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Research article

THE EFFECT OF MUSIC ON PHYSICO-CHEMICAL PARAMETERS OF SELECTED PLANTS

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ABSTRACT: This study was an attempt to understand the effect of music on plant growth and development. Eight medicinal and ornamental plants were selected for the study. Two sets of selected plants were prepared, one of them was subjected to rhythmic soft-melodious music, and a control set of plants was not exposed to any particular music. Music was played for fixed period for a month. After the treatment various growth and physiological parameters of treated plants were studied against the control plants. From the results, it was observed that plant growth in treated plants was better than control plants with treated plants especially showing increased level of various metabolites.
Key words: Soft-melodious music, plant metabolites.

INTRODUCTION

Music is an art form whose medium is sound and silence. It produces beauty of expression, emotion in significant forms through the elements of rhythm, melody, harmony and colour. A property of living things is that they respond to stimuli. Plants are complex multicellular organisms considered as sensitive as humans for initial assaying of effects and testing new therapies. Sound is known to affect the growth of plants and plants respond to music the same as humans do [1]. It also receives the same sound waves and could in fact be receiving some form of stimuli. Music can cause drastic changes in plants metabolism. Plants enjoy music, and they respond to the different types of music and its wave-length [11].

Little work has been done in this field wherein the plants have been subjected to different types of sound and the effects being monitored and analyzed. On the basis of literature review the present study was an attempt to test the music effect on plants through plant growth and biochemical analysis. Eight medicinal and ornamental plants were selected for the experiments.

MATERIALS AND METHODS

The selected plants were *Tagetes erecta* L., *Catharanthus roseus* L, *Trachyspermum ammi* L, *Dendranthema grandiflorum* L, *Hibiscus rosa-sinensis L.*, *Epipremnum aureum* L**.,** *Duranta repens* L., *Ocimum sanctum* L.) were collected from a nursery 'Van Chetna Kendra', Gandhinagar and saplings were planted in pots at green house of Department of Botany, Gujarat University. To investigate the effect of music on plants, two sets with three replica of each were prepared for the experiment. One set was exposed to the music and other set of plants was kept as control i.e. without any musical treatment. The music which was selected for the treatment of plants was a kind of soft and smooth music supplied by the normal 6Ω speakers for the 1 month of duration, in which music was played for 3 hours daily to the plants. After treatment plants were harvested and washed thoroughly with distilled water. Harvested plants were used for analysis of plant growth and various metabolites. The experiments were carried out in a completely randomized design with three replicates.

Chlorophyll were extracted from the leaves and estimated by the method of Arnon. Estimation of Total Sugars and Reducing Sugar was done in plant extracts by the protocol given by Nelson [7]. Starch was estimated by the method of Chinoy [4]. Estimation of Protein was done in plant extracts by the method of Bradford [2]. Total phenols were estimated by using the method described by Bray and Thorpe [3].

RESULTS

Music and plants are scientifically related to each other. When music was applied to the plants, they showed some drastic responses and affect both morphologically and physiologically.

Effect of music on plant growth

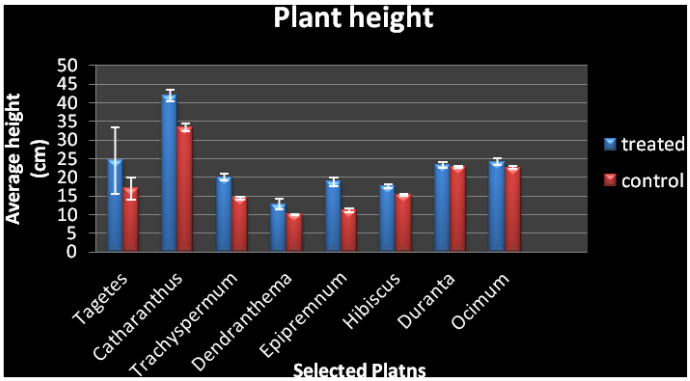

Fig 1. Effect of music on plant height. Values represent mean ± S.E. (n = 3).

