



# In Search for Resilient Ways to Food Production: Prospect of Application of Devotional Music as Input for Plant Growth and Development

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## Abstract

The sustenance of life on this planet depends not just on food but on quality food with safe environmental conditions. The environmental and ecological milieu are the basis for life and living. Human-centred actions have most often created many problems in global health. It is high time to reconcile the odds in different human development sectors. The global food production system is one such area that is demanding a modest transition from a chemical-rich production system to more sympathetic and eco-friendly approaches. This paper highlights a novel application of devotional music as an alternate source of clean energy to boost agricultural production. Devotional music has been found to enhance germination and vegetative and reproductive growth in Mung bean plants. Enhanced physiological growth in Mung bean crops was substantiated by an improvement in the synthesis of plant metabolites upon application of devotional music. This field of research deserves attention for the development of sustainable ways of food production.

## Forewords

Our environment is a complex whole with components, relationships, dependence, and consequences. The environmental balance is very intricate and intriguing. Humans are the most intelligent of all beings on this planet and have the highest responsibility to be rational for the survival of their own race as well as others.

## Environment and Human Civilization

Environment and ecology are the platforms for human action and sustenance. Most often civilizations have centered around human development. Human tryst for such development has revealed that numerous civilizations met their end on account of severe destruction of the environment. Our existential truth is a reality on account of a complex harmony that exists in this creation, especially with our immediate environment and ecology where we live in. If we take a deep look at the development of human civilizations then we will find that in this modern time, we are facing a lot more problems than ever before. Human activities have created a host of pathos in the environment



that we live in. Ease to life has come with a huge environmental cost, pollution has engulfed the air we breathe, the water we drink, and the soil we produce our food. Our development has come with a sacrifice of a huge species and life forms, those remaining are struggling against the possessive warfare of the ambitious human race; at many an instance, their own race is in the plight of hunger and devoid of the basic securities of life. "Environmental problems have contributed to numerous collapses of civilizations in the past. Now, for the first time, a global collapse appears likely. Overpopulation, overconsumption by the rich, and poor choices of technologies are major drivers; dramatic cultural change provides the main hope of averting calamity" (Ehrlich & Ehrlich, 2013). It is time for us to act sensibly to the melancholic outcry of the environment. It is time that we solemnly take an oath to develop a cultural heritage that is pro-environmental and that takes care of the sustenance of one and all as a part of a harmonious whole.

## Food Security and Global Environmental Issues

The emission of greenhouse gases due to human activities has led to global warming; a considerable rise in global temperature has resulted in the melting of polar ice caps, leading to rising sea levels, and flash floods. Indiscriminate falling of trees and encroachment of forest land to make way for modern settlements have badly affected the biodiversity, ecological balance in the environment, and provision of required carbon sink. Population pressure, the need for modernization, and industrial development has given rise to chemical-based intensive agriculture to feed a burgeoning population from an ever-dwindling land resource. According to estimates compiled by the Food and Agriculture Organization (FAO), by 2050 we will need to produce 60 percent more food to feed a world population of 9.3 billion. Doing that with a farming-as-usual approach would take too heavy a toll on our natural resources (United Nations, n.d.). "Pesticides are among the leading causes of death by self-poisoning, particularly in low- and middle-income countries. The Food and Agriculture Organization of the United Nations (FAO) estimates that, in developing countries, 80% of the necessary increases in food production to keep pace with population growth are projected to come from increases in yields and the number of times per year crops can be grown on the same land. Only 20% of new food production is expected to come from the expansion of farming land. Pesticides can prevent large crop losses and will therefore continue to play a role in agriculture. However, the effects on humans and the environment of exposure to pesticides are a continuing concern" (WHO, 2018). Resultant pollution from industrial growth and chemical-based agriculture has almost snatched us of everything pure, clean, and safe. The very soil, which is the home for diverse life including plants, is on the verge of extinction. "Today, 33 percent of land is moderately to highly degraded due to the erosion, salinization, compaction, acidification, and chemical pollution of soils.



Further loss of productive soils would severely damage food production and food security, amplify food-price volatility, and potentially plunge millions of people into hunger and poverty” (FAO, 2015). All forms of life are now under the sacrilege of development that the most intelligent race has performed on this planet. This calls for the utmost attention to evolve nature-friendly ways of living and development.

