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# Phenological and Morphological Characterization of Watermelon (*Citrullus lanatus* L.) Subjected to Spiritual Blessing/Biofield Energy Treatment (SBET)

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**Abstract:** Watermelon (*Citrullus lanatus* L.) is a high-value horticultural crop whose yield and quality are heavily dictated by phenological progression and vegetative vigor. Sustainable biostimulatory interventions, such as Spiritual Biofield Energy Treatment (SBET) have emerged as promising non-chemical strategies to modulate plant physiology and developmental dynamics. This study evaluated the effects of SBET on the morphological traits and fruit development parameters of *C. lanatus* under controlled field conditions. The current study was conducted using a randomized complete block design (RCBD). SBET significantly accelerated seed germination by reducing mean germination time. Plants subjected to SBET exhibited a significant increase in vine length (47.32%, $p$ = 0.030), primary branch count (41.82%, $p$ = 0.001), leaf count (31.44%, $p \leq$ 0.001), fruit length (31.25%, $p$ = 0.009), seed count per fruit (34.94%, $p$ = 0.008), and seed length (39.13%, $p$ = 0.005) in the treatment group compared to the control group. Ultimately, these improvements led to a 28.57% increase in total fruit yield per hectare in the treatment group compared to the control group. Overall, SBET serves as an effective biostimulant that optimizes vegetative architecture and advances reproductive phenology in *C. lanatus*. These findings highlight SBET as a viable agricultural tool to boost crop yield, shorten crop turnover cycles, and enhance fruit marketability.

**Keywords:** watermelon, crop yield, spiritual blessing, *Citrullus lanatus*, Blessing/biofield energy treatment, non-invasive biostimulant.

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## INTRODUCTION

Watermelon, *Citrullus lanatus* L. (*C. lanatus*) a major member of the family Cucurbitaceae, is an economically vital horticultural crop globally recognized for its high-water content, essential vitamins, and key bioactive antioxidants such as lycopene and L-citrulline [1]. Global watermelon production relies heavily on optimizing crop development efficiency, where genomic architecture and metabolic pathways directly govern phenotypic traits and harvest quality [2]. The lifecycle of *C. lanatus* progresses through distinct phenological stages, including seed germination, main vine elongation, lateral branching, staminate and pistillate anthesis, and fruit maturation, each sensitive to physiological and environmental cues [3]. Morphological characteristics, such as leaf surface area, primary vine length, node number, and the sex ratio of male to female flowers, serve as major determinants of photosynthetic source-sink relationships and overall fruit yield in watermelon [4]. Despite advancements in agricultural management and plant breeding, *C. lanatus* production frequently faces yield instability due to uneven seed vigor, delayed phenological transitions, poor flower synchronization, and abiotic stress factors [5]. Enhancing reproductive efficiency and early-stage phenotypic vigor remains a high priority for improving total yield per unit area and fruit uniformness in commercial watermelon farming [6].

To address these production limits without reliance on synthetic chemical inputs, biophysical interventions such as Biofield (Blessing) Energy Treatment have emerged as potential non-invasive approaches to stimulate plant development [7, 8]. While biofield interventions have shown promise in general agronomic studies, a comprehensive evaluation of how this biophysical treatment influences the specific phenological milestones, morphological traits, and fruit yield components of watermelon (*C. lanatus* L.) has not yet been documented [6]. Given the commercial significance of watermelon and the critical role of phenological timing plays in fruit development, establishing the effect of Blessing / Biofield Energy Treatment on *C. lanatus* was of substantial scientific and practical interest. Therefore, the present study was aimed to evaluate the phenological progression, vegetative and floral morphology, and harvest yield characteristics of *C. lanatus* subjected to Spiritual Blessing/Biofield Energy Treatment (The Trivedi Effect®) compared to the untreated control group.

