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Performance, Phenology, and Yield Enhancement of Yellow Zucchini (*Cucurbita pepo* L.) under Spiritual Blessings (Biofield) Energy Treatment

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Abstract: Background and Objective: Sustainable agricultural practices increasingly seek non-invasive, eco-friendly interventions to optimize plant physiological performance, accelerate phenological development, and maximize crop output. This study evaluated the effects of spiritual blessings (biofield energy) treatment on the vegetative growth dynamics, phenological transitions, and yield components of yellow zucchini (*Cucurbita pepo* L.). Methods: A field experiment was conducted using a Randomized Complete Block Design (RCBD) comparing two primary cohorts: an untreated/control yellow zucchini group (CONYZUG) and a blessing/biofield energy-treated yellow zucchini group (BTYZUG). Uniform agronomic and management practices were maintained across the treatment. Key phenological milestones, morphometric parameters, and yield metrics were systematically recorded and subjected to statistical analysis using unpaired, two-tailed Student's *t*-test. Results: Morphometric development showed a substantial significant enhancement of plant height (21.58%, $p \le 0.001$), leaf spread (22.60%, $p \le 0.001$), number of primary branches (41.87%, $p = 0.012$), number of nodes/plant (34.04%, $p \le 0.001$), leaf length (27.16%, $p \le 0.001$), leaf width (26.61%, $p \le 0.001$), and female flower counts 36.68% ($p \le 0.001$) in the BTYZUG compared to the CONYZUG. Yield components were markedly superior in the treatment group: fruit length (21.22%, $p \le 0.001$), fruit diameter (35.09%, $p \le 0.001$), fruit count per plant (27.16%, $p = 0.002$), seed count per fruit (24.64%, $p \le 0.001$), seed length (29.73%, $p \le 0.001$), and cumulative marketable fruit yield per hectare were significantly increased by 27.80% compared to the control. Conclusion: Blessing/Biofield energy treatment exerted a favorable biological influence on the growth performance, phenological characters, and overall yields of *Cucurbita pepo* L.

Keywords: *Cucurbita pepo*, yellow zucchini, spiritual blessing, crop yield, biofield energy treatment, agronomic productivity

INTRODUCTION

Yellow zucchini (*Cucurbita pepo* L.) is an economically significant summer squash cultivated globally for its high nutritional value, essential dietary minerals, and bioactive carotenoids. The phenological progression of *C. pepo* encompassing seed germination, early canopy architecture development, flowering synchrony, and fruit maturation directly dictates biomass accumulation and marketable yield potential [1]. However, crop performance and yield parameters in yellow zucchini are frequently constrained by abiotic stressors, soil nutrient imbalances, and physiological bottlenecks during critical growth phase [2].

Understanding the physiological traits and developmental timeline under non-standard growth conditions remains vital for optimizing cultivation protocols [3]. To surpass traditional physiological yield ceilings, modern agricultural science has increasingly evaluated non-chemical and non-invasive biostimulatory practices alongside classical agronomy and breeding [4].

Among novel biostimulatory interventions, spiritual blessings and biofield energy treatments subtle energy applications directed toward seeds or growing tissues have gained attention for their potential to modulate cellular metabolism, vegetative vigor, and plant defense mechanisms [5-7]. In agricultural models, biofield energy treatment has been reported to induce alterations in plant morphometrics, chlorophyll biosynthesis, and genetic expression without chemical inputs [8]. While baseline studies indicate an altered growth response in biofield-treated crops, systematic field evaluations linking spiritual blessing energy treatments to specific phenological stages, canopy performance, and quantitative fruit yield in yellow zucchini (*Cucurbita pepo* L.) remain limited. Therefore, this investigation was designed to evaluate the explicit effects of Spiritual Blessings Treatment (Biofield Energy) on the phenological development, vegetative performance, and overall yield enhancement of yellow zucchini (*Cucurbita pepo* L.).

