

Impact of Biofield Treatment on Growth and Yield of Lettuce and Tomato

¹Vishal Shinde, ¹Frank Sances, ²Shrikant Patil and ¹Amy Spence

¹Pacific Ag Research, San Luis Obispo, CA, USA.

²Trivedi Foundation, Scottsdale, AZ, USA.

Abstract: Recent studies report the effect of biofield treatment on changes in structural characteristics of organic and inorganic matter, on cancer cells *in vitro* and on overall plant development. This study tested the impact of the same treatment applied to lettuce and tomato seeds and transplants (*Lactuca sativa* var. *capitata* and *Lycopersicon esculentum* var. Roma) in commercial plantings with and without fertilizers and pesticides, in relation to yield, quality, and pest inhibition. Treated lettuce plants with fertilizer and pesticide applications were more vigorous, exhibited less incidence of soil-borne fungal wilt, and subsequent yield was statistically greater 43% compared to untreated plants. Treated plants with no fertilizer or pesticide applications in the field behaved similarly to untreated plants that received routine fertilizer and pest control inputs. Similarly, fertilizer applied and fertilizer non-applied treated tomato plants exhibited a 25% and 31% increase in total observable yields respectively. Treated tomato and lettuce plants also measured higher in total leaf tissue chlorophyll content. The combination of biofield treatment along with administration of chemical additives demonstrated the best results with statistically increased yields and higher pest resistance in both test cropping systems. The specific mechanisms that lead to these preliminary results have yet to be determined.

Key words: Crop development; Biofield treatment; Fertilizer and Organic; Lettuce; Tomato.

INTRODUCTION

Information-containing biofield energies have been postulated to be associated with living organisms and to affect their self-regulation processes (Rubik, 2002). Recent studies by Trivedi and Tallapragada (2008, 2009) present enhanced and lasting transformations seen in the physical and structural properties of organic and inorganic materials which were the effect of consciousness energy when transmitted using specific techniques. These authors report that elemental diamond, graphite and activated charcoal powders showed measurable and significant changes in their molecular structure, and go on to suggest that the biofield energy may involve electromagnetic and weak interactions. Dabhade *et al.* (2009) suggest that measurable changes in particle size and hence surface area as well as crystallite size of two test substances, antimony and bismuth metal powders, which they observed as a consequence of a similar treatment, was due to increased energy states caused within the treated substances. Trivedi and Patil (2011) reported multiple year results on Alphonso Mangos in Asia. The mango study showed yield increases and pest infestation decreases over a four year time period versus control trees which on the contrary showed lower yields and increased pest pressure. More recently the biofield energy was tested on Patchouli micropropagation (Patil *et al.*, 2012) where it was reported to increase regeneration and cause an overall improvement in plant health. In related studies, the biofield energy was reported to impact cancer cells *in vitro* (Yount *et al.*, 2012). The studies on living organisms are able to probe more relevant aspects of the information content in biofield energies, in order to establish both the reality of the impact as well as its nature. However, both the *in vitro* studies were in protected environments showing variability in the results. It can be expected that adaptive forces would be better tested *in vivo* in the field where the normal challenge of the environment is experienced and the informational integrity of the organism is also maintained. The nature of the biofield energy in these experiments may be expected to produce more well-defined results under such conditions. However, the mango study was performed on a pre-existing pest infested mango orchard and does not document the results of systematic treatment under a variety of conditions.

Although science has earlier tested such energies in plants, in the above-mentioned studies the scientific facts to support such claims are for the first time seeing reproducible and significant results in experimental observations. The source of biofield energy treatments are those of an internationally reputed energy healer whose name is here withheld according to recommended best scientific practice, but can be provided on demand for replication experiments. While any improvement in human health under such interaction can be accounted for by the placebo effect, such results in plant systems indicate some basic properties of living organisms which need to be noted. An understanding of the energy and its use can help improve the environmental conditions during plant cultivation. In this paper we report on the observed results of crop quality and yield of treated and untreated tomato and lettuce plantings in organic conditions and in the presence of need base fertilizers and pesticides applied according to standard procedure. Scientific mechanisms are not here speculated upon; at this

Corresponding Author: Shrikant Patil, Trivedi Foundation, Scottsdale, AZ, USA.

E-mail: shrikant@trivedifoundation.org, Tel: 1-877-493-4092 Fax: 1-480-320-3727

stage we report the positive results observed in our experiments. Further experimentation is necessary in order to generate the hypotheses regarding underlying mechanisms.