## MATERIALS AND METHODS

### Study Site

The trial site was located at Bhandarwadi, Sindhudurg, Maharashtra, India (15°37' to 16° 40' North and 73° 19' to 74° 13' East) situated at an altitude of 26 meter (m) above the mean sea level (MSL). Climatic conditions feature high ambient temperatures reaching 40°C during late spring (April–May), contrast with cooler winter ranges (8 °C to 25 °C, December–February). Erratic precipitation regimes at the experimental location frequently trigger soil moisture stress coinciding with active crop growth stages.

### Seed Source and Experimental Design

Hybrid watermelon (*C. lanatus* L.) seeds (95% purity, Lot No. 19558699, Syngenta India Pvt. Ltd.) were arranged in a randomized complete block design (RCBD) with three replicates. We compared an untreated control group (CONWAMG) against a blessing/biofield energy-treated group (BTWAMG). All experimental units received identical agronomic management, including standardized irrigation, fertilization, and crop protection schedules to eliminate confounding environmental variables.

### Study Plot Design

The experimental groups were evaluated using a randomized complete block design (RCBD) with three replications. Plots (5.5 m × 4.0 m; 22.0 $m^2$ each) were spaced 0.5 m apart within and between blocks, with plant spacing set at 0.5 m × 0.5 m. Pre-sowing fertilization consisted of 50, 100, and 50 kg $ha^{-1}$ of N, P, and K, respectively, incorporated directly into the topsoil.

### Spiritual Blessing (Biofield/Prayer) Energy Treatment (SBET) Strategy

The treatment group (BTWAMG: *C. lanatus* L. seeds and designated plot of land soil) received a single 4-minute non-contact spiritual blessing/biofield energy treatment (SBET) by an experienced practitioner (Mrs. Dahryn Trivedi; >14 years of clinical/field experience) at a fixed distance of 0.5 m to eliminate physical confounders. An untreated control group (CONWAMG) did not receive any kind of treatment. Both the groups were maintained under identical environmental conditions (28 ± 2 °C, 65 ± 5% relative humidity) to ensure experimental reproducibility.

### Soil Characterization and Sample Preparation

The trial site comprised a well-drained, brownish-red loam with low initial fertility. Prior to trial initiation, randomly collected topsoil samples (30 cm) were pooled, air-dried, and sieved to < 2 mm for baseline characterization. Particle size distribution was determined as per Richer-de-Forges 2022 [9], and the soil pH was measured potentiometrically in a 1:2 (w/v) soil-deionized water slurry using a calibrated pH meter.

### Agronomic Management and Plant Protection

Direct-seeded plots were manually irrigated for 8 days post-sowing and subsequently managed under surface drip irrigation (pressure-compensating emitters at 0.5 m spacing; 3.0 L $h^{-1}$ discharge rate). Basal fertilization was applied uniformly across all treatments at 50–100–50 kg $ha^{-1}$ (N:P:K), supplying 100% of P [single superphosphate (SSP)] and K [muriate of potash (MOP)] and 50% of N (urea). The remaining N was side-dressed at 21 days after sowing (DAS). Insect pest management was standardized using a foliar spray of a commercial insecticide mixture Hamla 550 (chlorpyrifos 50% + cypermethrin 5% EC), Gharda Chemicals Ltd., Mumbai, India at 2.0 mL $L^{-1}$.

### Growth and Morphological Parameters

At 90 days after sowing (DAS), five plants per plot were randomly selected to evaluate vegetative, reproductive, and yield dynamics. Qualitative characterization included leaf morphology (blade shape, coloration, margin type, and pubescence), fruit traits (shape, skin, and flesh coloration), and seed coat color. Quantitative vegetative parameters comprised vine length (m), primary branch count, internode length (cm), stem diameter (cm), leaf count, and leaf dimensions (cm). Phenological, yield, and quality traits included days to 50% flowering, fruit dimensions (length and diameter, cm), individual fruit weight (kg), flesh thickness (cm), rind thickness (mm), and total fruit yield per plant and per hectare (t/ha). Additionally, seed morphometry was assessed *via* seed dimensions (length, width, thickness, cm), seed count per fruit, and 100-seed weight (g).