MATERIALS AND METHODS

Study Site

Situated at an elevation of 26 meters above the sea level, the research site in Bhandarwadi, Sindhudurg, Maharashtra, India (15°37′–16°40′ N, 73°19′–74°13′ E) experiences distinct climatic pressures. The local microclimate features intense summer highs reaching 40 °C in April and May, alongside milder winter temperatures ranging from 8 °C to 25 °C between December and February. Compounding these thermal extremes, highly erratic rainfall patterns frequently induce critical soil moisture deficits during sensitive phases of crop development.

Seed Source and Experimental Design

Sourced from Syngenta India Pvt. Ltd. (95% purity, Lot No. 19471359, Label: A4-2706), hybrid yellow zucchini seeds (*Cucurbita pepo* L.) were assigned in a randomized complete block design (RCBD) to either an untreated/control yellow zucchini group (CONYZUG) or a biofield energy treated yellow zucchini group (BTYZUG). All experimental units were maintained under uniform agronomic management, ensuring standardized watering, fertilization, and pest control regimens.

Study Plot Design

Researchers cleared and prepared the 60.0 m^2 experimental site before planting, arranging it into a randomized block design of three blocks. Every block featured six plots measuring 4.0 m × 2.0 m (8.0 m^2 each) with a 1.0 m × 1.0 m planting grid. To guard against border effects and inter-treatment interference, 0.5 m alleyways separated adjacent plots, and 1.0 m buffers separated the replications.

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

Under standard environmental conditions of 28 ± 2 °C and 65 ± 5% relative humidity, the experimental cohort consisting of yellow zucchini seeds planted in designated cropland soil was administered a single four-minute session of distant blessing (biofield) energy treatment. This intervention was conducted remotely *via* a real-time web-conferencing platform by Ms. Alice Branton, a Florida-based spiritual healing practitioner with over 14 years of expertise. Meanwhile, the control group, comprising identical seeds and soil, underwent no treatment while being maintained under matching environmental conditions.

Soil Characterization and Sample Preparation

Composite soil samples retrieved from a 30 cm depth across the trial site were used to assess baseline soil characteristics. After air-drying and sieving through a 2-mm mesh, particle size distribution was analyzed following [9]. Soil pH was measured using a benchtop meter in a 1:2 (w/v) soil-to-deionized water suspension.

Agronomic Management and Plant Protection

For the experiment, seeds were sown directly into plots and hand-irrigated for the initial nine days to ensure consistent germination. Subsequent irrigation was managed through a surface drip system featuring pressure-compensating emitters spaced 0.5 meters apart, operating at a discharge rate of 3.0 L h^{-1}. All experimental plots received a uniform N:P:K fertilization rate of 50:100:50 kg ha^{-1}. Basal application supplied the total requirements for phosphorus (as single superphosphate) and potassium (as muriate of potash), along with 50% of the total nitrogen (as urea), while the remaining nitrogen was side-dressed at 21 days after sowing (DAS). To safeguard the crop uniformly across all treatments, a foliar spray of Hamla 550 (Gharda Chemicals Ltd., Mumbai, India) was applied at a concentration of 2 mL L^{-1}.

Growth and Morphological Parameters

To monitor vegetative and reproductive growth dynamics, five representative plants were randomly tagged per plot at 50 days after sowing (DAS). Qualitative observations documented leaf morphology (including blade size, shape, margin, color, and lobe count), floral color, fruit attributes (shape, epicarp color, and mesocarp color), and seed characteristics (size, shape, and color). Quantitative evaluation encompassed vegetative metrics such as plant height (cm), canopy spread (cm), primary branch count, node count, total leaf count, and leaf blade dimensions (length and width in cm) alongside phenology (days to 50% flowering). Additionally, harvest yield components were recorded, covering individual fruit weight (g), length and diameter (cm), fruits per plant, seed dimensions, and total fruit yield expressed in tonnes per hectare (t ha^{-1}).

Yield Parameters

At physiological maturity, yield assessments were conducted by randomly sampling five plants per experimental plot. Harvested yellow zucchini (*Cucurbita pepo*) fruits were weighed individually using a digital balance and measured for morphometric dimensions specifically length and diameter (cm). The cumulative plot yield was subsequently extrapolated to tonnes per hectare (t ha^{-1}).