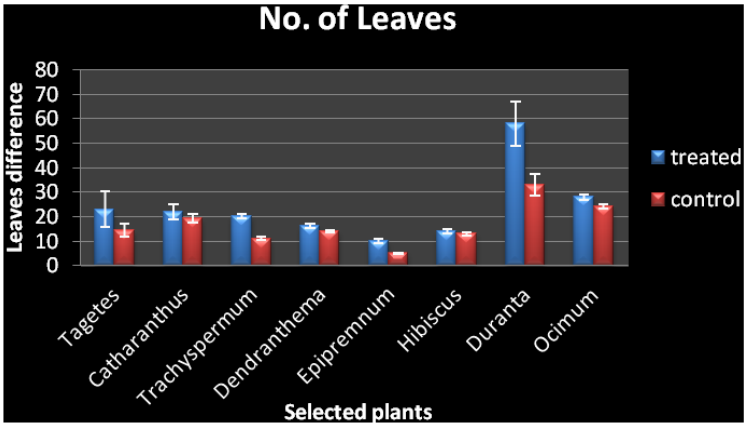

Fig 2. Effect of music on Leaf number. Values represent mean ± S.E. (n = 3).

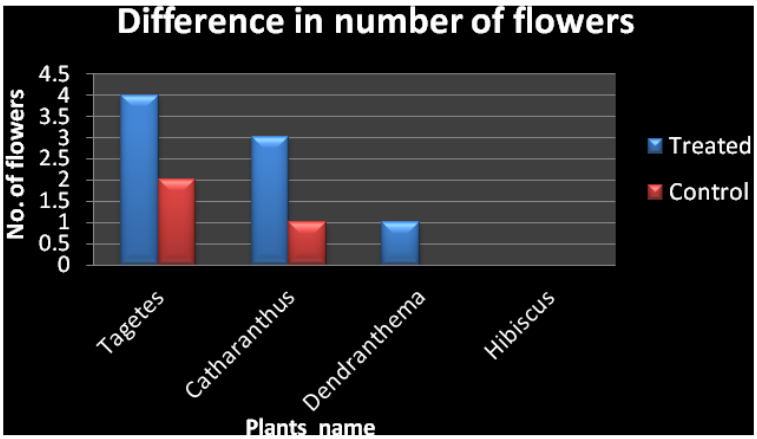

Fig 3: Music effect on number of flowers

Table-1: Music effect on budding and flowering time

S.NO	SET NAME	PLANTS NAME	DAY OF OCCURENCE OF BUD	DAY OF OCCURENCE OF FLOWER
1.	TREATED (With music)	*Tagetes erecta* L.	19th day	25th day
2.		*Catharanthus roseus* L.	25th day	28th day
3..		*Dendranthema grandiflorm*	21st day	29th day
4.		*Hibiscus rosa-sinensis L.*	No bud	No flower
1.	CONTROL (Without music)	*Tagetes erecta* L.	21st day	29th day
2.		*Catharanthus roseus* L.	26th day	30th day
3.		*Dendranthema grandiflorm*	30th day	No flower
4.		*Hibiscus rosa-sinensis L.*	No bud	No flower

When plants were exposed to the soft melodious music then it showed noticable changes in plant growth. The height of the plant in treated set is more than the control one. Plants like *Tagetes, Catharanthus, Trachyspermum* and *Epipremnum* shows the best result. (Fig 1).Number of leaves also increased in treated plants as compare to the control plants. Treated plants like *Tagetes, Trachyspermum, Epipremnum* and *Duranta* shows more increased in number of leaves. (Fig 2).When music is applied to the plants flowering was also affected as number of flowers were more in the treated set. Plants like *Tagetes, Catharanthus* shows more number of flowers in musical plants. (Fig 3). Music also effect the time of flowering, as bud and flower occurred one week earlier in musical plants as compare to the control ones. (Table-1).

Effect of music on plant metabolites

Results showed that music not only affects the plant growth, but it also affects the concentration of various metabolites.

When the music was applied to the plants then there was increase in the concentration of total sugar and reducing sugar in treated plants as compare to the control one. Plants like Catharanthus, Dendranthema, Trachyspermum and Duranta shows the best result. (Fig 4 & 5). When plants were exposed to the music, it affects the concentration of Phenols. Treated set shows the best result as compare to the control one (Fig 6). There was increase in the concentration of protein content in the treated set and plants like Dendranthema, Hibiscus, Tagetes, Ocimum had the much higher concentration in treated set (Fig 7). Plants of treated set (Catharanthus, Hibiscus, Duranta, Tagetes, and Ocimum) shows increase in the concentration of starch as compare with the control one (Fig 8). Concentration of chlorophyll also increased in the plants which were treated with the music. Trachyspermum and Duranta had the higher amount of chlorophyll in treated set as compare to the control ones (Fig 9).