“We have no choice but to embark on a greener revolution. We can sustainably increase crop production by using a range of techniques that are more in tune with ecosystems by minimizing the use of external inputs and by helping farmers cope with the weather extremes that increasingly accompany climate change, thereby enhancing their resilience and reducing greenhouse gas emissions. This is a kind of farming that is useful and accessible to small-scale farmers by being adapted to the conditions they face with emphasis on local crop varieties, and harnessing traditional knowledge to sustain, rather than fight, natural ecosystem processes” (Da Silva, n.d.). We need to gradually shift from chemical-based agriculture to more nature-friendly options for getting a good harvest from our fields. We need a greener revolution without harmful external inputs, but the challenges of population pressure and world food requirements simply indicate that we do not have a choice away from intensive agriculture and external inputs. Can't we find more intelligent and natural inputs? It seems that we ought to investigate some unattended dimensions of plant life, plant science, and also some aspects of science beyond this physical science.

## In search for resilient ways to food production

Existential universe whether seen or unseen, in its pure and most basic form consists of energy that resonates as a vibratory frequency or pattern. Even every thought and every feeling has its own vibration. The physicist Albert Einstein says “Everything is energy and that is all there is to it. Match the frequency of the reality you want and you cannot help but get into that reality. It can be no other way. This is not philosophy, this is physics.”

The words of Albert Einstein give us the subtle dimension of the universe we look at. It also opens a dimension to us the human beings that desired outcomes could be achieved through the subtle approach of frequency matching. Vibration is the internal state of matters. Everything in the universe exists as a differential level of vibration. So, we have liberty of thought that the vibrational state of matters or entities, be it insentient or sentient could be manipulated, harmonized, or disharmonized and its effect could be studied, organized, and formulated into a body of science to obtain desired outcomes.

Indian Vedic Scripture provides definite cues towards this understanding, it states that this physical world is created out of nothing, which means out of nothing that is material or to say that which could not be talked about in terms of physics. In Indian spiritual science, it is stated that the universe is not created as such but it has unfolded



from the supreme or some supreme power. The Vedic Scriptures (Taitairaiya Upanishad) state that from Atma (the Soul Universal) was born the Askash (the Space) from Akash the Vayu (the Air); from Vayu the Agni (the fire) from the fire the Apaa (the Water) and finally from Water the Prithivi (the Earth). These are also referred to as the Panchamahabhuta. "The word panchamahabhuta is made up of three words: 'Pancha', 'Maha' and 'Bhuta'. 'Pancha' means five, 'Maha' means great, and 'Bhuta' means that which exists. All the living and non-living objects in the universe are made up of panchamahabhuta. Therefore, Panchamahabhuta is the five fundamental elements responsible for the creation of the universe, including humans. Every individual has a unique panchabhautik constitution. This constitution remains in a state of equilibrium in health and any imbalance results in disease. It is crucial for healthcare providers to identify panchabhautik imbalance and should have the capability to restore equilibrium"(Charaksamhitaonline, 2021). These Panchamahabhutas are associated with Panchatanmatras. Panchatanmatra is the five perceptions or subtle elements that are the objects of the five senses. The term comes from the Sanskrit, Pancha, meaning "five"; Tan, meaning "subtle"; and Matra, meaning "elements." The pancha tanmatras are; Shabda (Touch), Sparsa (Touch), Roop (Form/ Vision), Rasa (Taste) and Gandha (Smell). The panchatanmatra comprises the information through which we sense or experience the external world. Another translation of Tanmatra is "mother of matter," meaning that the panchatanmatra represents the mother energy of the world. The panchatanmatra also combine to produce the gross elements that comprise the universe; Ether element from sound, Air element from sound and touch; Fire element from sound, touch, and sight; Water element from sound, touch, sight, and taste and Earth element from all five tanmatra (Yogapedia, n.d.). So, Vedic scripture reveals that Sound (Vibration) is the primordial cause of this material universe. In Sanskrit, it is also called Shabda Brahma. Shabda Brahman is the transcendental sound, the cosmic sound. In Sanskrit, Shabda means Sound or Word and Brahman means the Supreme Self or the Absolute of the Universe (Yogapedia, n.d.). This means the Supreme, the Absolute first manifests as sound vibration towards the creation of this universe, and therefore it is the basis of all living and non-living entities in the world. This is very much in tune with what Einstein has to say that everything in the universe is but energy/or vibration. So, a vibrational manipulation in the form of sound, in the form of a classified sound that is music can give us the required dimension of action research we are searching for.