Statistical Analysis

Continuous data are reported as means ± SEM. Two-tailed, unpaired Student's t-tests were used to compare independent groups. Analyses were executed in SigmaPlot 14.0, with significance set at $p < 0.05$.

RESULTS

Soil Properties

Substantial improvements in both the physical and chemical characteristics of the sandy loam matrix were observed following treatment with BTYZUG (blessing/biofield energy-treated yellow zucchini) versus CONYZUG. These positive shifts were evidenced by an increased water-holding capacity alongside elevated levels of exchangeable Ca^{2+}, Mg^{2+}, and Na^{+} (data not shown).

Phenological Progression and Morphology of *Cucurbita pepo*

Phenological progression and yield parameters of yellow zucchini (*Cucurbita pepo* L.) were systematically recorded throughout the cultivation period. **Figure 1** depicts the complete developmental trajectory, spanning germination, seedling establishment, vegetative growth, anthesis, fruit set, and harvest maturity.

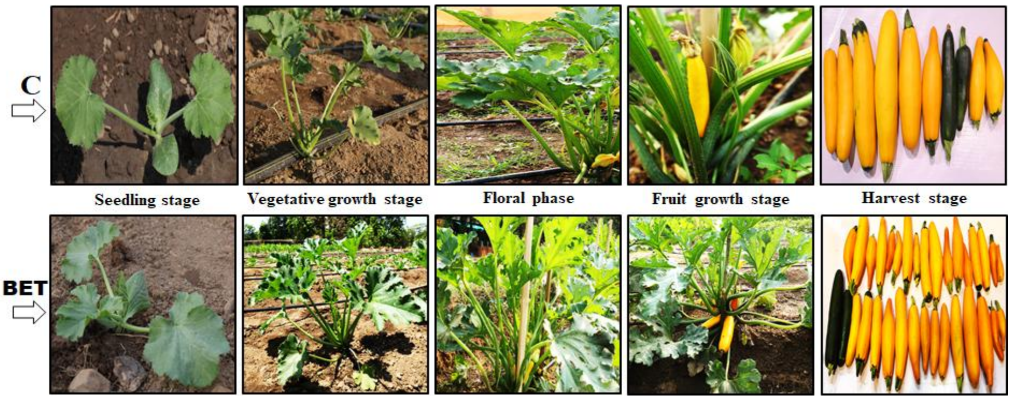

Figure 1: Representative photographs depicting the vegetative development of yellow zucchini across various growth stages. C: Control group; BET: Blessing/biofield energy treatment group.

Morphological Characteristics

Blessings (Biofield) energy treatment induced distinct phenotypic alterations in both vegetative and reproductive morphology of yellow zucchini (BTYZUG) relative to the untreated control (CONYZUG; **Table 1**). Treated plants exhibited darker green leaf blades, though leaf dimensions, margins, and lobation remained unchanged. Reproductive modifications were evident across floral, fruit, and seed traits: BTYZUG flowers and mature fruits displayed a bright yellow coloration compared to the standard yellow hues of CONYZUG. Furthermore, BTYZUG fruits exhibited superior physical and organoleptic properties, featuring a uniform cylindrical shape, smooth glossy skin, less spongy white flesh, and a mildly sweet, creamy flavor, contrasting with the non-uniform shape, duller skin, spongy off-white flesh, and mild earthy, nutty taste of control fruits. Seed morphology also shifted from small, light-cream seeds in CONYZUG to medium-sized, cream-colored seeds in BTYZUG.

Table 1: Fifty days post-sowing (DAS), blessing (biofield) energy-treated yellow zucchini (*Cucurbita pepo*) demonstrated significant enhancements in vegetative growth parameters relative to control plants.

