperus* and *Thuja* - common aphid (*Schizaphis graminum*) and Central Asian mealybug (*Planococcus vovae*) (vi). According to the results obtained at the end of the study on the studied objects for the assessment of the introduction, the following results were obtained: 4 species and 4 forms were included in the group of promising plants (80-90 points), and *Thuja occidentalis* f. *smaragd* - in the group of less promising (72 points) and are recommended for enriching the assortment of landscaping and improving the aesthetic condition of the cities of the republic.

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