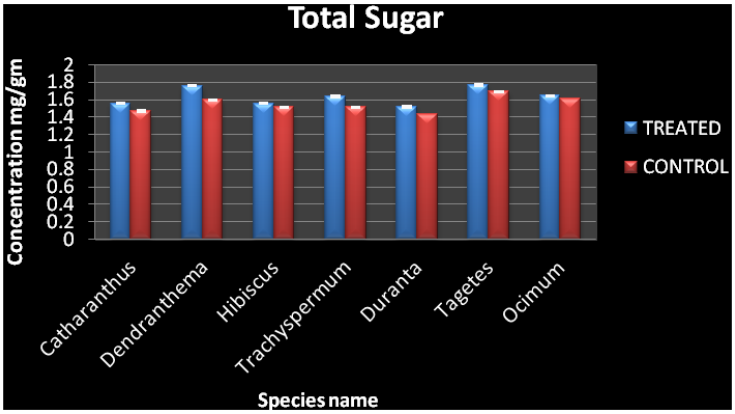

Fig 4. Concentration of Total sugar. Values represent mean ± S.E. (n = 3).

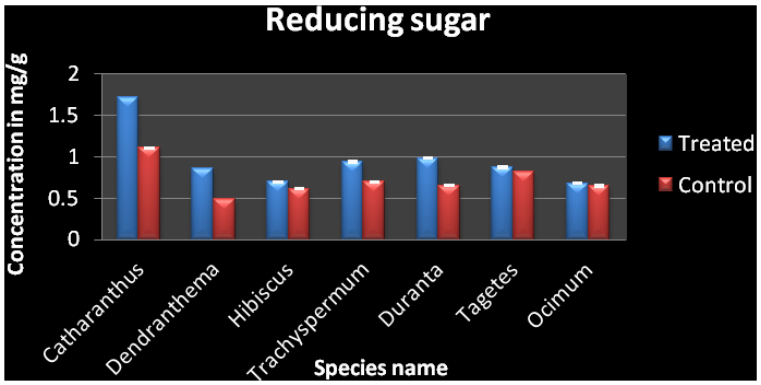

Fig 5. Concentration of reducing sugar. Values represent mean ± S.E. (n = 3).

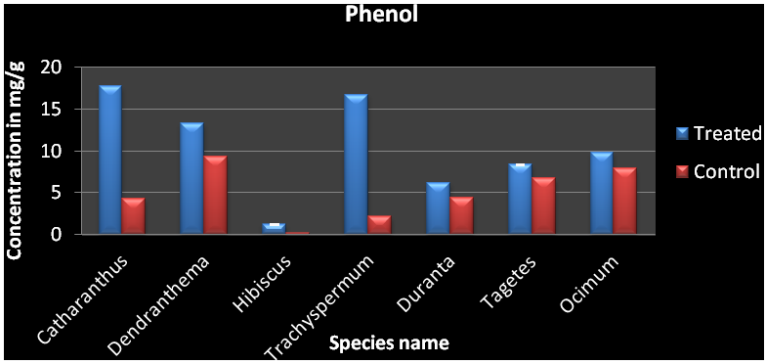

Fig 6. Concentration of Phenol. Values represent mean ± S.E. (n = 3).

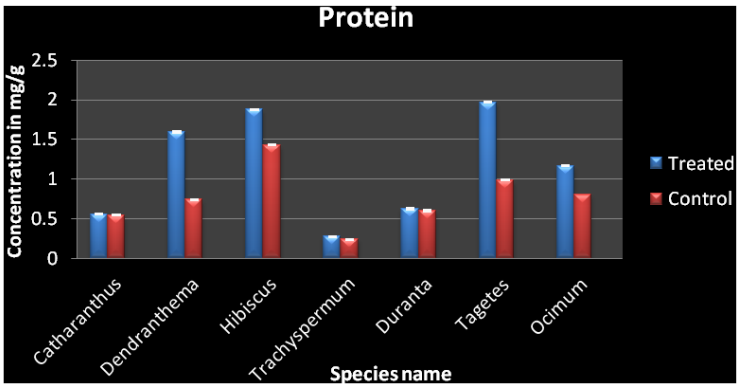

Fig 7. Concentration of Protein. Values represent mean ± S.E. (n = 3).