The objective was to conduct a blind study to determine the potential influence of biofield therapy on growth & development of lettuce & tomato in commercial plantings and to systematically compare the effects with and without application of fertilizers and pesticides. The treated and untreated plants were planted in plots in randomized fashion and the location of treated plants remained undisclosed to evaluators during the study.

MATERIALS AND METHODS

Seeds were treated and allowed to germinate until ready to be transplanted. The seedlings were treated again, transplanted into an open field, and allowed to develop according to the season. As a control, untreated seeds were allowed to germinate in the same manner and transplanted alongside the treated plots in a randomized fashion. Needbase fertilizers and pesticides were applied onto one set of plots with transplants from both untreated and treated seeds. Another set of plots for both untreated and treated transplants did not receive fertilizer and pesticide applications. Lettuce cultivar (*Lactuca sativa* var. *capitata*) was Cannery Row (Snow Seed Co., Salinas, CA). Tomato cultivar (*Lycopersicon esculentum*) was Roma (Snow Seed Co., Salinas, CA).

Treatment:

The Biofield treatment was applied for about 3 minutes from a distance of about 1 meter from the samples. The energy source individual was escorted to the laboratory for treating seeds and to the field for treating transplants, was seated on a chair at the given distance from the material to be treated, and was observed to focus concentrated thought outwardly towards the seeds or plants ready to be transplanted. The untreated samples were not in the same room or plot at the time. Each treated set received the treatment twice, the seeds once before being germinated and the resulting plants 53 days later just before they were transplanted in the field.

Crop Parameters:

Treated and untreated lettuce plants were planted in separate randomly allocated plots in five replicates measuring 3.33' by 60' on clay loam soil. Treated and untreated tomato plants were similarly planted in separate plots measuring 6.66' by 50' on sandy loam soil. Plots were hand transplanted, hand harvested, and drip irrigated.

Needbase fertilizer and pesticide applications:

Lettuce:

Fertilizer 18:6:12 was applied at a rate of 600 lb/a slow release pre-planting. The following pesticides were applied 18 days after transplanting (DAT): (a) Endura at a rate of 11 oz/a for the purpose of controlling *Sclerotinia* (*Sclerotinia minor* and *Sclerotinia sclerotiorum*). (b) Presidio at a rate of 4 fl oz/a for the purpose of controlling Downy Mildew (*Bremialactuae*). (c) Maneb at a rate of 2 lb/a for the purpose of controlling Downy Mildew (*Bremialactuae*).

Tomato:

Fertilizer 18:6:12 was applied at a rate of 600 lb/a slow release pre-planting. Fertilizer 7:7:7 was applied at 45, 52, 59, 66, and 80 DAT at a rate of 20 gal/a. The following pesticides were applied: (a) Bravo Weatherstik at a rate of 1.5 pt/a for the purpose of controlling Late Blight (*Phytophthora infestans*) on 63, 84, and 90 DAT. (b) Quadris at a rate of 10.5 oz/a for the purpose of controlling Powdery Mildew (*Oidiumneolycopersici*) on 63, 84, and 90 DAT. (c) Ran-man at a rate of 3.0 fl oz/a for the purpose of controlling Late Blight (*Phytophthora infestans*) on 114 and 121 DAT.

Evaluations:

All evaluations were carried out in blinded fashion, with assessors unaware of the location of treated plants.

Lettuce:

Crop vigor, stand counts and number of wilted lettuce plants due to *Sclerotinia* sp. infection were assessed at 21, 35, 50, and 56 DAT. Stand reduction was calculated using the formula:

$$\text{Percent reduction in stand} = 100 \times (\text{Reduced Stand} / \text{Original Stand})$$

Chlorophyll content was measured using a spad meter (Spectrum Technologies, Inc., Plainfield, IL) from 10 plants per replicate plot at 32 DAT. Lettuce heads were harvested 56 days after transplanting, and were assessed for marketable quality and size based on market standards.

Tomato:

Crop vigor and stand counts were assessed at 41 DAT and plants measured for height and diameter. Chlorophyll content was measured at 89 DAT, just before start of harvesting, using a spad meter, from 10 plants per replicate plot. Tomatoes were harvested over the course of seven pickings between 104 to 126 days after transplanting and were assessed for marketable quality and size based on market standards. Roots from ten tomato plants were analyzed for severity of Nematode infection based on a 0-10 scale with 10 representing maximum severity and lycopene content was assessed at 129 DAT.