The dimension of life in plants attracted the attention of scientists when the vitalities of plants were for the first time captured in the crescograph of Acharya Jagadish Chandra Bose in 1901. Achary Bose did pioneering research to demonstrate that plants have an electromechanical pulse and a nervous system and that plants are intelligent beings and are capable of remembering and learning(Tandon, 2019). Tandon also remarked that it was hard to believe in such investigation during his time and once



accepted with reluctance, there was practically very little activity in the field for the next several decades. More than a hundred years later, recent advances in molecular biology, genomics, ecology, and neurophysiology have led to renewed interest resulting in a flurry of activity, confirming most of Bose's observations. Today plants are regarded as conscious beings, possess their own system of perception and expression, and are capable of receiving and storing information, associative learning, remote sensing, and connecting them with other beings and such actions are visible not only at the levels of the plant as a whole organized system but even at the mere cellular level (Tompkins & Bird, 2004). Plants are equally adept in reacting to their ever-changing environment as animals and humans. Intelligent behaviour in plants is exemplified by their exceptional versatility to deal with abiotic stresses as well as microbial and insect attacks by balancing appropriate defensive mechanisms (Van Loon, 2016). Plants have their own system of signaling even beyond the known determinants of communication like volatile chemicals, direct physical contact, or changes in infrared light wavelengths. Plants are endowed with mechanisms for sensing and transduction of naturally occurring and fluctuating geophysical waveforms of both magnetic and acoustic origin (Gagliano et al., 2012). Research has mostly focused on Light, Temperature, Water, Air, and Nutritional impact on the plant but sound as a stimulus, as input for plants lacked emphasis, in fact, sound does play an extremely important role in communication and signaling in the plant for intelligent behavior at physical, chemical and genetic levels (Mishra et al., 2016). Plant growth is sum-total of cell proliferation and elongation, and apart from basic nutritional requirements plant's relationship to environmental stimuli like light, temperature, air, and sound determines its growth. All stimuli can play a negative or positive role depending upon the specific need of the cells or the plant species so is for sound. Sound waves with specific frequencies and intensities can have positive effects on various plant biological, biochemical, and physiological activities including seed germination, root elongation, plant height, callus growth, cell cycling, signaling transduction systems, enzymatic and hormonal activities, and gene expression (Chowdhury et al., 2014).

When sound and vibration are the primordial cause of this gross existence, when plants are extremely sensitive to external stimuli, when plants are especially adept at perceiving sound vibration for their existential realities, when music has so much of health benefits for human beings we should simply have the ease to speculate that music as an inputs for plants in addition to other natural inputs like air, water, light, temperature and soil nutrients can play a determinative role in the growth and development in a resilient way.



## Some remarkable footprints of past research initiatives

Analysis of RNA-Seq and microRNA-Seq using tomato fruits treated with optimized sound waves to attenuate fruit ripening revealed sound-specific microRNAs, which could be used as sound-specific biomarkers in tomato Sk et al. (2018). These research findings provide strong molecular evidence of sound perception in plants. Chandrakala & Trivedi, (2019) reviewed that music had a positive effect on seed germination due to enhanced metabolic rate of growth and development. The frequencies in these vibrations facilitate physiological processes like nutrient absorption, photosynthesis, protein synthesis, and the overall development of healthier plants with better yields. Exposure of seedlings and mature plants to green music, classical music, and nature sounds, Gayatri mantra, Pirith, elevated the levels of polyamines and increased the uptake of oxygen. The positive impact of music was observed on plants like wheat, spinach, horse gram, soya, and paddy; and there is an immense scope to exploit music as a tool for breaking seed dormancy and enhancing the yield. Roy Choudhury & Gupta (2015), in their germination experiment on *Cicer arietinum* (chickpea), revealed that throughout the period of germination and development of the saplings, those exposed to Indian Light Music had higher germinated seedlings and seedlings were blooming better compared to the control saplings. They also opined that soft rhythmic audible frequencies must have affected the absorption of nutrients and formation of metabolites in the plants and thus expedited germination of seeds, growth, and development of plants. Ankur, (2016) reported that higher elongation of the shoot was observed in Mung Bean (*Vigna radiata*) when exposed to Vedic chanting in comparison to control as well as discouraging words. Hanaa F.A. Abd El-Rahman (2017) reported that exposing *Salvia officinalis* plants to classical music twice per day promoted growth, oil percentage, and leaf pigments. Laad & Viswanathan (2010) in their experiment with the effect of string instruments (Violin and Veena) found a positive impact on the growth of *Trigonella Foenum graecum* (Fenugreek) exposed to Violin and Veena at a frequency of 1500 Hz and intensity of 50dB. The content of chlorophyll A, chlorophyll B, Carotenoids, Carbohydrates, and Protein were higher in the plants exposed to the sounds of string instruments.

