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Effect of physical and metaphysical energy on germination and seedling vigor of Chickpea

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ABSTRACT : Seeds of chickpea (var. PG 114) were exposed to physical energy through static magnetic fields of 100 to 250 milli Tesla intensity with the intervals of 50 milli Tesla for 1-4 hour, and to metaphysical energy through BK Rajyog meditation (BKRYM, a positive thought energy based meditation) with an interval of 1 hour. Treatment of chickpea seeds through metaphysical as well as physical energy fields resulted in significantly increased root length, shoot length, seedling dry weight, seedling vigor index, dehydrogenase enzyme activity over control. Electrical conductivity of seed leachate of treated seed, significantly decreased over control.

Key words : BKRYM, Chickpea, electrical conductivity, germination, magnetic field.

Chickpea is one of the most important protein rich pulse crop of India. It is grown in an area of 11.9 million hectare with the production of 10 million metric tons worldwide. (Parthasarathy *et al.*, 2010) Poor field emergence is the main problem when this crop is grown in adverse climatic condition and in late sown condition. Therefore, it is important to enhance the quality of seed for the better germination and crop establishment. Efforts are underway in search of efficient, eco-friendly techniques which enhance the quality of seed and increase their germination and seedling vigor. In recent years, a number of research reports on effects of magnetic fields on living organism are coming up. Exposure of seeds to magnetic field is one of the safe and affordable methods to increase seed germination, and seedling vigour for uniform crop establishment and sustainable crop production Vashist and Nagarajan, (2010). In germinating seeds activities of alpha amylase, dehydrogenase, and protease were significantly higher in treated seeds over control. Florez *et al.* (2007) reported that the germination and early growth of maize seedling were enhanced when seeds were exposed to magnetic fields of 125 or 250 milli Tesla. Nagaraju *et al.* (2012) reported that seeds of *Vigna radiata* exposed to magnetic fields of milli Tesla for 45 minutes showed highest germination and α -amylase enzyme activity over control. Florez *et al.* (2012) observed great increase in germination % of *Salvia officinalis* seeds when exposed to 125 milli Tesla strength for 20 min. Omrani and Asgharipour (2011) also concluded that there was a

significant increase in seedling length, seedling dry weight, germination % and vigor index of lentil seeds when they were exposed to 0.3 and 1.2 milli Tesla for 10 min.

The idea that thoughts can affect the matter is not new concept. Now a days the acceptance and recognition of thought power and healing techniques are increasing worldwide. In the lives of our ancestors, there was an inherent connection between two living systems, the living system of human thoughts, feelings and the living system of the natural world, a connection that scientific research continues to affirm.

The agricultural practices, as mentioned in Rigveda, Krishiprasara, Manusmriti, Agni Purana and Vriksha Ayurveda, are based on the spirituality which is time tested and time honoured. These agriculture modes have been devised to pursue the exclusive belief of "harmony" with nature. Having harmony with nature entails its creatures to comprise reverence and gratefulness for living and non-living objects, and maintain synchronization with natural forces or five elements viz., earth, water, air, fire and sky. Over the time, however, the awareness of this connection has become critically fragile. Since 1960s there has been systematic research into the effect of thoughts on flora. In 1963 Grad determined that plants are receptive to energy; healing energy improved growth, and negative energy stunted it. Backster (2003) pioneered studies clearly demonstrating that plants and other living organisms respond to human

intention. Emoto's popular research photographing water crystals (2004) confirmed that thoughts, words and intentions affect matter. A study by theology student Du Charme (2007) revealed that positive and negative intentions have a statistically significant effect on seed germination. Yiji (1991), and Roney-Dougal *et al.* and Solfvin (2003) have also conducted healing energy studies on seeds, with positive results. The objective of this study was to investigate the possible effect of exposure of physical and metaphysical energy of various strength and duration on the germination and seedling vigor characteristics of chick pea seed.

MATERIALS AND METHODS

Seeds of chick pea (var. PG-114) were obtained from Breeder Seed Production Center, G.B. Pant University of Agriculture and Technology, Pantnagar. Chickpea seeds were exposed to various static magnetic field of 100-250 milli Tesla in steps of 50 milli Tesla for different duration from 1-4 hour in steps of 1 hour. Two hundred visibly sound, and healthy seeds were held in the plastic container between the poles of the electromagnet having a uniform magnetic field for the required duration. (Fig. 1.)