### Yield Parameters

For yield evaluation, five representative plants per plot were selected following a randomized sampling protocol. Watermelon (*C. lanatus* L.) fruits were harvested at physiological maturity, and their morphometric traits length and equatorial diameter (cm) were recorded. Individual fruit mass (kg) was determined using a calibrated digital balance, and cumulative yield per plot was converted to yield per unit area (t $ha^{-1}$).

### Statistical Analysis

Continuous variables were assessed for normality and are expressed as mean ± SEM. Inter-group differences between the two independent cohorts were compared using an unpaired, two-tailed Student's *t*-test. Two-sided *p*-values < 0.05 were considered statistically significant. All statistical processing was executed using SigmaPlot (version 14.0).

## RESULTS

### Soil Properties

Baseline analysis characterized the soil as a strongly acidic (pH 5.01) sandy loam with low effective cation exchange capacity (ECEC) and high susceptibility to nutrient leaching. Post-harvest, SBET application effectively ameliorated this acidity, elevating soil pH to 5.90.

### Phenological Progression and Morphology of Watermelon

Growth and yield parameters of watermelon (*C. lanatus*) were systematically recorded at predefined developmental intervals. The phenological progression of *C. lanatus* encompasses five distinct stages: seedling establishment, vegetative expansion, flowering, fruit development, and harvest maturity (**Figure 1**).

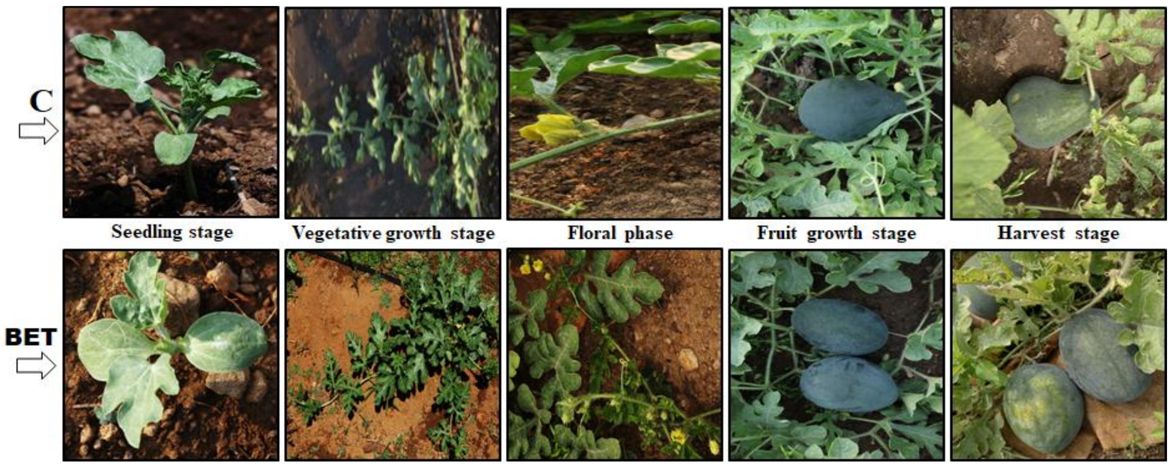


**Figure 1: Characterization of watermelon (*Citrullus lanatus* L.) vegetative growth characteristics. Chronological sample images depict the developmental transitions of the control (C) versus blessing/biofield energy-treated (BET) cohorts.**

### Morphological Characteristics

Distinct phenotypic variations were observed between the control (CONWAMG) and blessing/biofield energy-treated (BTWAMG) groups across several agronomic traits. Plant vine length was longer for the blessing/biofield Energy-Treated Group (BTWAMG) and medium for the control group (CONWAMG). The number of primary branches in the stem was a medium number for CONWAMG and many for the BTWAMG. Thicker stem diameter was observed in the BTWAMG, and less thick in the CONWAMG. The leaf shape and size were medium in the CONWAMG, and large in BTWAMG. Moderate leaf hairs were found in CONWAMG, and many leaf hairs were observed in the BTWAMG. Green leaf blade colour was observed for CONWAMG, whereas deep green colour was found in BTWAMG. The colour of the watermelon fruit skin was deep green with a few rind stripes in the BTWAMG group, and CONWAMG had medium green fruits with rind stripes. The inside fruit flesh colour of BTWAMG and CONWAMG fruits was bright red and red, respectively. The CONWAMG group had brown seed colour, and the BTWAMG had deep brown seed colour. Both groups consistently formed oval fruits at maturity (**Table 1**). Overall, these observations indicate a pronounced qualitative enhancement across key vegetative and reproductive descriptors in the treated group.

