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Abstract:
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plantings in Wisconsin and California, respectively. Following treatment to replicated plots in standard experimental design, data were collected at harvest for yield quantity and quality.

Ginseng plants treated both pre-harvest and a combination of pre- and post-harvest showed market grade increases of 33.3% and 40.0%, respectively. Point of sale gross return for this crop is dependent upon tuber quality, and from these data the economics of these treatments were calculated. Based on stand adjusted yields and quality values, a combination of pre- and post-harvest treatment increased gross income by 57.4%. The second crop showed similar trends in positive responses. In the two blueberry varieties studied, Emerald treated plants showed 96% statistical increase in yield, while Jewel showed 31% increase. At the time of treatment, each variety was in a different stage of flowering. The Emerald variety was in the flowering stage, and Jewel was predominately in the fruiting stage. Both treated cultivars however demonstrated increased yield quantity and quality. The specific mechanisms that lead to these preliminary results need further investigation.

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IMPACT OF BIOFIELD TREATMENT ON GINSENG AND ORGANIC BLUEBERRY YIELD

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ABSTRACT

This study tested the Null Hypothesis for the effect of BioField Energy applied to two separate crops under typical growing conditions, namely ginseng and organic blueberry in commercial plantings in Wisconsin and California, respectively. Following treatment to replicated plots in standard experimental design, data were collected at harvest for yield quantity and quality. Ginseng plants treated both pre-harvest and a combination of pre- and post-harvest showed market grade increases of 33.3% and 40.0%, respectively. Point of sale gross return for this crop is dependent upon tuber quality, and from these data the economics of these treatments were calculated. Based on stand adjusted yields and quality values, a combination of pre- and post-harvest treatment increased gross income by 57.4%. The second crop showed similar trends in positive responses. In the two blueberry varieties studied, Emerald treated plants showed 96% statistical increase in yield, while Jewel showed 31% increase. At the time of treatment, each variety was in a different stage of flowering. The Emerald variety was in the flowering stage, and Jewel was predominately in the fruiting stage. Both treated cultivars however demonstrated increased yield quantity and quality. The specific mechanisms that lead to these preliminary results need further investigation.

Keywords: crop yield, biofield treatment, ginseng, blueberry

INTRODUCTION

Information-containing biofield energies surrounding living organisms are postulated to be involved in their self-regulation processes (e.g. Rubik, 2002). In the field of complementary and alternate medicines, some attempts have been made to define a biophysical basis for such energies and to lay down some guidelines for clinical studies (e.g. review by Movaffaghi and Farsi, 2009). The energies have often been investigated in the past but their impact has never been consistent enough to be scientifically non-controversial in laboratory measurements. Both the NCCAM (National Center for Complementary and Alternative Medicine in the US) and the ACS (American Cancer Society) have issued statements that biofield energy therapies are not supported by available scientific evidence at this point of time (ACS, 2011; NCCAM, 2007). However biofield energies due to intentional mental energies transmitted by specific energy healers have increasingly been shown in recent times to have scientifically measurable impact on matter, on microbes and also on plants. From the time of Descartes the basic assumptions of science have progressively concluded that such energies can be ignored in normal scientific models of the material world, and the development of many noteworthy technologies has been the result. Nevertheless, the finding that biofield energies are able to directly influence matter, and more specifically, that they can influence the development and self-expression of living organisms, is of value to science. It is therefore necessary to determine the nature of the impact, scientifically integrate it into models and develop technologies to use such influences in beneficial ways if they are proven to be consistent and reproducible.

Recent studies by Trivedi and Tallapragada (2008, 2009) claim quantifiable transformations in the physical and structural properties of organic and inorganic materials due to such biofield energy. They report that elemental diamond, graphite and

