

ABSTRACT

Keywords: *Iridaceae*, geophytes, *Gladiolus*, *Crocasmia*, ornamental value

The family *Iridaceae* Juss. is one of the largest families of Monocotyledons, with over 2000 species distributed in 60-70 genera. They are native to South Africa, Central and South America, including the tropical part of Mexico and the Caribbean region, but their great ability to adapt to a wide variety of environmental the globe conditions has allowed them to spread almost all over, thus accounting for their almost "cosmopolitan" character.

Many of the species belonging to this botanical family have special decorative qualities and have a high economic importance due to the large number of plants that are used for ornamental purposes (*Iris*, *Gladiolus*, *Freesia*, *Crocus*, *Crocasmia*).

Species of the genus *Gladiolus* (about 260 species) are found in areas of South Africa, tropical Africa, Madagascar, the Arabian Peninsula, the Mediterranean basin, Europe and Asia, but are cultivated in many parts of the world for the beauty and elegance of the flowers. Three species of gladiolus are mentioned in the spontaneous flora of Romania: *G. imbricatus*, *G. palustris* and *G. illyricus*.

The species that make up the genus *Crocasmia* originate in the wetlands of South Africa, tropical Africa and Madagascar. The good adaptability to different environmental conditions, as well as the high ornamental value have made these species spread to almost all continents, in some areas even becoming invasive.

The doctoral thesis entitled **Evaluation of cultivation and capitalization possibilities of some ornamental species from the *Iridaceae* family** focuses on some representatives of this botanical family, less used for ornamental purposes in Romania. For this purpose, three species of the genus *Gladiolus* (*G. imbricatus*, *G. byzantinus*, *G. tristis*) and a cultivar of the genus *Crocasmia* ('Lucifer') were selected for the study.

We believe that the results obtained in this paper will motivate both flower growers and enthusiasts, as well as researchers in the field, to give due importance to seemingly more modest and less "aristocratic" species, but which can bring beauty and joy in houses or gardens.

The research was organized and carried out in the experimental field and in the flower greenhouse of the Floriculture discipline at the University of Life Sciences "Ion Ionescu de la Brad" from Iași. The physiological and biochemical determinations were performed within the Horticultural Research Center (former Fruit Research Laboratory "PhD. Gică Grădinariu").

The doctoral thesis has 199 pages and is structured in two parts, in accordance with the rules in force, respectively **the first part - The current state of research - and the second part - Own contributions**. The thesis totals six chapters, to which a reference section is added the bibliography.

Part I - Documentary study - includes the synthesis of all the bibliographic material that formed the core of the scientific documentation necessary to acquire information on the current state of knowledge in the field of study covered by this doctoral thesis.

Chapter 1 - General considerations regarding the family *Iridaceae* and the *Gladiolus* and *Crocasmia* genera

The first part includes a single chapter (chapter 1) structured in three distinct subchapters, intended for the general characterization of the family *Iridaceae* and of the two studied genera - *Gladiolus* and *Crocasmia*. The analyzed aspects include information on the origin and area spreading, botanical and biological features, systematics, history and importance, ecological requirements, technological features and cultivation methods of the representative plants from the three systematic units. According to the requirements regarding the ratio between the documentation part and the personal findings part, part I cover 64 pages, which accounts for 32,1% of the entire thesis.

Part II – Personal findings - is the most comprehensive part of the thesis that includes five chapters, written on 135 pages (67.9% of the total volume of the thesis).

Chapter 2 - Scope and objectives of study. Working material and methodology

The chapter is structured in four subchapters that highlight the purpose of the scientific approaches proposed by the doctoral thesis and the main objectives that support the stated scope of the paper.

The aim derives from the need to enrich current knowledge regarding the cultivation of some species of flowering plants less common in the usual assortment of ornamental plants, some of them coming from the spontaneous flora of Romania. Appropriate cultivation technologies and efficient ways of capitalization will help to promote them as garden decoration plants or as potted plants and cut flowers. In addition, large-scale cultivation of wild species will allow for the *ex situ* recovery and conservation of regional germplasm.

The main objectives of the doctoral thesis are:

- study of *Gladiolus* and *Crocasmia* taxa;
- analysis of the natural environment conditions in which the experiments took place (Iași city);
- conservation of *Gladiolus* genetic resources from the spontaneous flora of Romania;
- diversification of the germplasm fund, by introducing some species of *Gladiolus* from other areas and studying their behaviour under the current growing conditions of Iași area;
- establishing culture peculiarities for *Crocasmia* and *Gladiolus*;
- assessment of the possibility of prolonging the life and ornamental value of cut flowers of *Gladiolus* and *Crocasmia*;
- study of the possibilities of capitalization of the studied *Gladiolus* and *Crocasmia* taxa.

The second subchapter presents the materials used in each experiment (biological material, biotechnological materials, equipment, etc.), and the third subchapter described the working methodology adopted to reach assumed the objectives.

The working methodology was correlated with the research activities described in the activity plan. The observations, determinations and analyses carried out took into account the evaluation of some quantitative and qualitative characters of the taxa studied: determination of the main indicators that define the germination of seeds under different conditions; physiological and biochemical determinations in leaves; the development of the

main phenophases of the plants from the experimental variants; vase life of cut flowers, etc. The observations and determinations in the field and laboratory spanned throughout the entire period of study, and the data were centralized and capitalized using appropriate methods of processing and interpretation.

