DOI: 10.34101/ACTAAGRAR/2/5749

Comparison of the geranium (*Pelargonium*) pathological results of 2016–2017

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SUMMARY

The research was carried out in a Gyenes Flower gardening between 2016 and 2017 in Kecskemét. The gardening was founded in 1978. Initially, the main plants were gerbera (Gerbera) and yucca (Yucca), later replaced by the geranium (Pelargonium) cultivation as a result of market demand. In horticulture, there are about than 80 variety geranium of the standing, running, semi-trailer types and English gnawing. The Pelargonium had different sizes and colors. The study was set up in 1,000–1,000 pieces of geraniums each year. The following pathogens have damaged the geranium stock: Botrytis cinerea, Pythium debaryanum, with a rare occurrence of Alternaria porri, Phytophthora cryptogea. The greatest destruction was caused by botrytis (Botrytis cinerea). In the first experimental year, 42% of the 1,000 geraniums tested were infected with fungal diseases (30% B. cinerea, 8% P. debaryanum, 4% other fungi). In 2017, fungal infections were detected on 380 geraniums in the 1,000 tested geraniums (290 Botrytis cinerea, 70 Pythium and 20 other fungal diseases). In addition to the use of fungicides, we increased the spatial position of geraniums, early irrigation and frequent ventilation to ensure successful control. By 2017, we were able to reduce the damage caused by pathogens by 4 percent.

Keywords: *Geranium (Pelargonium), Botritys cinerea, garden, fungicide, 2016–2017*

INTRODUCTION

The geranium (*Pelargonium*) is part of the Geraniaceae family. Among the genus of the geranium there are annual or perennial herbaceous species, rarely woody (semi-shrubs or shrubs) (Nagy, 1975; Honfi et al., 2011). The most common species is the garden geranium (*Pelargonium hortorum*) (Szántó et al., 2003). To Europe, the first geranium (*Pelargonium triste*) was imported by the Dutch around 1600 from South Africa.

Today, the cultivated geranium species are of hybrid origin. The bloom depending on the variety and the season lasts 20–40 days. Geranium is an extraneous pollinating plant. In the geranium home country (South Africa), pollen mediated by the birds, while in Hungary the need for artificial pollination when the core recovery. Generally, fertility is poor. The germination strength is 71%.

The temperature requirement of the geranium moves within wide limits. Optimum temperature is 16–18 °C day and night of 12–14 °C vegetative periods. During cuttings it is 20 °C, but it can withstand 25–30 °C during the summer planting. It then blooms with the most intense water supply. The optimum temperature of the hybrid varieties is 18–24 °C (Dobay, 1998).

In addition to the optimal light conditions, the geranium develops and blooms favorably. With 25,000 lux illumination both in cultivation and outdoors, there is rapid growth, rich in flowering, rich in branching, stem does not stretch. It does not damage the 50,000 lux light when the required water content is available in the soil (Nagy, 1991).

Most of the geranium species live in their natural habitat in a dry, whimsical precipitation distribution area. Relative humidity should not exceed 70–75% in the glasshouse and foil. Particularly in the cool, dark, winter months, night and morning condensation are dangerous. If the temperature reaches the dew point, the water will precipitate on the glass, foil and drop into the plants, leading to the spread of the Botrytis (Glits et al., 1997; Glits and Folk, 2000). Winter irrigate geranium enough for 2–3 weeks.

The geranium species live in their original habitat on sandy humus soil. In cultivation, soil is not particularly demanding, just like other ornamental plants. The soils in the pH range of 6.3–7.2 are ideal. Nitrogen, phosphorous and potassium-rich, but excessive N content causes strong vegetative development, hindering flowering. The N deficiency causes short leaves with small leaves. Lime-rich sensitive, it induces chlorosis in plants. In the soil, the salt concentration cannot rise above 0.5% otherwise the lower leaves will be smothered by salt suffocation. Effective defense is frequent, abundant, relieving irrigation. Rooting medium consists of 70–80% peat, 20–30% clay minerals, 10–20% bark + 2.5–3 kg m^{-3} carbonated lime + 0.5 kg m^{-3} complex fertilizer (Nagy, 1975).

Soil disinfection is inevitable because the source of soil used in propagation and cultivation is very high. In addition to soil-fungi, bacteria and weeds, we find viral infected plant parts in the soil. The soil is disinfected by steaming at high temperatures at 92–95 °C for 4–6 hours (Gerbár, 1992).

The aim of the experiment is to determine what fungal diseases occur during the study period and what fungicides we can effectively control.

MATERIALS AND METHODS

The research was carried out in a Gyenes Flower gardening between 2016 and 2017 in Kecskemét. The gardening was founded in 1978, initially for gerbera (*Gerbera*) and yucca (*Yucca)* were their main crops, but switched to the geranium (Pelargonium) cultivation as a result of market (*Figure 1* and *Figure 2*).