The required strength of the magnetic field was obtained by regulating the current in the coils of the electro-magnet. For creating 100 mT of static magnetic field, current of 2.1A (ampere) along with voltage of 23 V (volts) was supplied; for 150 mT field, 3.7 A current along with voltage of 38 V; for 200 mT, 3.8 A current along with 42 V and for 250 mT current of 4.2 A along with 46 V were supplied. A gauss meter model DHE-200 was used to measure the strength of static magnetic field between the north and south poles. To expose the seeds of chickpea to metaphysical energy treatment through BK Raj Yoga Meditation (BKRYM), seeds were sent to International HQ of Brahma Kumaris World Spiritual University, Mount Abu. The duration of treatment was 1-4 hours with

an interval of 1 hour. (Anonymous, 2010). After the exposure of seeds to physical and Meta physical energy, germination test was conducted in four replications as per standard germination test (ISTA, 1993). In each replication 50 seeds were placed between two layers of moist germination paper, rolled carefully and wrapped in a sheet of butter paper to reduce surface evaporation. They were placed in an incubator at 25°C in an upright position. After 8th day, germinated seedlings were evaluated as normal, abnormal, and dead seeds. Germination percentage was calculated on the basis of normal seedlings divided by total number of seeds multiply by 100.

At the end of the standard germination test, ten seedlings from each replicate were randomly selected to measure their shoot and root length separately. Seedling vigour index (SVI, cm/seedling) was computed by multiplying seed germination percentage with seedling length (Abdul- Baki and Anderson, 1973). Electrical conductivity of seed leachate was measured with the help of electrical conductivity meter, by soaking 3 g of seeds, already exposed to various strength of static magnetic field, in 50 ml of water. Before soaking of seed, it should be surface sterilized with 0.1% HgCl₂ for 10 min for removal of dust and other impurities. Soaking was done at 25± 1° C for 17 hour. After that the seeds were removed from water with the help of forceps and electrical conductivity of water left was measured through digital electrical conductivity meter and expressed in µS/cm/g of seed. Dehydrogenase enzyme activity was measured following the method described by Kittock and Law (1968) and expressed in OD/10seed. The data was analysed using STPR-2 software.

RESULTS AND DISCUSSION

The study revealed that exposure of chick pea seeds to physical and meta physical energy field of different

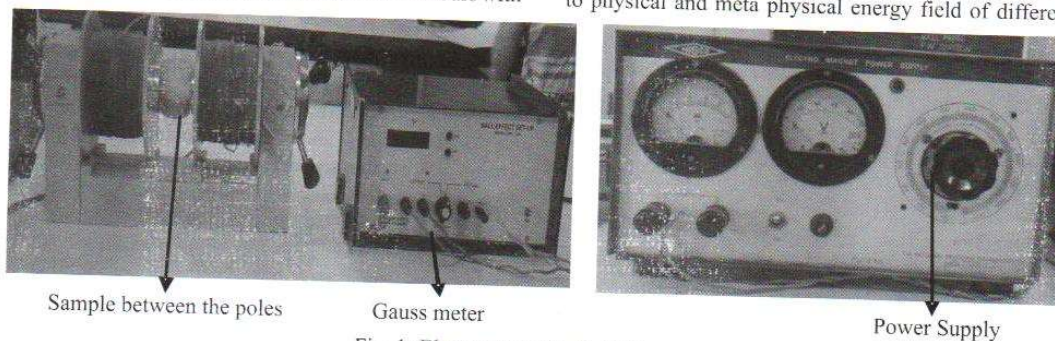


Fig. 1: Electromagnetic Field Generator

strength resulted in significant increase in root, shoot, seedling length, and vigour index I. Root length, shoot length, and seedling lengths in treated seedlings increased from 4.6% -15.7%, 19.22%-50.3%, and 3.6%-28% respectively over control. Seedling vigour index I which is a dependent factor on seedling length also increased from 13%-32%. over control.