The last subchapter in chapter 2 was reserved for detailing the organization of performed experiments, with the set-up of experimental schemes, of all necessary the activities for the establishment and maintenance of experimental cultures and the activities carried out in the laboratory.

Chapter 3 - Description of the administrative-organizational framework and the conditions of the natural framework.

The chapter includes information on the natural environment and the administrative-organizational conditions in which the research activity took place during the training period (2017-2021). The natural environment conditions are those that characterize the research station "Vasile Adamachi" of IULS Iași, respectively the field of Floriculture: geographical positioning, relief structure, geological, pedological and hydrological conditions, climatic characterization (with details on temperature, precipitation, relative humidity, duration of sunshine, wind speed and direction). In the context of the analyzed natural environment conditions and the results obtained, it appears that the studied species can be cultivated in this area.

Chapter 4 - Results on the study of the influence of technological factors in the cultivation and use of gladiolus

The content of this chapter has been structured in to three subchapters. The first subchapter presents the results of experiments that had targeted for focused on seed multiplication in *G. byzantinus*, *G. imbricatus* and *G. tristis*. Different factors that can influence seed germination were analyzed (stratification duration, germination temperature, time and place of sowing, water treatments applied to seeds). Cold layering time was found to have a greater influence on the germination of *G. byzantinus* and *G. imbricatus* seeds (74-98 days favored stratification germination), while germination temperature had a greater influence on *G. tristis* seeds (germination is inhibited at over 20°C, but is favored at 13-17°C). Wetting the seeds before sowing most favored the germination of *G. imbricatus* and *G. tristis* seeds. Sowing in greenhouse conditions, at moderate temperatures, is recommended only for *G. tristis*. *G. byzantinus* and *G. imbricatus*, species with spring flowering, are sown only in autumn, in field conditions, where they are provided with natural stratification in winter.

The second subchapter addresses issues related to corms proliferation of gladiolus. In *G. byzantinus*, the influence of corms size and plantation age on the morphological/ornamental characteristics of the plants was analyzed. The corms, large (> 9 g) and medium (5.5–8.9 g) generally had a positive influence on the analyzed characters. Regarding the age of the plantation, the results obtained recommend maintaining the cultures of *G. byzantinus* for at least 2-3 years, without harvesting and replanting the corms every autumn.

In *G. imbricatus* the experiments included two size categories of corms. As with the previous species, the large corms positively influenced the morphological and ornamental characteristics of the plants.

Also included in this subchapter were the results the analyses on the content of photosynthetic pigments and enzymes. In both *G. byzantinus* and *G. imbricatus*, there is a slight decrease in the total content of photosynthetic pigments, as the size of the corms

decreases. The results of the enzymatic activity were correlated with the results of biometric determinations and the content of photosynthetic pigments (variants that showed an increase in enzymatic activity, a decrease in the content of chlorophyll pigments and a weaker development of plants).

The third subchapter presents the results regarding the preservation and recovery of cut flowers by *G. byzantinus*. The cut flowers were kept in various solutions (water, boric acid, kinetin, 6-benzyl-amino-purine and commercial preservative). The results on the number of open flowers, the vase life of the cut flowers and the number of unopened buds left on the stem flower did not differ significantly between variants.

Chapter 5 – Results on the study of the influence of technological factors in the cultivation and use of *Crocsmia*

The content of the chapter was structured in to three subchapters that analyze the experimental factors specific to each experiment organized in the ‘Lucifer’ cultivar.

The first subchapter analysed the influence of time, place of sowing and water treatment on seed germination. The obtained data show that *Crocsmia* seeds can be sown only in spring both in field (it does not withstand winter in unprotected conditions) and in greenhouse conditions. Hydrated seeds, sown in the greenhouse were the ones that germinated best.

The second subchapter contains data on the multiplication of *Crocsmia* by corms and analyzes the influence of the planting season and the size of corms on some morphological and ornamental characteristics of *Crocsmia*. The corms classified into two size categories (3-5.9 g and 6-9 g), were planted in the field in the autumn and spring. By using small corms (3-5.9 g), better results were obtained in terms of spring vegetation growth and vegetative growth, but only with the condition of planting them in autumn. The set-up of the autumn crops with corms of both size categories has led to the approximately similar results in terms of flowering capacity and some morphological characteristics of flowers and inflorescences. In the case of crops set-up in the spring, only the use of large corms (6-9 g) proved to be effective. The main phenophases took place much earlier in the autumn. Physiological and biochemical analyses showed that in the case of the total content of photosynthetic pigments, the plants in the variants set-up in the autumn showed higher values, compared to those in the variants sown in the spring, while the Chl *a* / Chl *b* showed higher values in the variants spring-sown.

The third subchapter analyzes the results obtained by keeping the cut flowers of *Crocsmia* (‘Lucifer’) in different solutions. Storage solutions were: commercial preservative, gibberellic acid, boric acid, nitrate of silver and benzoate of potassium. The results recommend the use of commercial preservative (Vital Fleur®), which has determined the longest life of cut flowers and boric acid, to stimulate flower opening.

Chapter 6 - Conclusions and recommendations

It is the chapter that concludes the doctoral thesis and summarizes the most important conclusions resulting from the research conducted. A series of recommendations on the multiplication, cultivation and capitalization of the studied species and varieties were also mentioned.

All the documentary materials from the specialized literature used in the thesis are included in the bibliographic list (253 bibliographic references).