Data Analysis:

Statistics were analyzed using ANOVA mean comparison with LSD test and $\alpha=0.05$.

RESULTS AND DISCUSSION

Lettuce:

Wilted plants and stand reduction results by treatment are presented in Table 1. Biofield treated seeds with fertilizers/pesticides (TF) showed the lowest amount of total wilted plants per replicate plot. This resulted in the lowest stand reduction, 14.2%, in comparison to control seeds with fertilizers/pesticides (CF) at 27%. Although both control and biofield treated seeds without fertilizers/pesticides (designated C and T, respectively) showed similar wilted plants to the CF, the percent loss of stands in T plots were statistically similar to CF plots, suggesting that the externally applied energy created healthier and more vigorous plants, able to withstand unaltered field conditions. Figure 1 shows the differences in chlorophyll content between treatments. TF and T plots were observed to have statistically higher chlorophyll content than CF and C treatments. Chlorophyll content is largely determined by plant nutrition, health status, and exposure to sunlight (i.e. conversion of protochlorophyllide to chlorophyll); however, all plants in the study received the same amount of sun exposure, suggesting that the energy treatment had changed certain physiological processes which are beyond the scope of this study. TF plots were observed to have the greatest number and weight of marketable lettuce heads than any other treatment, and a greater amount of large (18s) and medium (24s) heads were harvested from these plots as well (Table 2). TF and CF received the same amounts and types of fertilizers and pesticides, yet yield and quality was approximately 43% greater in the TF plots. Further, Figure 2 shows that the TF treatment resulted in a statistically higher total of percent marketable heads compared to all other treatments. If the energy transmitted is generating change in metabolic processes to the plants, this may explain why TF plots exceeded yield and quality amounts of T plots, enabling a greater intake of fertilizer nutrients and thereby creating stronger and heartier plants.

Table 1: The number of wilted plants and total stand reduction of control and treated lettuce plants. Means followed by the same letter do not differ. (Fisher's LSD test).

Treatment	Wilted Plants (#)								Stand Reduction			
	21 DAT	35 DAT	50 DAT	56 DAT	Total			%				
Control with no fertilizers or pesticides (C)	3.60	a	10.20	a	17.40	a	9.00	a	40.20	a	38.23	a
Control with needbase fertilizers and pesticides (CF)	5.00	a	6.60	a	12.00	b	6.00	a	29.60	a	26.73	b
Treated with no fertilizers or pesticides (T)	5.40	a	9.80	a	15.20	ab	1.40	b	31.80	a	29.07	b
Treated with needbase fertilizers and pesticides (TF)	3.80	a	3.20	a	5.40	c	0.80	b	13.20	b	14.22	c

Table 2: The number (a) and weight in kg (b) of marketable lettuce heads harvested. Means followed by the same letter do not differ. (Fisher's LSD test).

(a)	Marketable Lettuce Heads #							
	Treatment	18s	24s	30s	Total			
Control with no fertilizers or pesticides (C)	7.60	b	22.80	b	12.40	a	42.80	b
Control with needbase fertilizers and pesticides (CF)	8.60	b	18.60	b	11.60	a	38.80	b
Treated with no fertilizers or pesticides (T)	10.80	ab	17.20	b	13.20	a	41.20	b
Treated with needbase fertilizers and pesticides (TF)	15.60	a	30.20	a	9.80	a	55.60	a
(b)	Marketable Lettuce Heads (kg)							
	Treatment	18s	24s	30s	Total			
Control with no fertilizers or pesticides (C)	7.85	b	18.36	b	6.03	a	32.24	b
Control with needbase fertilizers and pesticides (CF)	9.20	b	16.11	b	6.37	a	31.68	b
Treated with no fertilizers or pesticides (T)	11.88	b	14.29	b	7.16	a	33.33	b
Treated with needbase fertilizers and pesticides (TF)	20.17	a	28.64	a	5.78	a	54.59	a