In this study the highest root length was recorded in BKRYM (11.8 cm) which was at par with 150 mT magnetic field intensity (11.3). It was observed that with the increment in strength of magnetic field there was reduction in root length. Lowest root length was observed in 250 mT (9.6 cm), which was at par with control (Table 1).

MF: Magnetic field BKRYM: Brahma Kumari Rajyog Meditation mT: milli Tesla Highest shoot length was observed in 150 mT strength (4.21 cm), followed by 100 mT (3.94 cm), 200 mT (3.88 cm) and BK RYM treated seeds (3.80 cm), and all these treatments were at par with each other. Among treatments, lowest value of shoot length was observed in 250 mT (3.23 cm), however, this was significantly higher than control (2.27 cm) (Table 1).

Highest seedling length was recorded in BK RYM (15.46 cm), followed by 150 mT magnetic strength (15.45 cm), 100 mT (14.97 cm) and 200 mT (14.56 cm), these all were at par with each other. Lowest seedling length was recorded in 250 mT (12.82 cm) which was at par with control (12.45 cm). Among various energy treatments highest seedling vigor index was observed in 150 mT (1412) followed by BK RYM (1396), 100 mT (1366) and these were at par with each other. Lowest value of

seedling vigor index was found in 250 mT (1119) (Table 1 & Fig. 2).

Variation in seedling length due to interactive effect of strength of exposure of static magnetic field and duration of exposure was found significant. Highest seedling length was recorded in BK RYM treatment for four hours (17.49 cm), followed by BK RYM two hours, 200mT for one as well as two hours and 100mT for one hour. All the treatments were at par with each other. The lowest seedling length was observed in 200 mT magnetic field for four hours (11.12 cm) which was at par to all the exposure durations of 250 mT magnetic field except for one hour, as well as significantly lower than other interactive treatments (Table 2).

The results are in agreement with Tahir and Karim (2010) where they have reported that magnetic field treatment to the different varieties of chickpea increased seedling growth parameters under laboratory condition. They further reported that this may be due to the stimulating effect of magnetic field treatment on germination and seedling growth may be due to changes in intracellular level of Ca^{+2} and in other ionic density across cellular membrane which causes alternation in osmotic pressure and changes in capacity of cellular tissues to absorb water. Asgharipour and Omrani (2011) also reported significant increase in germination, seedling growth parameters, and vigour index I & II under laboratory condition when dry seeds of lentil were exposed to magnetic field of 0 to 1.5 T in the steps of 0.3 T for different time period from 5 to 20 minutes in steps of 5 min. Iqbal *et al.* (2012) also observed that magnetic field treatments to the dry seeds of pea increased growth

Table 1: Effect of physical and meta physical energy on growth, physico-chemical and biological activities of chick pea seeds

Treatments	Germination %	Root Length (cm)	Shoot Length (cm)	Seedling Length (cm/seedling)	Seedling vigor I	Electrical Conductivity dS/m/g of seed	Dehydrogenase OD/10 Seeds
Control	91.0	10.2	2.27	12.45	1138	0.233	0.91
MF 100mT	91.1	11.1	3.94	14.97	1366	0.202	0.146
MF 150mT	91.3	11.3	4.21	15.45	1412	0.179	0.142
MF 200mT	89.7	10.8	3.88	14.56	1313	0.225	0.99
MF 250mT	87.1	9.6	3.23	12.82	1119	0.212	0.080
BKRYM	90.3	11.8	3.80	15.46	1396	0.156	0.127
SEm±	1.2	0.21	0.14	0.32	35	0.004	0.008
CD (5%)	NS	0.60	0.41	0.92	98	0.011	0.024

(MF- Magnetic field; BKRYM- Brahma Kumari Rajyog Meditation; mT- Milli Tesla)

