Applying acoustic frequency and meditation techniques to improve crop production-a review

J. G. Ndiritu

School of Civil and Environmental Engineering, University of the Witwatersrand, Private Bag 3 WITS 2050, South Africa. john.ndiritu@wits.ac.za

Abstract

The global food crisis has been getting worse for more than a decade and it is estimated that 1 billion people were undernourished in 2009. Genetic modification using biotechnology has been applied for decades to improve crop production but several issues including concerns about the safety of genetically modified (GM) food and its impact on biodiversity and sustainable farming are hindering its use. To mitigate the food crisis, the need to fully utilize the potential of other appropriate technology cannot be overstated. This study reviews of sound-based (acoustic frequency) and thought-based (meditation) technology in improving crop production and assesses their potential.

Sound-based technology has been available for more than 2 decades and is reportedly in use in at least 35 countries. This technology determines the sound characteristics that enhance stomata activity and then applies this on the farm together with carefully constituted leaf fertilizer but applications without leaf fertilizer are also done. Sound is also used to enhance or inhibit specific processes at the molecular level to achieve specific objectives (e.g. to increase the content of specific proteins). It is reported to obtain large improvement in yield, nutritional value, shelf life and resistance to disease, pests and drought. Published studies report up to 60 and 90% increase in yield and nutritional constituent concentration respectively.

Thought-based technology (meditation) combined with organic farming is being applied in India. The method involves creating the awareness of being the subtle conscious being and directing pure energy from the Divine Source to the crops. Published experiences of 5 farmers report substantial improvements in yield and resistance to disease, pests and drought. Published data reports yield improvements of to 32% and up to 146% in nutritional constituent concentration. The technique is being promoted non-commercially by an NGO and thousands of farmers have been trained to use it.

The improvements in crop production from acoustic frequency and meditation techniques are found to be comparable to those from GM farming and their potential in mitigating the global food crisis is therefore considered significant. Research and community-based initiatives to promote the two techniques are therefore recommended. Meditation training is found to be largely non-profit driven and to also have considerable mental and physical health benefits. It also requires no additional resources and is therefore carbon footprint free. For sustainable farming in rural areas, meditation techniques that are adapted to the cultural, social and religious setting may therefore particularly favourable.

Key words

crop production, acoustic frequency, meditation, sound, thought

1. Introduction

The global food crisis has been on the rise and the number of undernourished people increased from 848 million in 1990 to 923 million in 2008 (CGIAR, 2008) .The Food and Agriculture Organization of the United Nations (FAO) estimates that 1.02 billion people were undernourished in 2009 (FAO, 2009). In response to the increased food insecurity, the Consultative Group on International Agricultural Research (CGIAR) produced a list of 14 best-bet investments in agricultural research to most effectively mitigate the deepening food crisis (Braun et al., 2008). The 14 investments have a specific focus on the poor and include; accelerated and sustainable food production by and for the poor, the preservation and sustainable use of natural resources, promotion of science and technology and innovations in policy and institutions. To help realize the 14 'best-bets', biotechnology, nanotechnology and information systems are seen as some of the technologies to be applied. CGIAR 2008 (pp. 18) reports the application of genetically modified maize and rice to improve crop production in response to the food crisis. There is evidence that GM crop production can bring enormous benefits if planned and implemented appropriately (Burachik, 2010) and there is also support for careful and farmer-friendly application of biotechnology (Weale, 2010; WHO, 2005; CGIAR, 1999). Some studies suggest that the current restrictions to GM crop production may be counterproductive as the potential benefits more likely outweigh the risks (Gollin, 2010; Conner et al., 2003; Nap et al., 2003). However, there is also the concern that widespread farming with genetically modified (GM) crops could worsen the crisis for various reasons including its impact on biodiversity and the environment and economic sustainability of rural farming in developing countries (ActionAid, 2003). The internet site www.banGMfood.org provides 10 grounds for banning GM farming. deGrassi (2003) informs that GM farming would not significantly reduce poverty alleviation in Africa and suggested the technology needs to be farmer-centred first. Garcia and Altieri (2005) consider the potential for considerable medium and long-term contamination and degradation of the natural genetic resources due to GM farming to be unknown as tests on the effects of GM farming are short-term. They call for more comprehensive risk assessment before releasing GM crops to the environment. Singh et al. (2006) also call for more detailed monitoring of the impacts of GM food production but consider this to be achievable in the short-term through advances in technology and careful regulation. As the food crisis deepens while GM farming continues to remain contentious into the future, the need to utilize the potential of other technologies is paramount.