Vegetative trait	Control group (CONYZUG)	Treated group (BTYZUG)
Leaf size and shape	Large and palmately lobed	Large and palmately lobed
Leaf blade margin	Dentate (pointed teeth)	Dentate (pointed teeth)
Leaf blade colour	Green	Dark green
Number of lobes in leaf blade	5 lobes	5 lobes
Flower colour	Yellow	Deep yellow
Colour of mature fruit (at harvesting)	Yellow	Deep yellow
Fruit freshness	Smooth and less glossy skin	Smooth and glossy skin
Fruit shape	Non-uniform cylindrical	Uniformly cylindrical
Fruit flesh flavour and taste	Mild earthy and nutty	Mild sweet and creamy
Fruit flesh texture	Spongy	Less spongy
Fruit flesh colour	Off white	White
Seed colour	Light cream	Cream
Seed size and shape	Small and oval	Medium and oval

Phenology and Yield Traits

Application of SBET in BTYZUG significantly enhanced plant performance across all evaluated physiological, phenological, and yield traits relative to CONYZUG (**Table 2**). Seed germination rate was increased significantly by 15.34% ($p \leq 0.001$) in the BTYZUG than CONYZUG. SBET promoted vegetative growth, driving substantial increases in plant height (21.58%, $p \leq 0.001$), leaf spread (22.60%, $p \leq 0.001$), number of primary branches (41.87%, $p = 0.012$), number of nodes per plant (34.04%, $p \leq 0.001$), leaf length (27.16%, $p \leq 0.001$), and leaf width (26.61%, $p \leq 0.001$) in the BTYZUG than CONYZUG. Phenologically, SBET accelerated plant development, reducing time to initial bud initiation (8.61%, $p = 0.031$), first male flower emergence (11.50%, $p \leq 0.001$), first female flower emergence (8.73%, $p \leq 0.001$), and 50% flowering (5.62%, $p = 0.012$) compared to the CONYZUG. Reproductive capacity also improved through higher male and female flower counts were 16.82% ($p \leq 0.001$) and 36.68% ($p \leq 0.001$), respectively in the BTYZUG than CONYZUG. Consequently, fruit physical characteristics expanded, including fruit length (21.22%, $p \leq 0.001$), fruit diameter (35.09%, $p \leq 0.001$), and fruit count per plant (27.16%, $p = 0.002$) in the BTYZUG than CONYZUG. Seed traits exhibited parallel gains, with significant increases in seed count per fruit (24.64%, $p \leq 0.001$), seed length (29.73%, $p \leq 0.001$), and 100-seed weight (12.10%,

$p \leq 0.001$) in the BTYZUG than CONYZUG. Together, these enhancements culminated in a 27.80% increase in total fruit yield per hectare in the BTYZUG than CONYZUG.