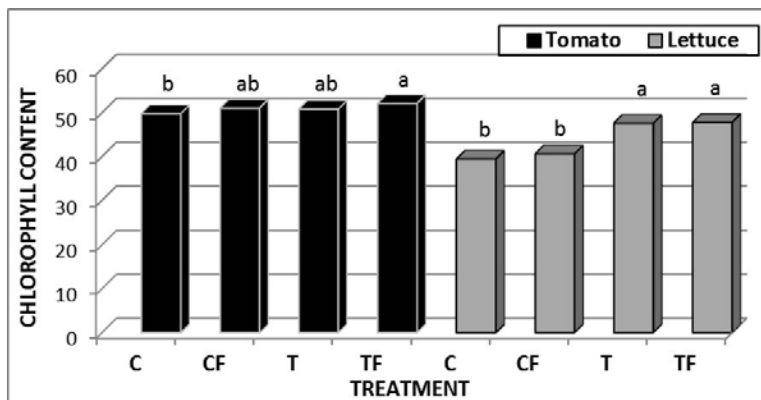


Fig. 1: Average chlorophyll content of lettuce and tomato leaves. Means followed by the same letter do not differ. (Fisher’s LSD test).

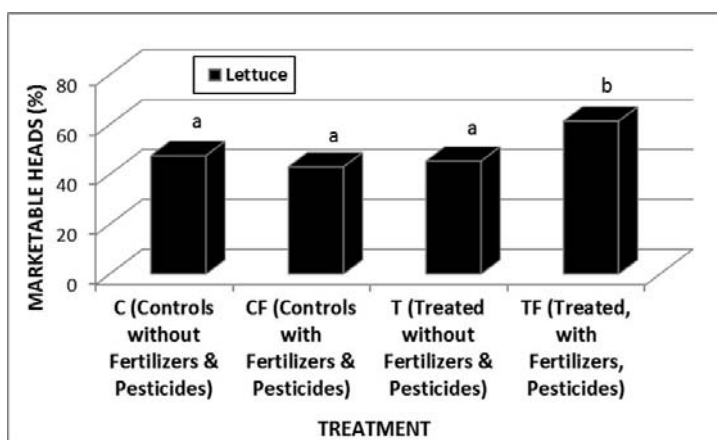


Fig. 2: Percent of marketable lettuce heads harvested. Means followed by the same letter do not differ. (Fisher’s LSD test).

Tomato:

Table 3 presents data for height and diameter of treated and untreated tomato plants, and shows discernible differences between treatments. T showed significantly greater plant heights compared to C, and greater crop diameters than all other treatments. Chlorophyll content (Figure 1) in tomato plants was similar to lettuce plants results; TF plots demonstrated higher chlorophyll content than any other plots, and significantly greater than C plots. Examination of tomato roots indicated that the energy treatment on tomato plants reduced the severity of root galling by nematodes (Figure 3). If the transmitted energy created healthier and more vigorous plants, a logical response would be normalized plant growth and development despite pest invasion and damage. However, in this case, treatments reduced observed galling suggesting the presence of a pest control factor as well. The number of marketable fruit did not differ among treatments; however, TF resulted in the largest weight of total fruit harvested and was significantly higher than C (results not shown). Extrapolation of the data into lb/a is more useable information for the grower, and this result is shown in Table 4. Here, a 31% and 25% increase in total yield was attributed to TF and T, respectively, compared to C. Similar to lettuce plants, the transmitted energy facilitates more robust crops with higher yields.

Thus overall it is seen that in both crops the TF plants have statistically outperformed all the others in terms of health and yield. The final weight of marketable yield and the gross return is significantly higher in the treated crops in both the leafy as well as the fruiting vegetable crops tested. Numerically the untreated plants in absence of fertilizer and pesticide, C, had the lowest performance and T performance is both better than C and comparable to or better than CF plants in the majority of parameters. It is interesting that TF plants, which received both biofield energies as well as chemical protection, have significant and highly consistent improvement over all other treatments. Thus a combination of scientifically designed methodologies along with presence of biofield energy treatment is seen to provide the best inputs for growth and yield.

The results are consistent with studies already reported in the literature and further studies are increasingly showing similar results; hence it is apparent that the current paradigm provides a sufficient model for such studies to probe the beneficial interaction of biofield energies and plants. The results make it necessary that the findings are fully discussed and further investigated by science, using objective and systematic methodologies, in order to be able to scientifically address common misconceptions and/or assumptions associated with the phenomenon, and to derive useful models for prediction and analysis of such results.

Table 3: Crop measurements (height and diameter) of tomato plants in cm. Means followed by the same letter do not differ. (Fisher’s LSD test).

Treatment	cm	
	Height	Diameter
Control with no fertilizers or pesticides (C)	36.38	b
Control with needbase fertilizers and pesticides (CF)	39.22	ab
Treated with no fertilizers or pesticides (T)	40.13	a
Treated with needbase fertilizers and pesticides (TF)	38.66	ab

Table 4: Total tomato yield (lb/acre). Means followed by the same letter do not differ. (Fisher’s LSD test).