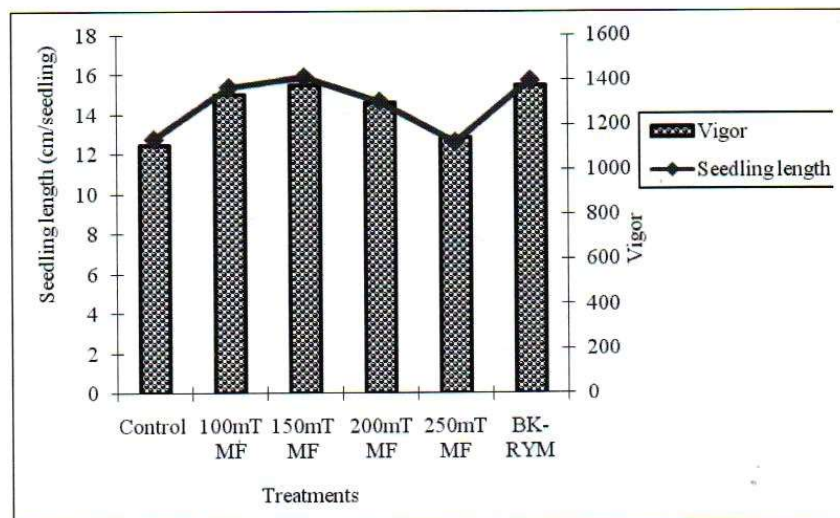


Fig. 2: Effect of various energy treatments on seedling length & seedling vigor index of Chickpea seeds

Table 2: Effect of different energy treatment and variable period of exposure on seedling growth parameters in chick pea seeds

Seedling length (cm / seedling)	Energy treatments						Mean
	Control	100mT	150mT	200mT	250mT	BKRYM	
1 hr	12.45	15.92	15.49	15.97	14.16	14.37	14.72
2 hrs	12.45	15.14	14.22	15.66	12.20	16.01	14.28
3 hrs	12.45	13.92	16.61	15.52	12.92	14.00	14.23
4 hrs	12.45	14.91	15.49	11.12	12.00	17.49	13.90
Mean	12.45	14.97	15.45	14.56	12.82	15.46	14.29
	Energy treatment	Exposure period	Interaction				
S.Em.±	0.32	0.26	0.65				
CD (5%)	0.92	NS	1.84				

mT- milli Tesla ; BK RYM- BK Raj Yog Meditation

parameters significantly. Feizi *et al.* (2012) observed significant increase in root length, shoot length and vigor index when seeds were exposed to continuous magnetic field of 3 mT. The improved functional root parameter indicates that magnetically treated tomato seeds can be used in agriculture under direct seeding where better root growth will enable earlier seed emergence and improved field establishment. Omrani *et al.* (2011) also observed significant increase in shoot length and seedling length over control when seeds of lentil were exposed to 1.5 Tesla magnetic field for 10 minutes. The result obtained

in study regarding seedling vigor are in agreement with the result obtained by Florez *et al.* (2007), wherein they reported higher seedling growth in maize seeds exposed to 125 and 250 mT magnetic field. Girish Kaddi *et al.* (2011) also reported that magnetically treated seeds had significantly higher vigor indices than that of control. It has been stated that the positive effect of magnetic treatment may be due to paramagnetic properties of some atoms in plant cells and pigments such as chloroplasts. Magnetic properties of molecules determine their ability to attract and then change the magnetic energy in other

type of energy and to transfer this energy forward to other structure in plant cells, thus activating them (Aladjadjiyan, 2010).

Among various energy treatments seedling vigor index which was computed on the basis of germination, seedling length/seedling dry weight, was observed highest in 150 mT (1412) followed by BK RYM (1396), 100 mT (1366) and these were at par with each other. Lowest value of seedling vigor index was found in 250 mT (1119) followed by 200 mT (1313). Seedling vigor index I is the dependent factor on germination percentage and seedling length. Strength of energy treatments and durations of exposure affect the seedling vigor index I significantly. Highest value of seed vigor index I was recorded in 150 mT for three hours (1513) which was significantly higher than control and at par with all the durations of same treatment except two hours. This value of highest vigor was also at par with all the durations of BK RYM. Lowest value was observed in 200 mT for four hours (939) which was significantly lower than other durations and treatments but at par with all the durations of 250 mT except one hour. It was also at par with 100 mT three hours (1231) and 150 mT for two hours (1292) (Fig 3). Increased seedling vigor may be because of increase in root growth of seedlings. Roots of plant contain starch molecules that determine the effect of the earth's magnetism. (www.buzzie.com). Our results are also in agreement with Aksyonov *et al.*, (2001) who showed that

15 min exposure of wheat seed by 30 m T magnetic field followed by 17 h imbibition, increased the root formation by nearly 25 %; the length of 6 days seedling displayed a 40 % increase.