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

Vegetative trait	Control group (CONYZUG)	Treated group (BTYZUG)	P value
Days to germination	7-9	7-8	-
Germination percentage	85.13 ± 1.29	98.19 ± 1.10	$p \leq 0.001$
Plant height (cm)	51.34 ± 1.58	62.42 ± 1.05	$p \leq 0.001$
Spreading of leaves (cm)	75.34 ± 1.37	92.37 ± 1.27	$p \leq 0.001$
Number of primary branches per plant	3.63 ± 0.46	5.15 ± 0.11	$p = 0.012$
Number of nodes per plant	11.37 ± 0.48	15.24 ± 0.22	$p \leq 0.001$
Number of leaves per plant	16.84 ± 1.16	18.97 ± 1.10	$p = 0.219$
Leaf length (cm)	20.03 ± 0.57	25.47 ± 0.23	$p \leq 0.001$
Leaf width (cm)	15.67 ± 0.69	19.84 ± 0.26	$p \leq 0.001$
Days to first bud initiation	24.15 ± 0.47	22.07 ± 0.64	$p = 0.031$
Days to first male flower appearance	29.04 ± 0.21	25.70 ± 0.43	$p \leq 0.001$
Days to first female flower appearance	34.25 ± 0.25	31.26 ± 0.15	$p \leq 0.001$
Days to 50% flowering	42.18 ± 0.69	39.81 ± 0.23	$p = 0.012$
Number of male flowers	14.39 ± 0.39	16.81 ± 0.17	$p \leq 0.001$
Number of female flowers	6.57 ± 0.41	8.98 ± 0.20	$p \leq 0.001$
Days to fruit harvest	46.87 ± 0.47	47.33 ± 0.22	$p = 0.401$
Fruit weight (kg)	0.48 ± 0.04	0.55 ± 0.03	$p = 0.199$
Crop duration (days)	66.34 ± 1.25	65.08 ± 1.10	$p = 0.471$
Fruit length (cm)	19.18 ± 0.29	23.25 ± 0.16	$p \leq 0.001$
Fruit diameter (cm)	8.15 ± 0.28	11.01 ± 0.24	$p \leq 0.001$
100-seed weight (gm)	9.01 ± 0.06	10.10 ± 0.03	$p \leq 0.001$
Seed length (cm)	1.11 ± 0.03	1.44 ± 0.01	$p \leq 0.001$
Seed width (cm)	0.56 ± 0.27	0.65 ± 0.02	$p = 0.748$
Seed count/fruit	77.64 ± 1.69	96.77 ± 1.29	$p \leq 0.001$
Number of fruits per plant	4.64 ± 0.18	5.90 ± 0.21	$p = 0.002$
Fruit yield/plant (kg/plant)	2.42 ± 0.02	3.25 ± 0.03	$p \leq 0.001$
Fruit yield (kg)	20.54	26.26	-
Fruit yield/sq. m plot (kg/sq. m)	0.86	1.09	-
Fruit yield/hectare (ton/ha)	8.56	10.94	-

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

Discussion

The application of blessing (biofield) energy treatment (Trivedi effect®) induced distinct and highly favorable phenotypic alterations across both the vegetative and reproductive morphology of the treated yellow zucchini (BTYZUG). The observation of darker green leaf blades in the treated plants, despite unchanged leaf dimensions and margins, reflects a potential increase in chlorophyll accumulation and enhanced photosynthetic capacity. In yellow zucchini (*Cucurbita pepo*), such modifications in leaf pigmentation was directly correlated with the plant's metabolic vitality and its ability to synthesize essential phytochemical components [10, 11]. The transition to a bright yellow coloration in both the flowers and mature fruits of the treated yellow zucchini (BTYZUG) suggested a marked upregulation in the biosynthesis of carotenoids. Carotenoids such as lutein, ß-carotene, and zeaxanthin were the primary pigment compounds responsible for the characteristic bright skin of yellow zucchini varieties. Extensive biochemical profiling of yellow zucchini confirms that such intense yellow coloration was driven by these accumulated functional carbohydrates and terpenoids within the fruit's epicarp and mesocarp [12]. The variations observed in the treated group (BTYZUG) relative to the untreated control (CONYZUG) highlight significant physiological shifts across the plant's life cycle.

The application of biofield therapy demonstrated a profound capacity to enhance the physiological, phenological, and reproductive traits of yellow zucchini (*Cucurbita pepo L.*), initiating with a highly significant increase in seed germination alongside substantial vegetative growth improvements [13]. Following germination, the treatment drove pronounced vegetative expansion, marked by significant increases in plant height, leaf spread, primary branches, node count, leaf length, and leaf width. These enhancements in early vegetative establishment and leaf canopy dimensions mirror the effects of optimal nutritional and biostimulant interventions previously documented exclusively in zucchini, where an improved root-to-shoot vigor translates to superior light interception, gas exchange, and vegetative spread [1].

Furthermore, the biofield (blessing) energy treatment significantly modified the phenological timeline of the yellow zucchini by accelerating plant development, reducing the time to initial bud initiation and the time to 50% flowering. The acceleration of reproductive timelines and the significant surge in early male and female flower emergence were critical determinants of high yield in *Cucurbita pepo L.*, a dynamic often governed by complex hormonal signaling, such as endogenous ethylene and brassinosteroid biosynthesis, which regulates sex expression and transition phases in zucchini [14]. Increasing the proportion and early emergence of female flowers were a primary horticultural objective for this crop, as similar physiological modifications have been shown to directly dictate the ultimate fruit-bearing potential and temporal yield distribution of the plant [15].