Research on plant bioacoustics conducted by scientists all around the world, like Yu et al. (2013), Sulong et al. (2016), Hanaa F.A. Abd El-Rahman (2017), Munasinghe et al. (2018), Roy Chowdhury & Gupta (2015), Massoumi et al. (2018), Chivukula & Ramaswamy (2014) and others has led us to a consensus that sound in the form of pure tone sound wave, music, classical music, chanting, etc. have a definite impact on plant growth and development. The impact of sound on plant growth has varied when the quality of sound has varied from noise to rhythmic music; from hard rock to mild music; from light music to a symphony and classical music and so on. Thus,



reviews of the literature give a general understanding that the qualitative aspect of sound in acoustic research does play a very important role in the impact observed.

## A novel approach to bioacoustics research with devotional music

In a bid to further improve the quality of acoustic inputs that could be delivered to plants for better growth and development references were drawn from the Indian spiritual scriptures, where in an essence was drawn that the power of God's name is held supreme in Indian spiritual science. God resides in each of his names with full potency. Singing of God's name, beauty, glory, and past-time in a contemplative disposition is conceived as the ultimate source of bliss (Kripaluji Maharaj, 2009)(Krishnadas Kabiraj, 1993)(Thakur Vrindavandas, 1995). It has been emphasized that the meditative intention of an action affects the outcome of the action (Haid & Huprikar, 2001).

Here it may be elaborated that Sri Chaitanya Mahaprabhu has greatly emphasized the role of god's name in fulfilling the eternal purpose of human life in his advice named "Shikshastak" or "Ashtapadi". Some of the verses from the Astapadi may be presented as under: -

**ceto-darpaṇa-mārjanam bhava-mahā-dāvāgni-nirvāpaṇa  
śreyaḥ-kairava-candrikā-vitaraṇam vidyā-vadhū-jīvanam  
ānandāmbudhi-varধানam prati-padam pūrṇamṛtāsvādanam  
sarvātma-snapanam param vijayate śrī-kṛṣṇa-saṅkīrtanam**

In explanation to the above verse Sri Kripaluji Maharaj in "Bhagavannama Mahatmya" signifies that chanting the name of Shri Krishna cleanses the mirror of the heart and extinguishes the blazing fire of misery in the form of the repeated cycle of birth and death. It is like the radiance of the moonbeam which causes the lily of eternal good to blossom in the nectar of the divine name. It is the very life of all transcendental knowledge. Every utterance of the divine name gives a full taste of its nectarine sweetness that swells in the heart of the chanter, like a surging ocean of everlasting Bliss and Peace.

**nāmnām akāri bahudhā nija-sarva-śaktis  
tatrārpitā niyamitaḥ smaraṇe na kālaḥ  
etādṛśī tava kṛpā bhagavan mamāpi  
durdaivam īdṛśam ihājani nānurāgh**

O my Lord, Your holy name alone can render all benediction to living beings, and thus you have hundreds and millions of names, like Kṛṣṇa and Govinda. In these



transcendental names, you have invested all your transcendental energies. There are not even hard and fast rules for chanting these names. O my Lord, out of kindness You enable us to easily approach You by Your holy names, but I am so unfortunate that I have no attraction for them (Kripaluji Maharaj, 2009).

The impact of the divine name of God is not restricted to human beings alone the verses that follow from the Chatanya Charitamrita and Chaintany Bhagwat will reflect its impact on lower beings as well.

**pashu pakshi keetadi balitena pare  
shunileya harinam tara sab tare.**

C B Adi Khanda 16.280(Thakur Vrindavandas, 1995)

It is being said that animals, birds, and insects who do not have the ability to sing God's name too receive the benediction of God upon hearing the chanting.

**Uchha kari karile Govinda sankirtan  
Jantu matra shuniai pai bimochan**

C B Adi Khanda 16.286(Thakur Vrindavandas, 1995)

Glories of God sung aloud help the animals to attain liberation from the savagery of their animal life when hear by them.

Lord Chaitanya thus stressed that the chanting of the Hare Krishna maha-mantra is the easiest means of self-realization. Loud public and congregational chanting and singing when enters the ears one gets absorbed in the sound vibration. Once it enters into the consciousness it purifies the mind and awakens dormant love for the supreme. This format of loud congressional singing or sankirtan not only benefits humans but animals, plants, and other lower creatures as well.