**Table 1: Effects of blessings (biofield) energy treatment on qualitative vegetative parameters of watermelon at 90 days after sowing (DAS).**

| **Vegetative trait** | **Control group (CONWAMG)** | **Treated group (BTWAMG)** |
|---|---|---|
| Vine length | Medium | Long |
| Number of primary branches per vine | Medium | More |
| Stem diameter | Less thick | Thicker |
| Leaf shape and size | Medium | Large |
| Leaf blade margin | Wavy | Wavy |
| Leaf hair | Moderate | More |
| Leaf blade colour | Green | Deep green |
| Fruit skin colour with stripes type | Medium green with rind stripes | Deep green with few rind stripes |
| Fruit shape (at maturity stage) | Oval | Oval |
| Fruit flesh colour | Red | Bright red |
| Seed colour (at mature harvest stage) | Brown | Deep brown |

### Phenology and Yield Traits

Relative to CONWAMG, BTWAMG significantly increased germination rate by 16.08% ($p \leq 0.001$) and enhanced vegetative growth, improving vine length (47.32%, $p = 0.030$), internode length (21.82%, $p \leq 0.001$), primary branch count (41.82%, $p = 0.001$), and stem diameter (13.31%, $p = 0.011$). Leaf morphology also showed marked improvement in leaf count (31.44%, $p \leq 0.001$), and leaf width (17.34%, $p = 0.020$). Phenologically, BTWAMG took less time to first flowering by 6.91% ($p \leq 0.001$) and 50% flowering by 4.98% ($p = 0.010$); while boosting of female flower counts (19.35%, $p \leq 0.001$) compared to the CONWAMG. Yield parameters responded positively, with increases in fruit length (31.25%, $p = 0.009$), fruit diameter (15.23%, $p = 0.021$), and number of fruits per plant (19.35%, $p = 0.022$), accompanied by 26.50% ($p \leq 0.001$) reduction in rind thickness. Furthermore, seed metrics followed a similar upward trend, with significant increases in seed count per fruit (34.94%, $p = 0.008$), seed length (39.13%, $p = 0.005$), seed thickness (29.17%, $p = 0.023$), and 100-seed weight (27.57%, $p \leq 0.001$) in the BTWAMG compared to the CONWAMG. Together, these improvements drove a 28.57% expansion in total fruit yield per hectare in the BTWAMG compared to the CONWAMG (**Table 2**).

**Table 2: Evaluation of the phenological and yield characteristics of watermelon following spiritual (biofield/prayer) blessing energy treatment (SBET).**