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activated charcoal powders showed measureable and significant changes in their molecular structure after the transmission. Dabhade *et al.* (2009) similarly show that measurable changes in particle size and hence surface area as well as crystallite size of antimony and bismuth metal powders resulted from the same external biofield treatment which they suggest may have caused a relatively high energy state to occur within the treated substances. Recently in Yount *et al.* (2012) brain cancer treated *in vitro* from a controlled laboratory setting was shown to be positively inhibited in a biofield therapy dose response. With regard to plant life, Patil *et al.* (2012) reported results from this energy of consciousness on micro-propagation response of Patchouli. The source of energy treatments used in these studies was a specific technique by an internationally well-known healing energy practitioner and his student whose names are not mentioned here in accordance with recommended best scientific practice, but can be provided on demand for replication experiments. As information-containing energies are here involved, with a symbiotic intention, it may be expected that living materials would be able to show the impact more effectively. While the impact on humans can be accounted for by the placebo effect, experiments on plant systems can show whether such placebo effects are necessarily involved. However the *in vitro* experiments reported above show significant results which display some intrinsic variability in the controlled laboratory conditions and in early tissue growth stages. To test such an energy, and to better establish whether plants are able to participate in such energy transfers, an *in vivo* testing may show more consistent results due to the larger adaptive challenges faced by samples in the field. In this paper we report on the results of crop quality and yield of treated and untreated commercial ginseng and organic blueberry plantings.

Five year old perennial blueberry bushes of the Emerald and Jewel variety and ginseng commercial plantings were tested through use of biofield energy. As the objective was to conduct a blind study, plots were allotted for treatment in a randomized fashion and the location of treated plants remained undisclosed to evaluators during the study.

MATERIALS AND METHODS

The experiments were conducted from July to November 2011 at sites of Pacific Ag Research in Wisconsin and California, USA. For both ginseng and organic blueberry studies, established plants were treated and allowed to develop according to the season. Untreated plants were allowed to develop according to the season in the same manner alongside the treated plots in a randomized fashion (Randomized Complete Block experimental design) as controls. Ginseng plants are subjected to a cleaning and drying process post-harvest during which there are further changes in texture, color and other characteristics important in their final grading. In order to further compare the impact at this vulnerable stage, some ginseng plants were treated twice (3 months before harvest and/or after harvest before processing) referred to as treatments A (pre-harvest only), B (post-harvest only) and AB (both pre- and post-harvest). Ginseng was a grower's cultivar and was planted 2.5 years prior to biofield treatment.

The Ginseng was located in central Wisconsin.Two blueberry cultivars, Emerald and Jewel, were used and treated only once. Treatment of the blueberry bushes occurred on the same day, with Emerald bushes at the bloom stage during treatment, and the Jewel variety past flowering and in the early fruiting stage. Both varieties were 5 years in age and well established at the time of treatment. Blueberries were located in Central California.

Treatment

The energy source individual was escorted to the field, maintaining a short distance (approximately 1 meter) from the plants to be treated, and was observed to focus targeted mental energy (referred to as the biofield) towards the established plants for approximately three minutes. In the case of tandem applications to the Ginseng, the length of time between treatments (A and B) was 88 days. The healing mental intention is not directly measureable at present; however the nature of the results was used as an indicator.

Crop Parameters

Treated and untreated ginseng plants were located in separate plots measuring 3.35m by 1.52 m in a randomized design on silt loam soil.

Treated and untreated organic blueberry plants were planted in separate plots measuring 3.05m by 18.29 m on clay loam soil. In both crops, treatments were performed on four replicate plots paired with 4 replicate untreated plots in the same block. All plot locations were maintained undisclosed to evaluators (blind study). During the study, irrigation occurred as per standard grower practice. Blueberries were drip irrigated and ginseng was irrigated by natural rainfall. Grower's customary farming practices were utilized in both cropping system.

Evaluations

Ginseng:

Ginseng roots were harvested from ground at 88 days after the first biofield treatment (A), treated again (B) post-harvest before processing and allowed to dry for 12 days, after which they were weighed. They were blind assessed by a commercial ginseng buyer for marketable grades on a 1-4 scale, with 4 recognized as very high quality, 3 above average, 2 fair quality, and 1 was at or below acceptable quality. Standard commercial estimations were used for the grading which is normally based on color, shape and texture of the ginseng roots, as described in the document for ginseng quality standards prepared by the United States Department of Agriculture (2007). After the roots were individually sorted and rated, the ratings were analyzed for each treatment, with calculation of average. Gross return based on first point of sale from grower was calculated as follows: 1s=$30, 2s=$38, 3s=$48, and 4s=$64, based on 2011 pricing. Retail pricing is 100% greater than wholesale based on current pricing (Ginseng and Herb Co-Op in Wausau Wis.) Total yield was adjusted based on the proportion of stand count in the control plots versus each treated plot.