Treatment	Total Yield	lb / acre
Control with no fertilizers or pesticides (C)	13016.20	b
Control with needbase fertilizers and pesticides (CF)	13824.30	ab
Treated with no fertilizers or pesticides (T)	16205.20	ab
Treated with needbase fertilizers and pesticides (TF)	17075.60	a

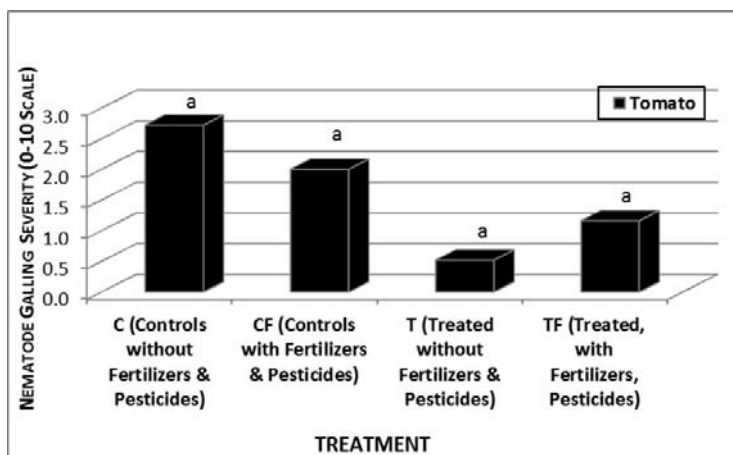


Fig. 3: Nematode root gallings severity on a 0-10 basis with 10 representing maximum severity. Means followed by the same letter do not differ. (Fisher’s LSD test).

Conclusion:

Statistically significant differences of agronomic parameters were here seen between biofield treated versus untreated leafy vegetable and fruiting vegetable crops. In the case of lettuce, a leafy green crop, where true botanical maturity is never reached, the benefits of these treatments included higher percent survivorship of plant stands in disease infested soil, improved color in plant vigor, and overall yields. In the case of tomatoes, a fruiting vegetable, where botanical maturation followed anthesis, plant growth and color were improved which also resulted in higher fruit yields from treated plants. These differences were statistically significant with 95% confidence using means difference one-way analysis of variance and Fisher's Least Significant Difference test. However, while adequately replicated statistically, these studies still represent a single test at a single site for each crop for the 2011 season. Nevertheless, they support the multiple year results on Alphonso mangos previously described. The current systematic studies of two crops show that biofield energies applied along with normal scientific treatments are able to produce healthier plants and higher yield.

ACKNOWLEDGEMENT

This project was financed by the Trivedi Foundation, AZ, USA.

REFERENCES

- Dabhade, V., R.M. Tallapragada and M.K. Trivedi, 2009. Effect of external energy on atomic, crystalline and powder characteristics of antimony and bismuth powders. *Bulletin of Material Science*, 32: 471-479.
- Patil, S.A., G.B. Nayak, S.S. Barve, R.P. Tembe and R.R. Khan, 2012. Impact of Biofield Treatment on Growth and Anatomical Characteristics of *Pogostemoncablin*(Benth.). *Biotechnology*, ISSN 1682-296X/ DOI: 10.3923/biotech.
- Rubik, B., 2002. The biofield hypothesis: its biophysical basis and role in medicine. *J. Alt. Comp. Med.*, 8: 703-717.
- Trivedi, M.K. and R.M. Tallapragada, 2008. A transcendental to changing metal powder characteristics. *Metal Powder Report*, 639(31): 22-28.
- Trivedi, M.K. and R.R. Tallapragada, 2009. Effect of superconsciousness external energy on atomic, crystalline and powder characteristics of carbon allotrope powders. *Materials Research Innovations*, 13: 473-479.
- Trivedi, M. and S. Patil, 2011. Eradication of Spongy Tissue Physiological Disorder in Mangoes Achieved Through Biofield. *ASHS Annual Conference.HortScience*, 46: S135.
- Yount, G., S. Patil, U. Dave, L. DeSantos, K. Gon, R. Arauz and K. Rachlin, 2012. Evaluation of Biofield Therapy Dose and Distance in a Cell Culture Model. *J. Altern. Complement. Med.*, 18: 1-4.