Plants as living beings are known to respond to sound (Measures and Weinberger, 1970; Weinberger and Graefe, 1973; Martens and Michelsen, 1981; Yi et al., 2003; Creath and Schwartz, 2004; Yaldagard et al., 2008) and to the energy of thought (Grad, 1963, 1964; Haid and Huprikar 2001; Roney-Dougal and Solfvin, 2003; Creath, and Schwartz, 2004). Sound-based crop improvement techniques have been practiced since the 1990s but do not seem to have gained much recognition in global food production and research. Thought energy-based (meditation) techniques are also in use in rural sustainable farming settings in India. This paper reviews crop production improvement achieved by these methods and then briefly reviews explanations of the phenomena (i.e. how the two energies affect plants). It finally assesses their potential for sustained food production.

2. Applications of acoustic frequency and meditation techniques

Several technological applications based on the effect of sound on plants have been developed, patented and commercialized (e.g. Plant Acoustic Frequency Control Technology (PAFCT), (http://www.chinawuli.net/en/cpjs.htm); Sonic Bloom, (http://www.real-sonic-bloom.com/); Echo-System, (http://www.ecosonic.net/index_1.htm)). These technologies improve the absorption capacity of plant leaves and spray a carefully balanced leaf fertilizer as sound of a frequency that activates the stomata (and other mechanisms) plays. Farming experiences of 32 crops with the sonic bloom (http://www.real-sonic-bloom.com/) report massive improvements in yield (many >100%), shelf-life and resistance to disease, pests and drought. The sonic bloom is reported to be in use in at least 35 countries. In China, sound-based technology is still in the developmental stage and the commercialization potential (both local and international) is seen as large (Hou et al., 2010a). Sound-based techniques have been found to reduce resource usage and Hou et al. (2010b) report a 25 % reduction in fertilizer requirement of rice over a 3-year period. Table 1 presents information from published research on the effects of sound-based technology on crop production. Figure 1 shows the QGWA-01 acoustic frequency generator in a cotton farm while Figure 2 shows an echo-system on a farm.

Figure 1 A QGWA-01 acoustic frequency generator on a cotton farm (Hou et al., 2010b)

Figure 2 An Echo-System (http://www.ecosonic.net/index_1.htm)

Table 1 The effect of acoustic frequency techniques on crop production

Reference	Crop	% increase in yield	% reduction in disease and pests	% increase in nutritional value
Lirong et al., 2010	Strawberries- greenhouse	- 6	66	
	tomatoes	13.2	9.0	
Hou et al., 2010a	Rice in pot	17.4 – 39.7	50 blight	8.9 protein
	Rice in field	5.7		
	cotton	6.0 – 9.0		
	wheat	17.0		3 starch 8.5 protein 11.6 fat
	Cucumber and green pepper	60.0		
	tomatoes		6.0 spider mite 8.0 aphids 9.0 late gray mold 11.0 late blight 8.0 virus	
Hou et al., 2010 b	cotton	11.1 - 13.5		
Hou and Mooneyham 1999a	tomatoes	13.89		26.19 sugar 55.39 vitamin A 92.31 niacin
Hou and Mooneyham 1999b	Spinach - field	22.4		37.5 sugar 35.63 vitamin A 41.67 vitamin c 40.00 vitamin B
	Lettuce - field	41.67		

In India, a combination of meditation and organic farming is being practiced (RERF, 2009; http://yogickheti.com/articles.html) and is reported to improve crop production considerably with fewer resources. Farmers using this technique report considerable improvements in resistance to disease, pests and adverse weather conditions. The meditation involves creating the awareness of being the subtle conscious being rather than the physical body and then directing thought energy (peace, love and bliss) from the Divine Source to the crops at any stage of growth or to the seeds before planting. This can be done on-site (Figure 3), while carrying out activities on the farm or remotely (e.g. while seated at home in the early morning hours). The method is being promoted non-commercially by an NGO and thousands of farmers have been trained in the use of the technique (http://yogickheti.com). Using another meditation technique that also involves directing energy from the Divine Source to the subject, Roney-Dougal and Solfvin (2003) obtained substantial improvements in the yield and disease resistance of commercially grown lettuce. Table 2 presents quantitative data on the effect of meditation on crop yield, disease resistance and nutritional value. In related studies, double blind experiments by Haid and Huprikar (2001) report a 16.4 % improvement in the germination rate of pea seed with meditation. Creath and Schwartz (2004) also report statistically significant impacts of meditation and music on the germination of zucchini and okra seeds. Schwartz (2009) reports a 16.7%