Organic Blueberry

Evaluations consisted of assessing yields from each blueberry variety including marketable and unmarketable weights.

Data Analysis

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

RESULTS AND DISCUSSION

Ginseng

Ginseng roots harvested from plants with two treatments (TAB) showed improved market grade compared to other treatments (Figure 1). An average root rating of harvested dry ginseng is based on root quality in terms of texture, shape and color, on a 1-4 scale with 4 recognized as being very high quality, 3 is above average, 2 is fair, and 1 is below average quality. A single biofield treatment after harvest (TB) had no effect on root quality, both TB and control plants (C) had root ratings of 2.4. Ginseng plants, and treated pre-harvest showed root ratings of 3.0. However, the combination of the two biofield treatments, both pre- and post-harvest showed a synergistic effect, with the greatest root rating of 3.2. This effect is further shown in Figure 2. Although a single treatment post-harvest increased market grade by 6.7% compared to the C, plots treated pre-harvest (TA), and the combined pre and post-harvest treated plots (TAB) demonstrated an increase in market grade quality of 33.3% and 40.0%, respectively. At the initial treatment, stand counts in the C plots were 8.5 per plot compared to an average of 7.6 (±0.03) in all of the treated plots (data not shown). Based on the final plant stands in all plots, a calculation was made for yield adjustment. The foundation for this calculation is based on the growing environment of ginseng; plants require only indirect light and mulched moist soils with unlimited soil moisture which in turn could support increased yields beyond the stand count. The hypothesis that there is a linear relationship between stand during the growing season with ginseng yields is supported by Park *et al.* (1987). When yields were adjusted with final stand differences between C plots and each treated plot at initial infield biofield treatment, a 22.1% increase in total yield (lb/acre) was observed from the TAB plots (Figure 3).

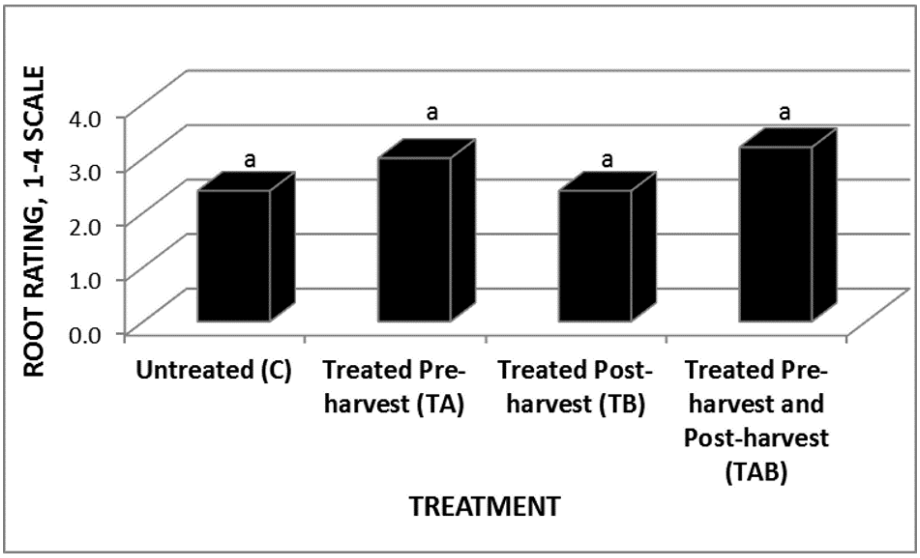

Figure 1. Root rating of harvested dry ginseng, based on root quality 1-4 scale with 4 recognized as very high quality, 3 is above average, 2 is fair, and 1 is below average quality. [a,b]Statistical differences are inclusive to each variety