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Figure 1: **Geranium seedlings**

Figure 2: **Experiment location**

The Gyenes Flower gardening distributed by Klasmann-Deilmann GmbH, Germany Company, Klasmann TS 3 types of peat used in the cultivation of geranium. The composition of Klasmann TS 3 is a medium decomposed white filler, 0–25 mm; chemical properties: pH (H_2O, v/v 1: 2.5) 6.0; Nutrient content (g/l): 1.0 and added nutrients: Nitrogen (mg N/l) 140; Phosphorus (mg P_2O_5/l) 100; Potassium (mg K_2O/l) 180; Magnesium (mg Mg/l) 100; Fe 13% EDTA. Physical properties: dry matter content <10%, water capacity 75–80%, air capacity 10–15% (http1).

The study was set up in 1,000–1,000 pieces of geraniums each year. The following pathogens have damaged the geranium stock*: Botrytis cinerea, Pythium debaryanum*, but rarely occurred *Alternaria porri, Phytophthora cryptogea*. The fungicides used in the experiment are listed in *Table 1*.

Table 1

The following fungicides were used in plant protection of geranium cultivation

Year	Fungicide	Active ingredient
2016	Signum	boscalid + pyraclostrobin
	Amistar Top	azoxystrobin + difenoconazole
	Polyram	metiram
	Dithane	mancozeb
2017	Signum	boscalid + pyraclostrobin
	Amistar Top	azoxystrobin + difenoconazole
	Polyram	metiram

RESULTS

During the experiment, the greatest damages were caused by botrytis (*Botrytis cinerea*). In addition, significant damage was caused by the fungal disease *Pythium debaryanum*, too. The chemical protection was carried out from March to November in both years (*Figure 3*). The results are summarized in *Table 2* and *Table 3*.

Figure 3: **The chemical protection of geranium**

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Table 2

Geranium (*Pelargonium*) pathological results of 2016

Pathogens	Year 2016	Total Geranium 1,000
Botrytis cinerea	30%	300
Pythium debaryanum	8%	80
Other fungal diseases	4%	40
Total diseases	42%	420

Table 3

Geranium (*Pelargonium*) pathological results of 2017

Pathogens	Year 2017	Total Geranium 1,000
Botrytis cinerea	29%	290
Pythium debaryanum	7%	70
Other fungal diseases	2%	20
Total diseases	38%	380

The Signum and Amistar Top fungicides were the most effective against Botrytis cinerea. Viral and bacterial diseases did not occur during the period under review.

DISCUSSIONS

Our study was carried out in 2016 and 2017 in a horticulture in Kecskemét, Hungary. During the experiment, the greatest damages was caused by botrytis (*Botrytis cinerea*). The Signum and Amistar Top fungicides were the most effective against of *B. cinerea*.

In addition to the use of fungicides, we increased the spatial position of geraniums, early irrigation and frequent ventilation to ensure successful control. By 2017, we were able to reduce the damage caused by pathogens by 4 percent.

ACKNOWLEDGEMENTS

This work was supported by Gyenes Flower gardening in Kecskemét (Bács-Kiskun County). Special thanks to student Nóra Pap.

REFERENCES

Dobay, I. (1998): *Pelargonium* – geraniump. In: Sarolta Czáka (ed.): Potted ornamental plants. Agriculture Publisher, Budapest 300., p. 92–112.

Gerbár, J. (1992): Geranium. Agriculture Publisher, Budapest. 97–120.

Glits, M.–Folk, Gy. (2000): Horticultural plant pathology. Agriculture Publisher, Budapest. 502–507.

Glits, M.–Horváth, J.–Kuroli, G.–Petróczi, I. (1997). Plant protection. Agriculture Publisher, Budapest. 457–460.

Honfi, P.–Szántó, M.–Tillyné Mándy, A. (2011): Geraniums. Cser Publisher, Budapest. 10–14.

http1://portal.nebih.gov.hu/documents/10182/287730/Klasmanncsalad.pdf/bd7c2190-f421-41bc-b2b7-36336d29f271 (April 2018)

Nagy, B. (1975): Growing of ornamental plants. Agriculture Publisher, Budapest. 263–269.

Nagy, B. (1991): *Pelargonium* (*Geraniaceae*) – Geranium.. In: Annual flowers. Agriculture Publisher, Budapest. p. 127., 94–95.

Szántó, M.–Mándy, A.–Fekete, Sz. (2003): *Pelargonium.* In: Flower beds and balconies. Association of Westphalian Diving Schools, Szombathely. 128 p.; 38–39, 70–73.