increase in seedling height in a double blind experiment of the impact of distant group intention (remotely applied thought energy) on the germination of seeds.

Figure 3 Meditation on a farm (http://yogickheti.com/photos.html)

Table. 2 The effect of meditation on crop production

Reference	Crop	% increase in yield	% reduction in disease and pests	% increase in nutritional value
RERF, 2009; http://yogickheti.com/articles.html	Sugar cane -field	32		
	Sugar cane - field	14		
	Tomato - field [1]	- 9 [2]		-45 fat 52 protein 36 carbohydrate 41 energy value 146 vitamin c
Roney-Dougal and Solfvin (2003)	Lettuce - field	23	10 fungal attack 5 slug attack	

[1] meditation alone compared with chemical fertilizer and chemical disease/pest control
[2] 10% higher net profit obtained with 9% lower yield as no chemicals were applied with meditation

3 Explanations of how sound and thought energy affect plants

Van Doorne (2000) and Van Doorne and Cappuis (2003) propose four physical mechanisms to explain the effect of sound on plants: i) when the external sound generated matches the natural frequency of the stomata, the increased vibration due to resonance increases the activity of the stomata allowing a faster movement of oxygen, carbon dioxide and nutrients sprayed as leaf fertilizer. ii) Sound of specific characteristics may also create resonance within individual cells stirring up cytoplasm movements within the cell. iii) Certain sound frequencies can create cavitation within the cytoplasm that may cause cell walls to collapse thereby enabling faster translocation of nutrients within the plant. iv) Resonance may also be induced at the molecular

level (scale resonance) to enhance specific processes. This follows the discovery from quantum mechanics research that elementary particles behave in a harmonious and musical manner by Joel Sternheimer (Coghlan, 1994; Sternheimer, 1994; http://biogenesislab.blogspot.com/2008/07/joel-sternheimer-earthpulse-press.html). Lirong et al. (2010) consider plants to possess spontaneous sound that can be enhanced or inhibited with external sound to achieve specific objectives.

The observed effect of meditation on plant growth cannot be explained using physical laws as that of sound as meditation applies the energy of thought. However, the effect of the energy of thoughts on human health is well recognized and the increasing use of mind - body medicine including meditation (Barrows and Jacobs, 2002) attests to this. Meditation is now recognized as a valuable complement in the treatment of many illnesses and as a means of achieving holistic health (Fortney and Taylor, 2010). In a study of 514 college students, Lo and Wu (2007) report reductions in depression, anxiety and stress/tension of 37 % (45 - 8), 18% (48 - 30) and 38% (50 - 12) with the use of zen meditation. Zamarra et al. (1996) show that transcendental meditation can be used in the treatment of coronary artery disease patients and Leeka et al. (2010) also propose meditation as a technique for reducing the risk of cardiovascular mortality of stressed spectators of sporting events. The impact of thought energy can also be used to explain the widely known correlation between the level of confidence (or doubt) a patient has on the treatment being received and the level of success that will be achieved. This effect, known as the placebo effect (Beecher, 1955) is significant and is formally recognized and accounted for in experiments on the effectiveness of drugs and other treatment methods (Bensing and Verheul, 2010). In spite of the ethical issues around placebo treatment (prescribing drugs that do not have the healing active ingredients without informing the patient so that s/he takes it with the belief that is the real medicine that will heal), it is still widely practiced on a regular basis (Tilburt et al., 2008). In spite of the efficacy of meditation, the literature indicates that the underlying fundamental principles of the technique are not well understood and not widely researched. These principles would be expected to also explain the observed effect of thought energy on plants.

