Effect of types of sound (music and noise) and varying frequency on growth of guar or cluster bean (cyamopsis tetragonoloba) seed germination and growth of plants.

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ABSTRACT

This project is an attempt to show how the rate of growth plant species was affected by sounds of varying frequencies and types of different sound (music). The common guar or cluster bean. Cyamopsis Tetragonoloba plants was selected because of their relatively seasonal and fast growing rates. In 13 plant sets; One of plant was used as a control for the untreated, and the other 12 plants were subjected to sounds of different frequencies and types of sound (music). 4 sets of silent classical music second 4 sets of rhythmic rock music and third 4 sets of non-rhythmic traffic noise are being played by normal speakers daily 1 hour at roughly the same sound intensity by varying frequencies lower frequency (50-100) and higher frequency (1500-2000) With in 4 sets 2 were kept near (25cm) according to lower (50-100) and higher (1500-2000) frequencies and 2 were kept far (550cm) according to lower (50-100) and higher (1500-2000) frequencies. The parameters such as number of seeds germinated in petri-dish plates every day, difference in height of plants and number of leaves are all monitored in every two days for regular basis till 13 days because after 13 days there is not significant change is seen in plants. The results show that the plants are able to distinguish between silent classical music, rhythmic rock music and non-rhythmic traffic noise and by varying frequencies; and also definitely showing positive effect on exposure to silent classical music and rhythmic rock music and in some case mixed and some case negative effect of non-rhythmic traffic noise compare to control or untreated plants.

INTRODUCTION

Musical sound has a significant effect on the number of seeds sprouted compared to noise and untreated control and sound vibrations directly affect living biologic systems [1]. Sound is known to affect the growth of plants. Seeds are sometimes treated with ultrasound to help start the germination process [2,3]. Neurophysiologic studies have indicated that human physiologic processes are affected by music, but they have concentrated on how our brains process music and where the neural interactions are focused rather than on systemic physiologic effects [4]. Sound vibration can stimulate a seed or plant [5]. Studies in the audible frequency range have examined effects on seed germination [6,7]. They have focused on single frequencies in an attempt to map responses as a function of frequency [8-12]. However, these studies did not look at dynamically organized sound with the complexities of musical sound[13]. The author, A.E. Lord, performed random noise experiments on coleus plants in which one group was subjected to random noise and a second group was used as a control. Lord came to the conclusion that botanists had not carried out sufficient experiments to show causes behind the effects that he observed, and he put forward the idea that the rate of water transpired out of the leaves is affected by the
sound. Transpiration, in turn, affects growth. Typical leaf structures and the topic of transpiration can be found in textbooks on botany [14]. Foliage planted along freeways to reduce noise pollution often grows differently than foliage planter in a quiet environment [15]. Sound waves have been used for different types of experiments not only on bacteria but also certain parts of plants that react to the sound waves and optimization of chrysanthemum callus growth can be altered with different sound wave frequencies, strength and loading time[16]. The radio sensitivities of different plants has shown considerable variations [17]. Sound wave can accelerate growth of plants and the stimulation of sound wave has an obvious effect on the growth and development of plants [18]. Certain reports indicate that plants enjoy music, and they respond to the different types of music and their wave-length [19]. Optimum plant growth occurs when the plant is exposed to pure tones in which the wavelength coincides with the average of major leaf dimensions. Seeds of guar or cluster bean (cyamopsis tetragonoloba) plants were collected from Anand Agriculture University (AAU), in Anand; and potted at equal depth of 3/4 inch inside the soil. And this project is held in ARIBAS.

![Fig1: difference in number of seeds germination](image)

**Fig1:** difference in number of seeds germination

**MATERIALS AND METHODS**

Seeds of guar or cluster bean (cyamopsis tetragonoloba) plants were collected from Anand Agriculture University (AAU), in Anand; and potted at equal depth of 3/4 inch inside the soil. And this project is held in ARIBAS.
New Vallabh Vidhyanagar in physics laborato- ry. The pots were divided into different sets and labelled as control, classical music, and rock music and traffic noise. Each set was kept in the same environmental conditions and were receiving the same external sound. The sound exposure was given for one hours both low frequency (50-100) and high frequency (1500-2000) as soon the seeds germinated in petri-dish plates and pot experiment. The petri-dish plates and pots were kept at a distance of (25cms) near and (550cms)far from the speakers and silent classical music second 4sets of rhythmic rock music and third 4sets of non-rhythmic traffic noise were played to the set labelled music using normal laptop with speakers. The control was given no external sound exposure. The volume of the selected sound pieces and the piece of music played was constant throughout the exposure period (13 days). The height of the plants was recorded every 2 days using a measuring scale which went along with the stem of the plant. Numbers of leaves were counted every 2 days.

RESULTS AND DISCUSSION

Seed germination recorded everyday till germinated all seeds in petridishplates. The difference in germination of seeds were maximum for the plants exposed to at near (25cm) at low(50-100) and high(1500-2000) frequency in silent classical music in 4th day and also maximum for the plants exposed to at near (25cm) and far(550cm) at high(1500-2000) frequency in silent classical music in 7th day, followed by the plants exposed to rhythmic rock music maximum germination rate observed in near(25cm) ;far(550cm) at low(50-100) frequency; and near(25cm) at high(1500-2000) frequency in 4th day and also maximum for the plants exposed to both near (25cm) and far(550cm) at low(50-100) and high(1500-2000) frequency in rhythmic rock music in 7th day and when non rhythmic traffic noise exposed to plants seed germination rate would be maximum in near(25cm) at high (1500-2000) frequency and same for the plants exposed to at near (25cm) and far (550cm) low (50-100) and high(1500-2000)
frequency in traffic noise in 7th day (Fig1). The control set showed the minimum difference compare to other frequencies and types of sound. That means that musical sound (25cm) at high frequency(1500-2000) then with high(1500-2000) frequency has definitely helped in better growth of the plant and same effect in traffic noise in case of seed germination in petridishplates. Therefore, the plants with no external sound or untreated control being played showed slower growth. Height recorded every two days for regular basis till 13days in pots of guar plants. The difference in height of guar plants were maximum according to near(25cm) at high(1500-2000); near(25cm) at low (50-100); far(550cm) at high(1500-2000); near(25cm) at low(50-100); far(550cm) at high(1500-2000) and then near (25cm) at low(50-100) frequency in silent classical music compare to control in 13days and, followed by the plants exposed to rhythmic rock music maximum growth rate observed in far(550cm) at high(1500-2000) and then according in near(25cm) at low(50-100); far(550cm) at low(50-100) frequency in silent (550cm) at high(1500-2000); near(25cm) at classical music compare to control in 13days high(1500-2000) and far(550cm) low(50-100) and, followed by the plants exposed to rhythmic rock music compare to mic rock music maximum growth rate observed 13days and when non rhythmic served according in far(550cm) at high(1500-2000)
2000); near(25cm) at high(1500-2000); near (1500-2000) frequency; near(25cm) and far (550cm) in particular. For plants, both silent classical music and rhythmic rock music are proving to be beneficial. silent classical musical sound is showing better results at some places but the results are very close. and in case of traffic noise plants feel stressed condition. Hence it can be concluded that the mechanical perturbation produced by sound in the physical environment of the plant, is what matters more than the type of sound and varying frequencies which the plant encounters be it silent classical music; rhythmic rock music and non rhythmic traffic noise by applying varying frequencies.

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