| Vegetative trait | Control group (CONWAMG) | Treated group (BTWAMG) | P value |
|---|---|---|---|
| Days to germination | 5 to 8 | 5 to 7 | - |
| Germination percentage | 84.78 ± 0.47 | 98.41 ± 0.14 | $p \leq 0.001$ |
| Vine length (m) | 2.24 ± 0.36 | 3.30 ± 0.18 | $p = 0.030$ |
| Internode length (cm) | 8.34 ± 0.26 | 10.16 ± 0.20 | $p \leq 0.001$ |
| Number of primary branches/plant | 6.05 ± 0.35 | 8.58 ± 0.37 | $p = 0.001$ |
| Stem diameter (cm) | 2.78 ± 0.10 | 3.15 ± 0.05 | $p = 0.011$ |
| Number of leaves | 172.38 ± 8.31 | 226.57 ± 5.11 | $p \leq 0.001$ |
| Leaf length (cm) | 16.24 ± 0.57 | 17.63 ± 0.25 | $p = 0.056$ |
| Leaf width (cm) | 12.34 ± 0.58 | 14.48 ± 0.46 | $p = 0.020$ |
| Days to flowering | 43.27 ± 0.28 | 40.28 ± 0.44 | $p \leq 0.001$ |
| Days to 50% flowering | 59.67 ± 0.36 | 56.70 ± 0.80 | $p = 0.010$ |
| Number of male flowers | 123.25 ± 3.57 | 120.92 ± 5.33 | $p = 0.726$ |
| Number of female flowers | 12.04 ± 0.23 | 14.37 ± 0.26 | $p \leq 0.001$ |
| Days to fruit harvesting | 83.62 ± 3.68 | 81.51 ± 1.54 | $p = 0.611$ |
| Average fruit weight (kg) | 2.54 ± 0.67 | 3.58 ± 0.40 | $p = 0.219$ |
| Vegetation period (days) | 121.35 ± 3.54 | 116.14 ± 2.36 | $p = 0.256$ |
| Fruit length (cm) | 19.23 ± 1.25 | 25.24 ± 1.21 | $p = 0.009$ |
| Fruit diameter (cm) | 16.87 ± 0.58 | 19.44 ± 0.68 | $p = 0.021$ |
| Fruit flesh thickness (cm) | 2.64 ± 0.37 | 3.34 ± 0.08 | $p = 0.102$ |
| Rind thickness (mm) | 8.68 ± 0.05 | 6.38 ± 0.05 | $p \leq 0.001$ |
| 100-seed weight (gm) | 4.57 ± 0.03 | 5.83 ± 0.07 | $p \leq 0.001$ |
| Seed length (cm) | 0.69 ± 0.05 | 0.96 ± 0.05 | $p = 0.005$ |
| Seed width (cm) | 0.59 ± 0.03 | 0.63 ± 0.03 | $p = 0.373$ |
| Seed thickness (cm) | 0.48 ± 0.04 | 0.34 ± 0.03 | $p = 0.023$ |
| Seed count/fruit | 102.65 ± 8.34 | 138.52 ± 5.79 | $p = 0.008$ |
| Number of fruits/plants | 2.79 ± 0.13 | 3.33 ± 0.14 | $p = 0.022$ |
| Fruit yield (kg)/plant | 8.01 | 11.92 | - |
| Fruit yield (kg)/plot | 66.52 | 85.52 | - |
| Fruit yield/sq. m plot (kg/sq. m) | 1.01 | 1.30 | - |
| Fruit yield/hectare (tones/hectare) | 10.08 | 12.96 | - |

Data represented as mean ± SEM (n = 5); $p \leq 0.05$ *vs*. control watermelon group (CONWAMG) using Student's *t*-test

## DISCUSSION

The observed morphological enhancements in the blessing/biofield energy-treated watermelon group (BTWAMG) compared to the control group (CONWAMG) highlight significant physiological modifications across vegetative, foliar, fruit, and seed development stages. The increase in main vine length, thicker stem diameter, and a higher number of primary branches in BTWAMG indicate an overall boost in vegetative vigor and structural biomass accumulation. In watermelon (*C. lanatus*), robust vine growth and lateral branching are primary determinants of sink-source relationships, driving efficient nutrient uptake and carbohydrate allocation throughout the canopy [10]. Foliar analysis revealed larger leaf size, deeper green blade coloration, and increased trichome (leaf hair) density in BTWAMG compared to CONWAMG. The transition from a standard green to a deep green blade color denotes elevated chlorophyll concentration, directly boosting light-harvesting efficiency and photosynthetic capacity in *C. lanatus* foliage [11]. Furthermore, the proliferation of foliar trichomes serves as an adaptive mechanism in watermelon to reduce transpirational water loss and protect against abiotic stressors [2]. The Blessing/Biofield Energy Treatment likely stimulated secondary metabolic pathways, leading to structural modifications in leaf surface microstructures and enhanced photosynthetic pigment biosynthesis [4, 12].