Thought energy is also known to affect inanimate matter and water in particular. Carefully planned experiments by Dibble and Tiller, (1999) found that thought energy can change the P^H of water by 1 unit (10 fold reduction in H^+ concentration). Radin et al. (2006) have shown in a comprehensive double blind test that remotely applying thought energy on water can influence the structure of ice crystals obtained from the water. Using light scattering techniques, Pyatnitsk and Fonkin (1995) have demonstrated that human intention influences the structure of water. Nelson (1995) found that the rainfall on the days of large planned outdoor activities at Princeton is significantly less than on other days suggesting that the thought energy in wishing and hoping for good weather may actually have some influence on the weather. Although it is hardly disputable that the energy of thought affects matter, the comprehension of how thought influences the physical dimension is still a major quest of contemporary science. Jahn and Dunne (2005) and Tiller (2007) provide models of mind-matter interaction.

4. Discussion and Conclusions

Between 1996 and 2006, the GM crop yield improvements for soyabean, corn and papaya obtained from annual global surveys range between 9 and 50 % (PG Economics). The increase in crop yields from use of sound and meditation reported in Tables 1 and 2 and those from other sources (e.g. http://www.chinawuli.net/en/cpjs.htm; http://www.real-sonic-bloom.com/) compare favourably with those from genetically modified crops. The use of sound and thought energy is however unlikely to encounter the controversy currently facing GM farming.

In contrast to thought-based techniques, sound-based techniques need to be installed, cared for (against vandalism and adverse weather) and maintained. They also have operational costs in powering the equipment and obtaining the leaf fertilizer where this needs to be used. While these requirements may well be within the capacity of commercial farmers, considerable adaptation would be needed for widespread application in rural resource-scarce farming. This may include; doing away with the liquid fertilizer; using solar, wind or manual energy to power the sound-generation. These options would however still need external inputs and may still be largely unaffordable. It is however probable that technological advancement could lead to viable application devices. Improved affordability of the technique could also be achieved through cooperative structures within the community (e.g. a group of farmers owning a single system and scheduling its use among the group).

The main requirement of the thought-based (meditation) methods is for the farmer to train in the technique or simply apply it to farming if s/he already meditates. This method therefore is especially applicable to the resource-scarce situations of rural areas but it could also substantially improve production in capital-intensive commercial farming. Meditation is now widely accepted as a beneficial health practice and there are many organizations that offer free training in meditation (http://www.freemeditations.com/). For widespread use to improve crop production, meditation training would however need to be adapted to the specific religious and cultural setting. As there is a variety of meditation techniques, selection of the appropriate ones may be required based on simplicity, applicability, effectiveness, availability of trainers and the perceived levels of acceptability by the community.

No evidence suggests that sound-based and meditation techniques cannot be applied together or with any other technologies and could add to the benefits obtained through other methods. Synchronization may however be required at times for instance in applying biotechnology and the sound-based techniques that work at the molecular level. From a sustainable farming perspective, meditation holds the upper hand as it is largely not profit driven and is resource-usage free. It is probably the only technology with no carbon footprint. Research and community-based initiatives to promote sound-based and meditation-based techniques have a large potential in offsetting the dire global food crisis and are therefore recommended.

References

ActionAid., 2003. GM crops - going against the grain.

deGrassi, A., 2003. Genetically Modified Crops and Sustainable Poverty Alleviation in Sub-Saharan Africa -An Assessment of Current Evidence, Third World Network - Africa

Barrows, K.A., Jacobs, B.P., 2002. Mind-body medicine: An introduction and review of the literature, Medical Clinics of North America, 86(1), 11-31.

Beecher, H.K., 1955. The powerful placebo. J Amer Med Assoc, 159, 1602-1606.

Bensing, J.M., Verheul, W., 2010. The silent healer: The role of communication in placebo effects, Patient Education and Counseling 80, 293-299.

Braun, J.V., Fan, S., Meinzen, D.R., Rosegrant, M.W., Pratt, N.A., 2008. International Agricultural Research for Food Security, Poverty Reduction, and the Environment What to Expect from Scaling Up CGIAR Investments and "Best Bet" Programs, IFPRI Issue Brief 53.

Burachik, M., 2010. Experience from use of GMOs in Argentinian agriculture, economy and environment, New Biotechnology, 27(5), 588-592.

CGIAR (Consultative Group on International Agricultural Research)., 1999. Proceedings of Conference, Agricultural Biotechnology and the Poor.