Consequently, the heightened reproductive capacity observed in the treated plants translated into robust fruit development, marked by physical expansions in fruit length, fruit diameter, and rise in fruit count per plant, culminating in an impressive increase in total fruit yield per hectare. Such proportional gains in physical fruit dimensions and overall yield were highly indicative of enhanced photosynthetic sink capacity, stress resilience, and nutrient partitioning mechanisms comparable to the application of advanced exogenous elicitors that maximize fruit expansion and water-use efficiency specifically in *Cucurbita pepo L.* cropping systems [16].

Parallel to the enhancement in fruit biometrics, the seed parameters specifically seed count per fruit, seed length, and 100-seed weight were significantly improved under the biofield regimen. The optimization of seed mass and physical dimensions highlights an improved sink strength and prolonged nutrient accumulation within the reproductive organs, a crucial agronomic factor considering that seed vigor and quality in *Cucurbita pepo L.* rely heavily on continuous assimilate availability and optimized partitioning during late developmental stages [17]. Collectively, these synchronized enhancements across vegetative, flowering, fruit, and seed metrics suggest that the spiritual blessing (biofield) energy treatment (The Trivedi Effect®) induces a fundamental metabolic and physiological up-regulation in yellow zucchini, maximizing both canopy efficiency and reproductive yield far beyond untreated baselines.

CONCLUSION

The application of blessing (biofield) energy treatment significantly improved the vegetative architecture, reproductive potential, and overall economic yield of *Cucurbita pepo* L. These results indicated that blessing/biofield energy can offer potential as an effective, non-invasive complementary technology for boosting crop yield and operational productivity within sustainable farming frameworks. Future investigations should focus on elucidating the underlying physiological, biochemical, and molecular pathways such as hormonal modulation, photosynthetic efficiency, and nutrient assimilation that drive these observed agronomic gains.

Abbreviations

SBET: spiritual blessing energy treatment; CONYZUG: control yellow zucchini group; BTYZUG: biofield energy-treated yellow zucchini group.

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Conflict of Interests

Author AB was employed by Trivedi Global, Inc. NRP, TBG, 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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REFERENCES

[1]. Rouphael Y, Colla G. Growth, yield, fruit quality and nutrient uptake of hydroponically cultivated zucchini squash as affected by irrigation systems and growing seasons. Scientia Horticulturae, 2005;105(2):177-195. https://dx.doi.org/10.1016/j.scienta.2005.01.025

[2]. Putra DNH, Widaryanto E, Karyawati AS. Optimizing watering strategies: Enhancing zucchini (*Cucurbita pepo* L.) growth and yield through phase specific water management.

International Journal of Environment, Agriculture and Biotechnology, 2024;9(6):188-194. https://dx.doi.org/10.22161/ijeab.96.23

[3]. Gurau S, Ray RL. Comparative analysis on the growth and yield of summer squash (*Cucurbita pepo*) varieties in the southern climate of Nepal. Sarhad Journal of Agriculture, 2024;40(4):1383-1393. https://dx.doi.org/10.17582/journal.sja/2024/40.4.1383.1393

[4]. Paris HS. Historical records, origins, and development of the edible cultivar groups of *Cucurbita pepo* (Cucurbitaceae). Economic Botany, 1989;43:423-443. https://dx.doi.org/10.1007/BF02935916

[5]. Campobenedetto C, Grange E, Mannino G, van Arkel J, Beekwilder J, Karlova R, Garabello C, Contartese V, Bertea CM. A biostimulant seed treatment improved heat stress tolerance during cucumber seed germination by acting on the antioxidant system and glyoxylate cycle. Frontiers in Plant Science, 2020;11:836. https://doi.org/10.3389/fpls.2020.00836