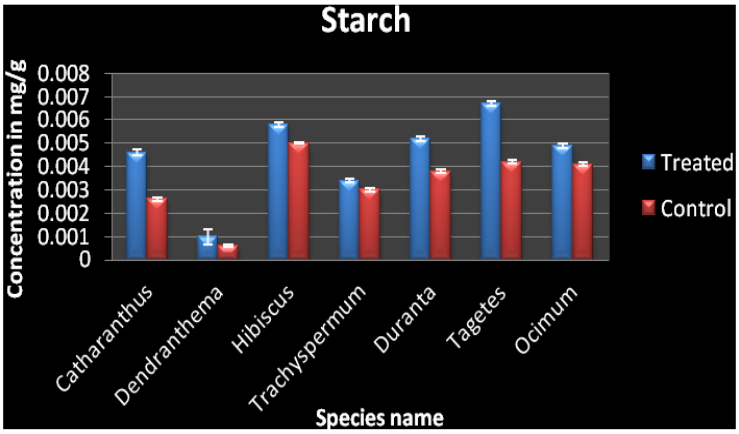

Fig 8. Concentration of Starch. Values represent mean ± S.E. (n = 3).

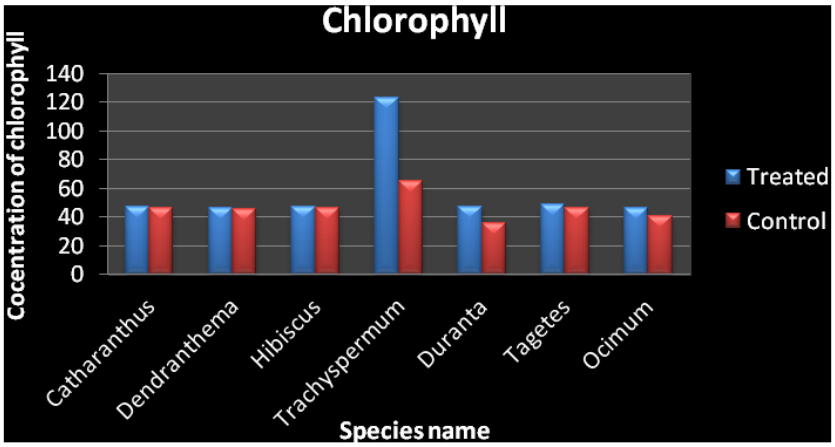

Fig 9. Concentration of Chlorophyll. Values represent mean ± S.E. (n = 3).

DISCUSSION

Our experiment shows that plants respond to sounds in profound ways which not only influence their overall health but also increase the speed of growth and the size of the plants [6]. Science is now showing that soft sounds actually influences the growth of plants. In this experiment the height of the plants increased in treated plants, so this result was similar to the experiment done by Chatterjee *et al*, [5], when plants were exposed to music, then the height of the plant increased and they became healthier. Music therapy also increases the number of leaves and the number of flowers as compared to the plants which are not exposed with the music. This has also been observed by Singh, [10]. Flowering was advanced and the flowers occurred one week earlier in treated set than the control one. Music was actually influencing the plant growth and in a similar manner, it was affecting the plants biochemically also. If plants were exposed to the music then there was also a change in the concentration of these metabolites. The result is similar to those obtained. Chlorophyll is the most important green pigment of the plants and Music increases the amount of chlorophyll and starch content in the plants.

CONCLUSION

It is concluded that when melodious music therapy is applied to the plants, then plants shows positive results. Plants grow faster when exposed to the music. Music also greatly influences the concentration of various metabolites. Hence this musical concept can be very useful in the field of Biochemistry, Horticulture, Physiology and ecology. Music can be used in plant nurseries. The knowledge can be applied in agriculture to increase the yield. This idea may help to solve the problem of starvation and world hunger in the future.

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