CGIAR (Consultative Group on International Agricultural Research)., 2008. Annual Report.

Coghlan, A., 1994. Good vibrations give plants excitations, New Scientist, issue 1927.

Conner, A.J., Glare, T.A., Nap, J., 2003. The release of genetically modified crops into the environment Part II. Overview of ecological risk assessment, The Plant Journal 33, 19-46.

Creath, K., Schwartz, G.E., 2004. Measuring Effects of Music, Noise, and Healing Energy Using a Seed Germination Bioassay, The Journal of Alternative and Complementary Medicine, 10-1, 113-122

Dibble, W.E., Tiller, W.A., 1999. Electronic Device-Mediated pH Changes in Water. Journal of Scientific Exploration, 13- 2, 155-176.

FAO (Food and Agriculture Organization of the United Nations)., 2009. The State of Food Insecurity in the World Economic crises - impacts and lessons learned, Rome.

Fortney, L., Taylor, M., 2010. Meditation in Medical Practice: A Review of the Evidence and Practice. Primary Care: Clinics in Office Practice, 37- 1, 81-90.

Garcia, M.A., Altieri, M.A., 2005. Transgenic Crops: Implications for Biodiversity and Sustainable Agriculture, Bulletin of Science Technology & Society, 25, 335-353, DOI: 10.1177/0270467605277293.

Gollin, A., 2010. Economic impacts of policies affecting crop biotechnology and trade, New Biotechnology, 27(5), 558-564.

Grad, B., 1963. A telekinetic effect on plant growth: I. Int J Parapsychol, 5, 117-134.

Grad, B., 1964. A telekinetic effect on plant growth: II. Experiments involving treatment of saline in stoppered bottles. Int. J Parapsychol., 6, 473-498.

Haid, M., Huprikar, S., 2001. Modulation of Germination and Growth of Plants by Meditation, American Journal of Chinese Medicine, 29, 3-4, 393-401.

Hou, T, Bao-ming, L., Guang-hui, T., Lirong, Q., Kai, H., 2010a, Research and application progress of plant acoustic frequency technology, Journal of China Agricultural University 15-1, 106-110.

Hou, T., Bao-ming, L., Mingliang, W., Weibing, H., Guanghui, T., Qing, Z., Yufeng, L., 2010b. Influence of acoustic frequency technology on cotton production Transactions of the CSAE, 26-6, 170?174.

Hou, T., Mooneyham, R.E., 1999a. Applied studies of the plant meridian system: I. The effect of agri-wave technology on yield and quality of tomato, Am J Chin Med. 27-1, 1-10.

Hou, T., Mooneyham, R.E., 1999b. Applied studies of the plant meridian system: Agri-wave technology increases the yield and quality of spinach and lettuce and enhances the disease resistant properties of spinach, Am J Chin Med. 27-2, 131-41.

Jahn, R. G., Dunne, B., 2005. Endophysical Models Based On Empirical Data. In Buccheri, R., Elitzur, A. C., Saniga, M., Endophysics, Time, Quantum and the Subjective; Proceedings of the ZiF Interdisciplinary Research Workshop, Bielefeld, Germany, 81 - 102.

Leeka, J., Schwartz, B.G., Kloner, R.A., 2010. Sporting Events Affect Spectators' Cardiovascular Mortality: It Is Not Just a Game, The American Journal of Medicine, 123(11), 972-977.

Lirong, Q., Guanghui, T., Tianzhen, H., Baoying, Z, Xiaona, L., 2010. Influence of Sound Wave Stimulation on the Growth of Strawberry in Sunlight Greenhouse, International Federation for Information Processing, AICT, 317, 449-454.

Lo, P-C., Wu, S-D., 2007. Effect of Zen meditation practice on perceived stress in college students: A survey study, Biomedical Engineering - Applications, Basis and Communications, 19(6), 409-413, DOI: 10.1142/S1016237207000513.

Martens, M.J.M., Michelsen, A. 1981. Absorption of acoustic energy by plant leaves. J Acoust Soc Am, 69, 303-306.

Measures, M., Weinberger, P. 1970. The effect of four audible sound frequencies on the growth of Marquis spring wheat. Can J Botany, 48, 659-662.

