**국문 리뷰 예시**

**A Review: Leaf Anatomy Features of *Echeveria***

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**에케베리아 속 식물 잎의 해부학적 특징**

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**Abstract** *Echeveria* is a genus belonging to the Crassulaceae family that comprises approximately 170 species. It is a representative plant known as a succulent with economic potential in the floriculture industry. *Echeveria* plants are widely distributed in dry environments and endemic to Mexico. These plants have a rosette formation and varied leaf colors and shapes, which are characteristics of interest for landscaping, cut flowers, or interior decoration. Given their range of locations in different climates or indoor conditions, it is important to have an understanding and knowledge of their leaf morphology and anatomy and how they function to provide optimum care and management. Owing to high demand in horticultural markets, many breeders have crossed their desired species. However, this method has progressively increased the number of species without proper records of parents or other natural unintended crossings, creating phylogenetic problems and identification issues. The use and understanding of phenotypes, anatomical data, and/or research to aid in taxonomic issues and improve cultural management practices have been reviewed and discussed in this paper. In this review, we have provided a brief background of *Echeveria* species, focusing on the challenges and studies that have attempted to address these issues.

***Additional Keywords:*** anatomy, Crassulaceae, *Echeveria*, phenotype, succulents

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**서언**

다육식물은 건조한 환경에서도 살아갈 수 있는 능력을 지닌 관상용 식물로 인기가 높다. 70여종의 현화식물과 중 약 12,500여종이 다육식물로 돌나물과(Crassulaceae), 용설란과(Agavaceae), 아스포델루스과(Asphodelaceae)가 있다(Ardelean 2009; Carrillo-Reyes et al. 2008; Males 2017). ~

1. **돌나물과
1.1 돌나물과 식물의 특징**

*Echeveria* 속 식물의 분류를 위해서는 형태학적 연구가 중요한데, 세포, 조직 및 기타 식물 기관 구조 분석을 해야 한다(Simpson 2019). ~

**결론**

다육식물은 건조한 환경에 적응하도록 진화한 형태학적, 해부학적 특징이 있다. 이는 에케베리아(*Echeveria*) 속의 잎의 형태학적 구조와 특정 기관 및 조직에서도 설명된 바 있다. ~

**초록**

에케베리아(*Echeveria*) 속은 돌나물과에 속하는 다육식물로 화훼산업에서 경제적 잠재력을 지닌 대표적인 식물이며 약 170여종이 있다. ~

추가 주요어:해부학, 돌나물과, *Echeveria*, 표현형, 다육식물

**사사**

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Karukstis KK (1991) Chlorophyll fluorescence as a physiological probe of the photosynthetic apparatus. In: Sheer HS (ed) Chlorophylls. CRC Press, Florida, pp 769-795

Kim YJ, Lee HJ, Kim KS (2011a) Night interruption promotes vegetative growth and flowering of *Cymbidium*. Scientia Hort 130:887-893

Kim YJ, Lee HJ, Kim KS (2011b) Day interruption promotes vegetative growth of *Lilium*. Scientia Hort 130:894-899

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**Figures**



**Fig. 1.** Leaf anatomical section of *E.* ‘Peerless showing a single epidermis (EP) layer and followed below it is the hypodermis (HP) (100×). Scale Bar = 50 µm.

**영문 리뷰 예시**

 **A Review: Mutation Breeding using Gamma Irradiation in the Development of Ornamental Plants**

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**Abstract** Gamma irradiation has been judiciously practiced in several ornamental plant species to obtain the desired genetic variability. Commercially, ornamental plants with a rich variety in flower color and uniform shape are prized and are in high demand. Irradiation technology is widely performed to generate a high number of mutations, which helps introduce new improved variants in comparison to the control plant. The main purpose is to promote well-adjusted species by customizing some specific features to expand on the desired parameter. Exposure to an optimum dose of gamma irradiation is crucial to ensure the most beneficial mutation density. Among species, the effects of dose rates vary, thereby affecting the probability of inducing favorable attributes such that they are either not clearly exhibited or are disoriented during gradual physical development of plants. To obtain high-quality species, within a very limited period, gamma irradiation may present an alternative method to selective screening with the combined application of molecular-based analysis to contribute mutational changes in plant physiology. Here, we review current literature that focuses on the effect of appropriate doses of gamma irradiation and the morphological, functional, and molecular objectives of such irradiation in ornamental plants.

***Additional Key words*:** gamma irradiation, high-quality species, molecular based analysis, optimum dose, ornamental plants, plant physiology

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**Introduction**

Plant mutation breeding is a core area among modern approaches that is practiced as a part of plant breeding technology. The contribution of plant breeding combined with modern technologies for expansion of crop production toward improved food security and nutrition is recognized worldwide (Oladosu 2016). With increasing population and concomitant decreasing land resources, improvement in crop yields based on fertilizer utilization, and the control insects, pests, and pathogens need to urgently be implemented and faces several challenges (Ahloowalia and Maluszynski 2001; Oldach et al. 2011; Swaminathan 1998).

**Plant Mutation Breeding**

Since the 1950s, radiation has emerged as a prevalent means of plant breeding to extend variation across an extensive range of grain and flower plant (Oldach et al. 2011). The first spontaneous cereal mutant plants are originated in China 2317 years ago (Solanki et al. 2011; Van 1998). Furthermore, scientific records of spontaneous diversity in crop species have been made between 1590 to 1968 (Beyaz and Yildiz 2017).

**Application of gamma irradiation and associated mechanism**

With the aid of atomic particles, ionizing radiation is produced utilizing the process wherein one or more electrons are discharged during collisions of the particles with atoms or molecules (Thomas 2012). Regarding gamma irradiation, radioisotopes are produced electromagnetic radiation and nuclear reactors, from sources such as Cobalt-60, and Caesium-137 which have dangerous effects and permeate the cell (Bradshaw 2013). ~

**Conclusion**

Application of gamma radiation is used extensively to promote a novel cultivar in modern ornamental plant breeding. Although it can elicit adverse responses from plants through physiological and biochemical changes, it can compete successfully to produce predicted results for creating renewed varieties. Gamma irradiation has the potential to develop new varieties that require less time for establishments in different locations.

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**Tables**

**Table 1.** Number of officially released different Mutant ornamental plants (references in Maluszynski et al. 2000).

|  |  |  |
| --- | --- | --- |
| Scientific name | Name of the released mutant variety | Total number of mutant varieties |
| *Tulipa* sp. | Tulip | 9 |
| *Dahlia* sp. | Dahlia | 36 |
| *Hibiscus sp.* | Roselle | 3 |
| *Hibiscus* sp. | Hibiscus | 4 |
| *Begonia* sp*.* | Begonia | 25 |
| *Gladiolus* sp. | Gladiolus | 4 |
| *Lupinus luteus* L*.* | Yellow lupin | 3 |
| *Lupinus albus* L. | White lupin | 13 |
| *Chrysanthemum* sp. | Chrysanthemum | 232 |
| *Lupinus consentini* Guss | Lupin | 1 |
| *Lupinus angustifolius* L. | Blue lupin | 2 |
| *Dianthus caryophyllus* L. | Carnation | 18 |
| *Gerbera jamesonii* Bolus. | Gerbera | 1 |