Root length, shoot length, seedling length and germination were found lowest at 250 mT. Vigour index which is the resultant of all seedling growth parameters & biochemical activities was also observed lowest at 250mT static magnetic field (Table- 1). Observations of this study were supported by the finding of Racuciu *et al.* (2006) who reported that the exposure of maize seeds to the low static magnetic field (50 mT) has stimulatory influence on fresh weight, assimilatory pigments level as well as the chlorophyll ratio, average nucleic acid level and increase of the seedling length. He further reported that high magnetic field induction (ranging between 100 and 250mT) had an inhibitory effect on all measured traits. Bujrekh (2011) also observed the harmful effects of exposure of high magnetic intensity. Statistically, difference in germination % among the treatments and over control was found non significant (Table 1). Our findings are in agreement with Feizi *et al.* (2012) who also reported that magnetic field had no significant effect on final germination percentage of tomato seeds. Besides seedling growth parameters and seedling vigour index, the biochemical activities were also hampered at high intensity static magnetic field exposure to chick pea seeds. It was observed in our study that dehydrogenase

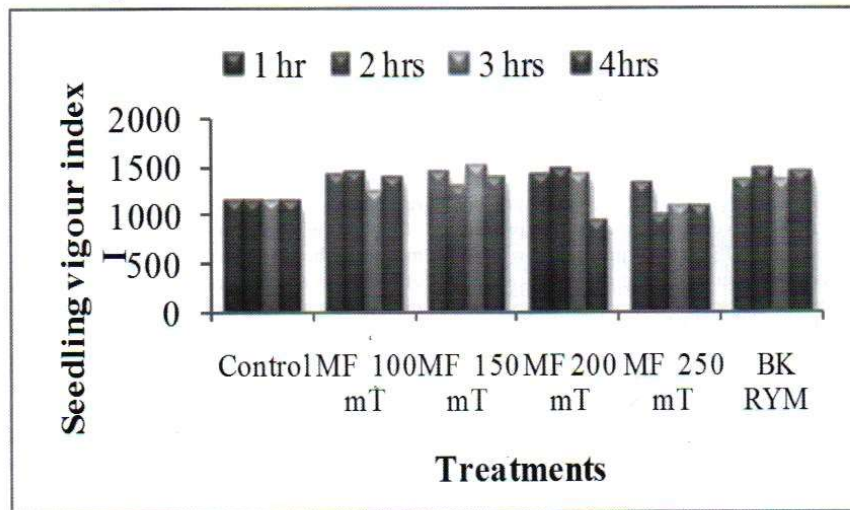


Fig 3: Effect of energy treatments on seedling vigour index I of chickpea (MF- Magnetic field; BK RYM- BK Raj Yog Meditation; m T-Milli Tesla)

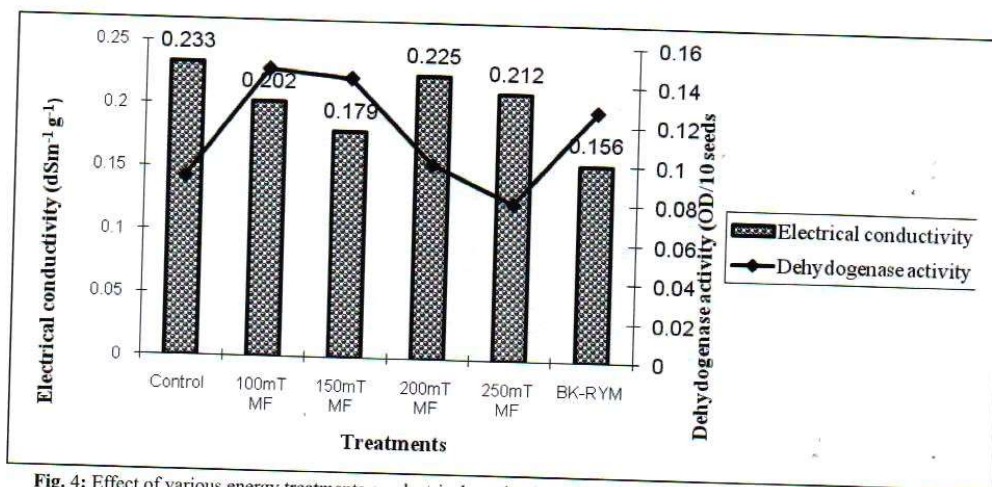


Fig. 4: Effect of various energy treatments on electrical conductivity (dSm) & dehydrogenase activity of Chickpea seeds (MF- Magnetic field; BK RYM- BK Raj Yog Meditation; m T-Milli tesla)