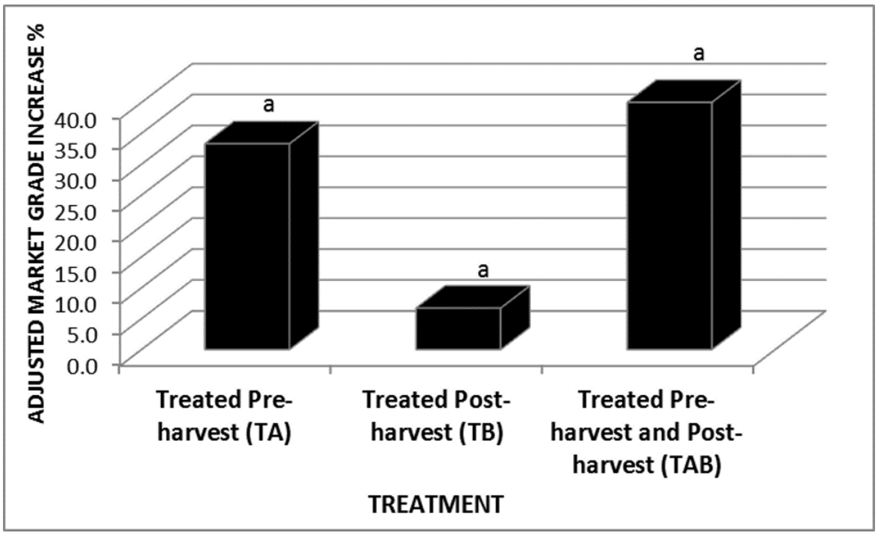

Figure 2. Percent increase of stand-adjusted market grade ginseng compared to control plots.[a,b]Statistical differences are inclusive to each variety

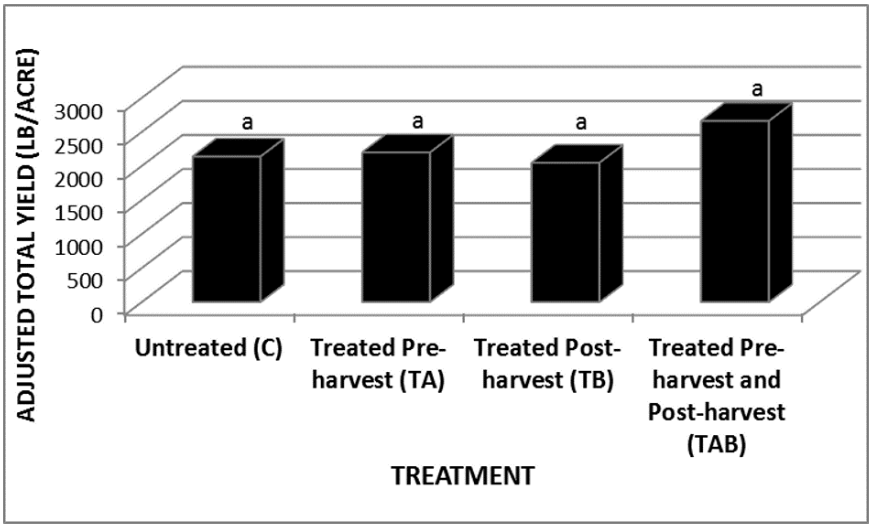

Figure 3. Adjusted total yield (lb/acre) of dry ginseng roots harvested.[a,b]Statistical differences are inclusive to each variety

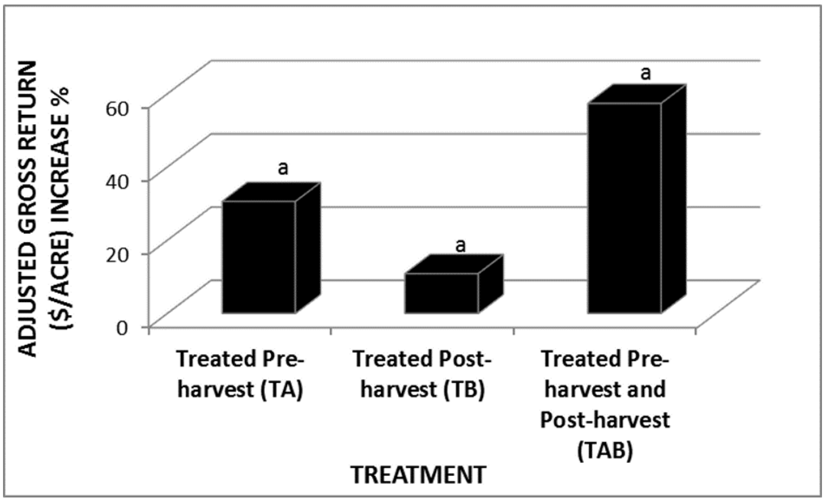

Figure 4. Adjusted gross return ($/acre) of dry ginseng roots harvested.[a,b]Statistical differences are inclusive to each variety