Hence, devotional music comprising of the singing of the name, beauty, glory, and past time of God was perceived as a source of supreme energy, and the required frequency matching for good health at physical, mental, or psychological and obviously at spiritual level might be possible for all living beings with devotional singing or with an exposure to devotional music in a contemplative disposition.

## **Some remarkable outcomes of exposure of crops to devotional music**

Systematic research on the effect of devotional music on crops was initiated in the year 2019 at Braj Gopika Seva Mission, at Tutumberpalli, Tangi, District-Khurda in the state of Odisha, India with professional help from Sambalpur University, Odisha. Braj Gopika Seva Misson being aspiritual Institution,had the advantage of spiritual





inputs and a serene atmosphere required for the study. The institution situated in rural surroundings close to an agrarian backdrop was suitable for the research programme, and the institution had an added advantage of an acoustic studio necessary for recording and formulating treatments. Six numbers of devotional songs were purposefully selected in consultation with her holiness Raseshwari Deviji from a repository of devotional songs (kirtans) composed and /or professed by Jagadguru Kripaluji Maharaj and specific soundtracks were prepared in the acoustic studio. Soundtracks were manipulated over Sound Pressure Level (SPL) and duration of exposure to form ten different levels of treatments including one control group where no musical exposure was given to the plants. Treatments were executed thrice daily, in the early morning, at noon time, and in the evening in acoustic growth chambers specially designed for the purpose, and hosted in a polyhouse for achieving a controlled condition suitable for experimental research. Treatments were executed on some selected crops like Mung Bean (Green Gram), Okhra, Pea, and Tomato for standardization of the applications with organic inputs. To be categorical, the impact of devotional music was studied on seed germination, vegetative growth, and reproductive growth as well as selected biochemical parameters like synthesis of Chlorophyll, Carbohydrates, and Protein. All the crops in all through the seasons had shown a definite impact of their exposure to devotional music. There had been variations in the impact over seasons. While the research encompassing various crop are on its way, research data compiled for the Mung Bean crop over three seasons has shown a remarkable difference in major growth and development parameters. The effects of devotional music on the growth and development of the Mung Bean crop and the prospect that lies ahead are briefly summarised in the following paragraphs.

While germination rate and germination index improved nominally with exposure to devotional music, remarkable and most significant improvements were observed in the radicle development and seed vigour index of Mung bean seeds when measured after 48 hours of a germination test. Both the parameters Length of radicle and Seed Vigour Index increased by over 42% when exposed to devotional music at  $95 \pm 5$  dB for a duration of 3 hours per day in comparison to the control group which was not exposed to devotional music. It was also found that season had a significant impact on the germination parameters and the impact of devotional music varied over seasons.

The exposure of the experimental groups of Mung Bean plants to devotional music was continued on a daily basis from seed germination to harvesting of crops. The vegetative growth of Mung Bean plants was measured in terms of Shoot and Root length, and Green Weight and Dry Weight of the total vegetative growth at 60 days after sowing of the crop. Mung Bean plant height increased significantly in the Rabi season and summer season when exposed to devotional music with a sound pressure level of  $85 \pm 5$  dB and for duration of 1 hour per day and  $75 \pm 5$  dB for 3 hours per day



respectively. The height of plants increased by almost 38 % in the Rabi season and 57% in the summer season in comparison to plants not exposed to devotional music. Whereas a significant increase in the overall root length was more vivid and wider over a wider range of treatments, a 44 to 65% increase in the mean root length was observed when plants were exposed to devotional music at  $75\pm 5$  dB &  $85\pm 5$  dB for 3 hours per day or at  $95\pm 5$  dB for 2 hours per day. The mean green weight of Mung Bean plants increased by 52% when plants were exposed to devotional music at  $85\pm 5$  dB for 1 hour per day in comparison to the control group. The corresponding dry weight of the plants recorded an increase of almost 42% when compared with the control group.