Nap, J., Metz, P.L.J., Escaler, M., Conner, A.J., 2003. The release of genetically modified crops into the environment Part I. Overview of current status and regulations, The Plant Journal, 33, 1-18.

Nelson, R.D., 1997. Wishing for Good Weather: A Natural Experiment in Group Consciousness Journal of Scientific Exploration, 11-1, 47-58.

PG Economics Limited. Biotech crops: the real impacts 1996-2006 - yields.

Pyatnitskanyd, V. A., Fonkin, L.N., 1995. Human Consciousness Influence on Water Structure Journal of Scientific Exploration, 9- 1, 89-105.

Radin, D., Hayssen, G., Emoto, M., Kizu, T., 2006. Double-blind test of the effects of distant intention on water crystal formation. Explore, 2-5, 408-411.

RERF (Rural Development Wing, Rajyoga Education and Research Foundation and Prajapita Brahma Kumaris Ishwariya Vishwa Vidhyalaya)., 2009. Perpetual Yogic Agriculture (Shashwat Yogic Kheti) A Novel Step towards a New Era.

Roney-Dougal, S.M., Solfvin, J., 2003. Field Study of an Enhancement Effect on Lettuce Seeds: A Replication Study. The Journal of Parapsychology, 67-2, 279-284.

Schwartz, G.E., 2009. The Germination Intention Experiments, 9th meeting of the Society for Scientific exploration Charlottesville, VA.

Singh, O.V., Ghai, S., Paul, D., Jain, R.K., 2006. Genetically modified crops: success, safety assessment, and public concern, Appl. Microbiol. Biotechnol. 71,598-607, DOI 10.1007/s00253-006-0449-8.

Sternheimer, J., 1994. Quantum vibrations, New Scientist, issue 1937.

Tilburt, J.C., Emanuel, E.J., Kaptchuk, T.J., Curlin, F.A., Miller, F.G., 2008. Prescribing "placebo treatments": results of national survey of US internists and rheumatologists, Brit Med J, 337:a1938.

Tiller, W.A., 2007. Towards a Quantitative Science and Technology that Includes Human Consciousness, CIHS Journal, 2-1, 1 - 34.

Van Doorne, Y.A., 2000. Influence of variable sound frequencies on the growth and the developments of plants, PhD thesis, Technical University of Ghent, Belgium.

Van Doorne, Y.A., Chappuis, V., 2003. The effects of sound on living organisms Applications in agriculture, International Agro santé Forum, Beauvais, France.

Weale, A., 2010. Ethical arguments relevant to the use of GM crops, New Biotechnology, 27(5), 583-587.

Weinberger, P., Graefe, U., 1973. The effect of variable-frequency sounds on plant growth, Can J Botany, 51, 1851-1856.

WHO (World Health Organization)., 2005. Modern food biotechnology, human health and development: an evidence-based study, Department of Food Safety, WHO.

Yaldagard, M., Mortazavi, S.A., Tabatabaie, F., 2008. Application of Ultrasonic Waves as a Priming Technique for Accelerating and Enhancing the Germination of Barley Seed: Optimization of Method by the Taguchi Approach, J. Inst. Brew, 114(1), 14-21.

Yi, J., Bochu, W., Xiujuan, W., Daohong, W., Chuanren, D., Toyama, Y., Sakanishi, A., 2003. Effect of sound wave on the metabolism of chrysanthemum roots Colloids and Surfaces. Biointerfaces, 29, 2-3, 115-118.

Zamarra, J.W., Schneider, R.H., Besseghini, I., Robinson, D.K., Salerno, J.W., 1996. Usefulness of the transcendental meditation program in the treatment of patients with coronary artery disease, The American Journal of Cardiology, 77(10), 867-870.

Web References

http://www.chinawuli.net/en/cpjs.htm (accessed 6 August 2010)
http://www.real-sonic-bloom.com/ (accessed 6 August 2010)
http://www.ecosonic.net/index_1.htm (accessed 6 August 2010)
http://yogickheti.com (accessed 6 August 2010)
http://yogickheti.com/articles.html (accessed 6 August 2010)
http://yogickheti.com/photos.html (accessed 6 August 2010)
http://biogenesislab.blogspot.com/2008/07/joel-sternheimer-earthpulse-press.html (accessed 6 August 2010)
http://www.freemeditations.com/ (accessed 6 August 2010)