The first-point-of-sale gross return from the C plots yielded $90,285 compared with $94,087, $108,956 and $139,545 obtained from TB, TA, and TAB, respectively (results not shown); gross return based on first point of sale from grower is calculated dependent upon ginseng quality (1-4 scale). Based on stand-adjusted yields and ginseng quality assess-ments, there was an increase in gross income of 30.6%, 10.9%, and 57.4% from TA, TB, and TAB, respectively, shown in Figure 4. A combination of treatments as presented here may suggest a synergistic effect; the biofield treatment created healthier and more vigorous plants, resulting in increased root quality and subsequent yields, by unknown processes beyond the scope of this study.

Organic Blueberry

Table 1 shows the number of marketable berries harvested from Emerald and Jewel varieties. Both treated Emerald (TE) and treated

Jewel (TJ) plants resulted in greater weights of marketable berries in seven out of eight picking dates, compared to the control plants. For example, on the first picking date, 832.5 blueberries were harvested from TE plots compared to 422.3 blueberries in the CE plots. Further, on the 7th harvest, TE plants had a statistically greater amount of fruit harvested, 253.5 blueberries, compared to CE at 166.5 blueberries. Total harvest yield, Figure 5, from all Emerald pickings was significantly greater for TE plots compared to CE plots with the number of total blueberries harvested at 3,351.8 and 1,862.0, respectively. TJ plots also showed a greater total yield of 9,754.5 blueberries compared to CJ plots at 8,303.8 blueberries, although not significantly different. Out of eight harvests, TE and TJ plants showed a 96% and 31% increase in yield compared to the untreated plants, respectively (Figure 6). As stated, each blueberry variety was at a different growing stage at treatment; Emerald plants were in the flowering stage while Jewel plants were in the early fruiting stage. This may explain why the Emerald variety displayed an elevated improvement following biofield treatment than the Jewel variety since Emerald plants had a longer period of time to respond to the applied biofield treatment and hence subsequent yields were increased.

Table1. The weight (g) of blueberries harvested, over the course of eight pickings

	Harvest Number																Harvest Total	
Treatment	1st		2		3		4		5		6		7		8			
CE – Emerald Control	422.25	a	247.00	a	140.00	a	378.75	a	98.50	a	121.00	a	166.50	b	288.00	a	1862.00	b
TE – Emerald Treated	832.50	a	598.00	a	452.25	a	523.25	a	147.50	a	105.75	a	253.50	a	439.00	a	3351.75	a
CJ - Jewel Control	989.50	a	619.25	a	618.25	a	528.25	a	531.00	a	585.00	a	1531.50	a	2901.00	a	8303.75	a
TJ – Jewel Treated	1288.50	a	923.25	a	1001.50	a	1019.25	a	759.00	a	702.75	a	1546.50	a	2513.75	a	9754.50	a

