



RESEARCH ARTICLE

Investigation of in-situ changes in electrical behavior during one day with environmental effects of *Spathiphyllum spp.* and African violet (*Saintpaulia ionantha*)

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ABSTRACT

Plants play an extremely important role in environmental cleanliness by reducing harmful gases in the atmosphere. *Spathiphyllum spp.* and African violet (*Saintpaulia ionantha*) plants are widely found in many countries of the world, decorative inside. Since these two plants are commercially propagated throughout the world, they have economic importance at the same time. *Spathiphyllum spp.* also has a separate prescription due to its ability to clean some air toxins in the interior. Simultaneously monitoring, the frequencies and electrical voltage values per hour were measured by using oscilloscope for during one day on the leaves of these plants. African violet plant decrease and *Spathiphyllum spp.* increase are showed in frequency values especially at night and in the near morning. The change in voltage values in the *Spathiphyllum spp.* plant was particularly reduced in the morning and the changes were clearer until the evening, and the voltage change in the African violet plant was at very low levels.

Keywords: Frequency, electrical voltage, *Saintpaulia ionantha*, *Spathiphyllum spp.*

1. INTRODUCTION

People prefer to live in multi-storey buildings for various reasons. Particularly in winter, since the houses are much less ventilated, the harmful gases inside reach much more. Therefore, a wide variety of indoor plants can be used to remove these harmful gases from the interiors of our living spaces. The aim of this study was to investigate the changes in frequency and electrical potential difference of these plants for 24 hours (night-day) indoors.

Spathiphyllum spp. is a plants species known as peace grass with attractive white leaves and dark green leaves. It is a monocotyledon plant belonging to the Araceae family and contains about 40 species [1]. These plants are known for their ability to remove toxins from. It is a popular plant in the world and in our country and it is preferred as a decorative plant in the interior. *Spathiphyllum* is an economically important ornamental plant native to the tropical regions of America and Southeast Asia and grown all over the world [2]. These plants are known for their ability to remove toxins from indoor air as well as attractive flowers [3]. Thus are rated as a top

performer in NASA's clean air study. As with many other ornamental plants, plant propagation is also the main method in *Spathiphyllum*. Vegetative proliferation of these plants occurs with lateral and adventitious shoots [4].

African violet (*Saintpaulia ionantha*) is an important and popular species of *Saintpaulia*. It is domesticated, grown and commercialized and easily reproducible vegetatively [5]. African violets belong to Gesneriaceae, a large family of plants (about 2000 species, 125 genera), mostly tropical plants and shrubs, many of which are popular planted ornamental plants [6]. This plant has many different varieties in terms of flower color, leaf shape, vegetative structure, flowering time and flowering time [7,8]. Characteristic features such as visual appeal, ability to blossom under artificial light and vegetative propagationally ear round make the African violet popular indoor ornamental plant [9]. They have been subjected to intensive breeding by the horticultural industry for nearly a century and commercial *Saintpaulia* hybrids are popular ornamental plants in the rich parts of the World [10].

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Electrical stresses and frequencies of plants may change at different times of the day depending on the sun, physical situations and some other factors. Frequency and electrical stress can also change in seasonal changes, flowering, fruiting, leaf casting and stress conditions. Therefore, measuring the set values may give us some clues. In addition to that, frequency and electrical voltage measurement may be important to follow the health of the plant.

2. MATERIALS & METHODS

In this study, *Saintpaulia ionantha* and *Spathiphyllum spp.* the measurement of frequency and electrical tension per hour in a 24 hour cycle on the leaves of plants was measured simultaneously in two plants. Measurement of frequency and electrical voltage was made simultaneously with AA TECH-1022B Digital Storage oscilloscope for 24 hours every hour. Besides, Origin Pro -2015 is used as the computer software (Fig 1).

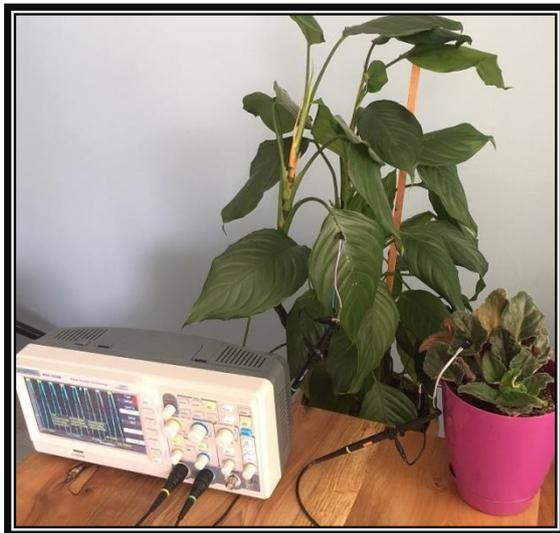


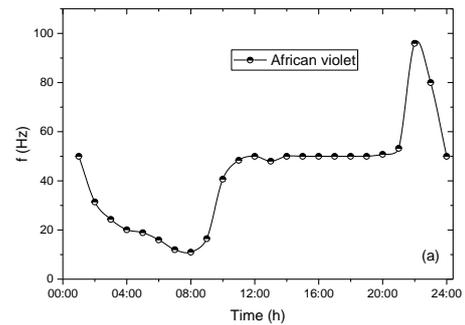
Fig 1. General image of frequency and electrical voltage measurement in plants of *Saintpaulia ionantha* and *Spathiphyllum spp.*

3. RESULTS & DISCUSSION

In *Saintpaulia ionantha* and *Spathiphyllum spp.* plants, frequency and electrical stress measurements were made every 24 hours and recorded. No literature similar to this study was found.