[6]. Matos LC, Machado JP, Monteiro FJ, Greten HJ. Perspectives, measurability and effects of non-contact biofield-based practices: A narrative review of quantitative research. International Journal of Environmental Research and Public Health, 2021;18(12):6397. https://doi.org/10.3390/ijerph18126397

[7]. Rubik B, Muehsam D, Hammerschlag R, Jain S. Biofield science and healing: History, terminology, and concepts. Global Advances in Health and Medicine, 2015;4:8-14. https://doi.org/10.7453/gahmj.2015.038.suppl

[8]. Das S, Poduval M, Ali Md. N. Characterization of cashew: A review with reference to morphological, biochemical and molecular descriptors. Journal of Crop and Weed, 2021;17(3):158-168. https://doi.org/10.22271/09746315.2021.v17.i3.1505

[9]. Richer-de-Forges AC, Arrouays D, Chen S, Dobarco MR, Libohova Z, Roudier P, Minasny B, Bourennane H. Hand-feel soil texture and particle-size distribution in central France. Relationships and Implications, CATENA, 2022;213:106155. https://doi.org/10.1016/j.catena.2022.106155

[10]. Martínez-Valdivieso D, Font R, Fernández-Bedmar Z, Merinas-Amo T, Gómez P, Alonso-Moraga Á, Del Río-Celestino M. Role of zucchini and its distinctive components in the modulation of degenerative processes: Zenotoxicity, anti-genotoxicity, cytotoxicity and apoptotic effects. Nutrients, 2017;9(7):755. https://doi.org/10.3390/nu9070755

[11]. Biareh V, Shekari F, Sayfzadeh S, Zakerin H, Hadidi E, Beltrão JGT, Mastinu A. Physiological and qualitative response of *Cucurbita pepo* L. to salicylic acid under controlled water stress conditions. Horticulturae, 2022;8(1):79. https://doi.org/10.3390/horticulturae8010079

[12]. Xu X, Lu X, Tang Z, Zhang X, Lei F, Hou L, Li M. Combined analysis of carotenoid metabolites and the transcriptome to reveal the molecular mechanism underlying fruit colouration in zucchini (*Cucurbita pepo* L.). Food Chemistry, (Oxf). 2021;2:100021. https://doi.org/10.1016/j.fochms.2021.100021

[13]. Khouya K, Taimourya H, El Malahi S, Zim J, Lahrach I, Elatrassi A, Zakri B, Benbya A, Basaid K, Lahlou O, Imani Y, Ennami M. Enhancing the growth and the yield of greenhouse zucchini (*Cucurbita pepo* L.) cultivars using desalinated seawater in semi-arid regions. International Journal of Plant Biology, 2026;17(4):30. https://doi.org/10.3390/ijpb17040030

[14]. Manzano S, Martínez C, Megías Z, Garrido D, Jamilena M. Involvement of ethylene biosynthesis and signalling in the transition from male to female flowering in the monoecious *Cucurbita pepo*. Journal of Plant Growth Regulation, 2013;32:789–798. https://doi.org/10.1007/s00344-013-9344-6

[15]. Manzano S, Martínez C, Megías Z, Garrido D, Jamilena M. The role of ethylene and brassinosteroids in the control of sex expression and flower development in *Cucurbita pepo*. Journal of Plant Growth Regulation, 2011;65:213–221. https://doi.org/10.1007/s10725-011-9589-7

[16]. Abd El-Mageed TA, Semida WM, Mohamed GF, Rady MM. Combined effect of foliar-applied salicylic acid and deficit irrigation on physiological–anatomical responses, and yield of squash plants under saline soil. South African Journal of Botany, 2016;106:8-16. https://doi.org/10.1016/j.sajb.2016.05.005

[17]. Wakson H, Oliveira JA, Monfort LHF, dos Santos JM, Trancoso AC, de Carvalho MV. Physiological maturity and drying speed in the quality of zucchini (*Cucurbita pepo* L.) seeds. Journal of Seed Science, 2017;39:142-149. https://doi.org/10.1590/2317-1545v39n2171033