The effect of devotional music on reproductive growth revealed that both flowering and fruiting in the Mung bean plant were marginally accelerated upon exposure to exposure to devotional music. The number of pods produced in the plant also increased nominally when exposed to devotional music. However, the impact of devotional music was most prominent when it was recorded to the number of seeds produced per plant or the total weight of seeds produced in a plant. It was observed that there was a significant rise in the number of seeds produced per plant when they were exposed to devotional music at  $85\pm 5$  dB for 1 hour per day or at  $95\pm 5$  dB for 2 hours per day. The number of seed production increased by 82% and 75% in the above experimental groups respectively. A wide range of treatment levels gave a significant boost to the Mung bean crop yield and the most significant results was obtained when plants were exposed to devotional music at  $85\pm 5$  dB for 1 hour per day and at  $95\pm 5$  dB for 2 hours per day followed by exposure to devotional music at  $75\pm 5$  dB for 3 hours per day,  $85\pm 5$  dB for 2 to 3 hours duration per day and  $95\pm 5$  dB for 1 hour per day. Yield of mung bean in terms of seed weight increased by 80 to 120% as a resultant impact of devotional music.

Devotional Music gave a significant boost to chlorophyll synthesis in Mung bean plants. Synthesis of Chlorophyll A increased to an extent of 33% and Chlorophyll B synthesis to an extent of around 44% in comparison to the control group when measured in the leaf samples at 40 days after sowing of the Mung bean plants. All the experimental groups of Mung Bean plants registered a higher synthesis of total Chlorophyll and the total Chlorophyll synthesis increased by 22 to 35% in the experimental groups. The protein synthesis in the germinating seeds also increased up to a level of 30% upon exposure to devotional music. A higher protein synthesis was clustered around a higher SPL that is  $95\pm 5$  dB and a duration of 1 to 3 hours per day. Exposure of Mung bean plants to devotional music sustained a higher protein synthesis during the growth phases as well. Measurement of Protein content in leaves sampled at 40 days after sowing as well as 60 Days after sowing recorded an increase in the protein content by 46% and 30% respectively in comparison to the control group when exposed to devotional music at SPL of 80-100 dB for a duration of 1-3 hours per day.



Significant qualitative improvement was observed in the harvested Mung bean seeds at the end of the experiment. Plants exposed to devotional music with a sound pressure level of  $85\pm 5$  dB for a duration of 1 hour per day yielded seeds with enhanced carbohydrate and protein content in them. The carbohydrate and protein content increased by almost 36% and 49% respectively when exposed to devotional music at  $85\pm 5$  dB for a duration of 1 hour per day. The research findings established a strong biochemical basis for the impact of devotional music on the growth and development of Mung bean plants. It may be summarized that while germination of Mung Bean seeds had an overall positive impact when selected devotional music was administered at  $95\pm 5$  dB for a duration of 3 hours per day, most other growth and development parameters in Mung Bean crop improved with exposure to devotional music with a sound pressure level of  $85\pm 5$  dB and for a duration of just 1 hour per day.

Thus, the current research testifies that sound in the form of music and the meditative impact of music in the form of devotional music had an immensely beneficial impact on the physiological growth and development of crops. Music acts as a catalyst in the synthesis of biomolecules necessary for plant growth. The outcome of the research makes it believe that devotional and contemplative music might have an advantage over other forms of sounds and music. This certainly deserves and makes way for a comparative study with other forms of music. However, devotional music at its own credibility could be effectively used as a befitting energy for plant growth and development in parallel to other auxiliary energy sources like light, temperature, and air. The findings strengthen a dimension of thought that manipulation of sound can play a basic role in the organizational patterns of the matter both at organic and inorganic levels and thus control its growth and development. To further generalize or to simplify, it may be added that music and meditation are facts of well-being for human beings, this very fact of well-being, health, and vigour could be extended to other beings as well at least to the plant kingdom towards a resilient, towards an environmentally safe way to food production. There is a vast scope of systematic investigation and refinement through action research to finally generate technologies replicable by the agrarian society.

## Conclusion

Devotional music is found to be a sound stimulus with the qualitative advantage of music, chanting and meditation. This specific format of sound stimuli has a prominent catalytic effect on cellular function. Metabolic activities of a plant cell get elicited with an optimum strength of devotional music, resulting in better seed germination and vegetative and reproductive growth. Devotional music promotes the plants' effective use of available resources and even overcomes adverse weather conditions. It may be speculated with logical reason that this format of music must be affecting all the forms of life present in ecology, including the microflora and fauna in the soil. Thus, it can also



bring good health to the soil system. The application of devotional music in the agricultural production system can add a new dimension of resilient ways to food production. Therefore, this area deserves detailed, multidisciplinary studies to explore underlying mechanisms and relationships to build an applicable technology for the benefit of farmers and the environment at large.

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