The frequency and electrical voltage measurements of the leaves of *Saintpaulia ionantha* (African violet) plant and *Spathiphyllum spp.* plant were recorded for 24 hours. These measurements were made side by side every hour (Fig 1). Frequency values of these two plants showed different values. The wavier and various frequency values were measured in *Saintpaulia ionantha* plant than *Spathiphyllum spp.* plant. Frequency values were measured around 10-15 Hz between 2 am and 9 am, between 10 am and 9 pm and between 12 pm and 1 am at 50 Hz in *Saintpaulia ionantha* (African violet) plant. Besides, the frequency values at night 10-11 were measured as 100 and 80 Hz respectively (Fig 2a).

(a)



(b)

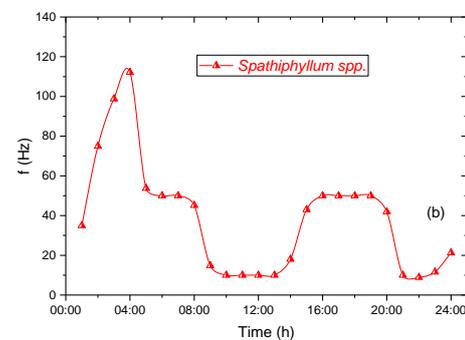
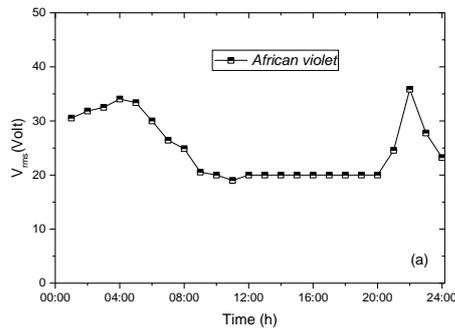


Fig 2. Time-dependent frequency change graph of a) *Saintpaulia ionantha* and b) *Spathiphyllum spp.*

The frequency measurements of *Spathiphyllum spp.* plant are shown in figure 2b. Frequency values between 9 and 2 in the day and between 9 and midnight were measured as 11 Hz. Frequencies between 3 pm to 8 pm and between 5 am to 8 am were measured at 50 Hz. Differently from these results, a value of about 80-125 Hz was measured between the night 2 and morning 4 (Fig 2b).

The electrical voltage measurements of *Saintpaulia ionantha* plant and *Spathiphyllum spp.* plant were as follows (Fig 3a and Fig 3b). Electrical voltage values in *Spathiphyllum spp.* plant were measured more fluctuated than *Saintpaulia ionantha* plant. The electrical voltage is usually measured at around 20 Vrms in *Saintpaulia ionantha* (African violet) plant. Differently, only around 35 Vrms at 5 am, 8 am and 60 Vrms at 10 am in the night were measured (Fig 3a). A fluctuating potential difference between 0-20 Vrms was generally measured in *Spathiphyllum spp.* plant. As a difference, only values between 80 and 120 Vrms were read at 9 and 10 in the morning. Additionally, low values such as 11-12 Vrms were measured between 11 am and 12 am in the day, between 2 pm and 4 pm, between 10 am and midnight (Fig 3b).

(a)



(b)

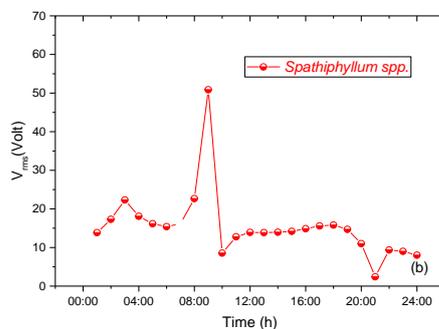


Fig 3. Time-dependent change electrical RMS voltage graph of a) *Saintpaulia ionantha* and b) *Spathiphyllum spp.*

4. CONCLUSION

Frequency and electrical voltage measurements made at each hour for 24 hours in the indoor environment generally showed an increase in frequency values near night and sunrise in the plants of *Saintpaulia ionantha* and *Spathiphyllum spp.* In African violet, frequency values generally decreased in the morning hours and increased at 10-11 at night. *Spathiphyllum spp.* the frequency values of the plant generally showed a decrease from morning to noon and from evening to night. Only an increase of 2-3 times in the morning hours was observed. The electrical voltage of this plant was increased 2-3 times in the morning and noon. Starting from this study, it is aimed to investigate the changes in frequency and electrical voltage by applying various stress conditions by increasing the number and variety of plants in

subsequent experiments. After this study, a research will be conducted by increasing the parameters of the same species in the indoor and outdoor areas.

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