activity was lowest in 250 mT (0.080 OD/10 seeds), which was at par to control (0.09 OD/10 seeds). Maximum dehydrogenase activity was observed in 100 mT (0.146 OD /10 seeds) which was at par with static magnetic strength of 150 mT (0.142 OD /10 seeds) followed by BK RYM treatment (0.127 OD /10 seeds). Lowest EC was observed in the treatment of metaphysical energy through BKRYM (0.156 OD /10 seeds) followed by 150 mT, and 100 mT. Highest EC was found in the leachate of control seeds (0.233 OD/10 seeds). Membrane integrity and dehydrogenase enzyme activity of seed exposed with static magnetic fields of low intensity up to 150 mT and in metaphysical treatment through BKRYM improved significantly over control seed. (Fig. 4).

Increased dehydrogenase activity and improved membrane integrity in sunflower seeds exposed to magnetic field was also reported by Vashisth and Nagarajan, (2010). However according to the present state of awareness it is difficult to say precisely how these energy treatments help in improving physiological and biochemical process of seed, but several theories have been proposed including biochemical changes or altered enzyme activities by Phirke *et al.* (1996).

Experimental studies revealed that treating seeds with BKRYM metaphysical energy treatment recorded significantly higher values of seedling vigour index over control. This is the resultant of higher root length, shoot length, and seedling length, higher dehydrogenase activity and low electrical conductivity over control. The stimulatory effect of application of metaphysical energy

treatments on germination rate and seedling vigor has already been reported by various researchers.

Du Charme (2007) also reported that after giving intentional thoughts to seeds, there is increase in seed weight, germination and seedling length. Grade (1963) reported that water soaked seeds when treated by intense thought grew taller than the untreated batch. The result demonstrated that whatever healer did to the water reflected in the improved health of the plants. He also reported that water treated by the thought power of healer had minor shifts in its molecular structure and decreased hydrogen bonding between the molecules. This is the same thing observed when water was exposed to magnetic fields thus thought did affect the water. He also reported that healing energy increased plant growth and enzyme activities. Russian physicist Korotkov (2011) reported that plants response to human emotions in terms of energy field of plants, which can be measured by measuring the changes in the bio-electrographic activity of the plants and their emissions. Thus positive energy from human beings generates an immediate response in the energy field of plants. In fact, this energy field influences all environmental situations, plants, other people, water and all conditions around us. Haid & Huprikar (2001) on the basis of double blind series of experiments concluded that meditation upon the water supplied to green peas and wheat can affect their germination rate and growth.

Very exiting body of scientific research had demonstrated the effect of thoughts energy on water.

Water stores thought energy and this energy impacts on who so ever use it Emoto Masaru (2004). The positive thought subject to water have been found to form beautiful crystals and water exposed to negative thought form either no crystals or deformed crystal. Thoughts, words, and feelings affect the molecular structure of water and thus thought also have an effect on human body and plants as both contain water in plenty.

CONCLUSION

On the basis of findings on seedling growth parameters, seedling vigour index, biochemical parameters (dehydrogenase activity and electrical conductivity of seed leachates) for various strengths and durations of energy treatments, it can be concluded that exposure of seeds to physical energy treatments through static magnetic field of strength below 250 mT for one hour and metaphysical energy treatment through BK RYM, (a positive thought energy based treatments) for two and four hours could be a suitable, cheap and easy seed invigoration method for improving germination and seedling vigour indices of poor quality seed. These seed enhancing energy treatments not only increase the growth and vigor parameters of seedlings but also play a significant role in enhancing biochemical properties of seeds.

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