Remarks: ^{a,b} Statistical differences are inclusive to each variety

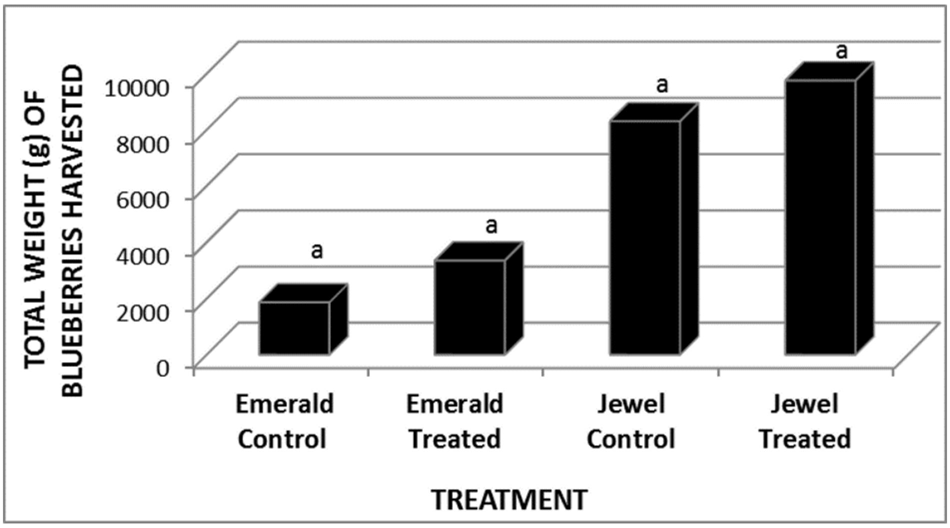

Figure 5 Total blueberry yield for Emerald and Jewel varieties. ^{a,b}Statistical differences are inclusive to each variety

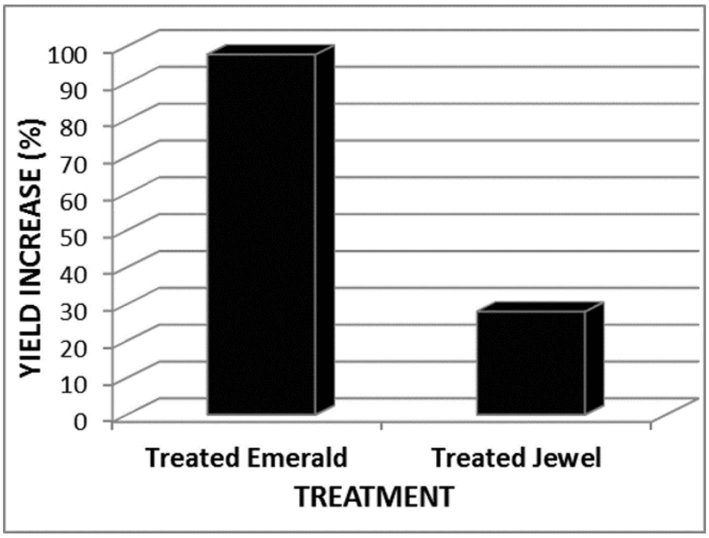

Figure 6. Percent increase in yield for treated Emerald and Jewel varieties compared to control plots

Thus it is seen that in repeated harvests the yields were consistently higher in both blueberry varieties against all expectations of probabilities, and the increase was also significant in one cultivar. These results support the reports in the literature. Similar trends are also seen in the ginseng crop. Numerically the yields and quality of ginseng over multiple replicates and four different treatments have shown consistent improvement in treated crops in each case. Moreover, the improvement in gross return is the minimum at 10.9% in case of a post-harvest treatment (TB), in which assessments were performed after 12 days, while the combined treatment of both pre- and post-harvest (TAB) has shown the maximum effect at 57.4% and the pre-harvest treatment (A) administered 100 days before evaluation of results has shown an intermediate result of 30.6% improvement. As seen by the uniformity of trends in these results and in previously published studies, biofield energy affected blueberry and ginseng plants by processes yet to be established, which resulted in greater amounts of harvest from treated plots.

It, thus, becomes evident that further experimentation is necessary with more in-depth investigation to elucidate possible underlying mechanisms or causal processes for the results reported herein. 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. It is therefore necessary that these findings are discussed and further investigated by science, using objective and systematic methodologies in order to address misconceptions and/or standard assumptions associated with the phenomenon and derive useful models for prediction and analysis of such results. The scope and extent of the influence in these cases also need further study, through systematic monitoring of various growth parameters and treatments at different stages of growth. In the case of ginseng, the benefits of these treatments included higher root quality ratings resulting in greater gross return yields. In the case of blueberries, there were greater total yields over the course of a season for two different varieties. However, while adequately replicated statistically, these studies still represent a single test at a single site for each crop for the 2011 season. Nevertheless, the reported results have confirmed the ability of the biofield technique to increase yield and profit-related parameters in these two species. Future studies are warranted in order to further probe these trends.

CONCLUSIONS AND SUGGESTION

Biofield treatments have been seen to beneficially impact yield and profit-related parameters in ginseng and blueberry crops, improving overall quality as well as quantity of yield in the field. Further studies on various stages of plant growth are required to determine the scope of the influence as well as to probe underlying mechanisms, whereas the study here has established the ability of the plants to respond to the treatment.

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