External and internal fruit parameters showed distinct qualitative improvements in the treated group, transitioning from medium green to deep green skin color with reduced rind striping, alongside a shift from red to bright red internal fruit flesh. In watermelon, the intensification of flesh red color was directly linked to higher lycopene bioaccumulation and chromoplast differentiation during the ripening phase [13]. The shift from brown to deep brown seed coats in BTWAMG indicates complete physiological seed maturity and heightened deposition of phenolic compounds in the seed coat integument layers [14]. These collective enhancements align with previous biofield energy findings in watermelon crops, confirming that non-invasive biofield application positively modulates physiological maturation, pigment synthesis, and reproductive development in *C. lanatus* [12].

The significant increase in germination rate in the BTWAMG compared to CONWAMG highlights an enhanced physiological activation during early seed imbibition. Rapid and uniform germination was vital for establishing optimal crop stand density and canopy uniformity. This early vigor aligns with broader plant growth dynamics described by Reed et al. 2022 [15], who noted that targeted bio-management enhances metabolic reserve mobilization during initial germination stages. Specifically, in watermelon (*C. lanatus*), accelerated seed emergence directly establishes early vigor and vigorous root-shoot axis expansion, as established by Gusmini and Wehner, 2005 [16].

The marked enhancement in vegetative architecture in the BTWAMG evidenced by increases in vine length, internode length, primary branch count, and stem diameter, reflects a robust expansion of photo-assimilatory capacity. Concurrently, leaf expansion was substantially improved, showing elevated leaf count and leaf width. In vine-growing cucurbits, higher branching and larger leaf dimensions optimize light interception and total carbon fixation, establishing a strong source-to-sink relationship. These structural dynamics are fundamental to watermelon growth, where main-vine length and lateral branching govern total photosynthate accumulation, as demonstrated by Ren et al. 2012 [17]. Phenologically, BTWAMG accelerated the transition from vegetative to reproductive growth, requiring less time to first flowering and 50% flowering. In *C. lanatus*, the timing and abundance of pistillate (female) flowers serve as key physiological determinants of early fruit set and cumulative harvest capacity [18]

The enhanced vegetative foundation and floral density translated directly into superior fruit yield attributes. The BTWAMG exhibited significant increases in fruit length, fruit diameter, and number of fruits per plant. Notably, this fruit expansion was accompanied by a reduction in rind thickness, indicating greater assimilate partitioning toward edible mesocarp/endocarp flesh tissue rather than structural pericarp layers. Such morphological partitioning toward enlarged fruit diameter and thinner rinds represents a core quality and yield objective in watermelon cultivation, as analyzed by Lian et al. 2021 [19]. Consequently, the cumulative impact of increased fruit load and enlarged fruit dimensions led to expansion in total fruit yield per hectare. In parallel with fruit mesocarp growth, seed physical traits responded positively to the BTWAMG. In *C. lanatus*, seed weight and seed dimensions reflect sink strength during post-fertilization ovary expansion, a relationship mapped out by Li et al. 2018 [20]. Overall, the comprehensive improvements across germination, canopy structure, phenological speed, fruit traits, and seed metrics validate SBET (The Trivedi Effect®) as an effective strategy for optimizing source-sink dynamics and driving high-yield productivity in watermelon crops.

## CONCLUSION

These results indicate that SBET effectively modulates watermelon's (*Citrullus lanatus* L.) developmental phase, promoting superior morphological vigor, and yield efficiency. Therefore, spiritual blessing/biofield energy is a promising, sustainable biostimulatory strategy for high-yield horticultural production.

### Abbreviations

SBET: spiritual blessing energy treatment; CONWAMG: control watermelon group; BTWAMG: biofield energy-treated watermelon group; SSP: single super phosphate; MOP: muriate of potash

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### Conflict of Interests

Author DT was employed by Trivedi Global, Inc. TBG, NRP, and VDK were employed by Shree Angarsiddha Shikshan Prasarak Mandal's College of Agriculture, Sangulwadi, Mohitewadi, Maharashtra, India. Authors SM and SJ were employed by Trivedi Science Research Laboratory Pvt. Ltd.

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