



Impact of Pranic Agriculture on Crop Growth and Yield: A Systematic Review

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ABSTRACT

Pranic Agriculture (PA) is a supplementary approach to plant cultivation, incorporating the deliberate process of channeling prana-a fundamental life force energy-towards soil, seeds and seedlings to foster and enhance plant growth. This deliberate cleansing and revitalization process contributes to a harmonious and flourishing environment, fostering optimal conditions for plant development. This systematic review seeks to evaluate the influence of Pranic Agriculture by examining its impact on key crop parameters such as germination, plant dimensions, leaf characteristics, flowering, crop yield, chlorophyll content and plant polymorphism. By delving into seventeen pertinent studies conducted between 2009 and 2024 and published in reputable English peer-reviewed journals, this review aims to shed light on the potential viability of Pranic Agriculture. The selected studies, sourced from databases such as Web of Science, Scopus, Google Scholar and recognized journals by UGC and NAAS, were identified using keywords such as prana and agriculture, pranic agriculture, supplementary agriculture and complementary treatment in agriculture. Pranic Agriculture emerged from the reviewed studies as a catalyst for significant improvements in diverse growth parameters, spanning germination rates, shoot and root development, leaf morphology, early flowering and enhanced yield. In addition, an increase in chlorophyll content and polymorphism is noticed in plants treated by PA. Implementing Pranic Agriculture holds the promise of not only enhancing crop growth and yield, but potentially increasing farmer income. Continued research in this realm promises to deepen our understanding of the interconnected relationship between Pranic Agriculture and the broader environment, paving the way for sustainable agricultural practices that harmonise with nature.

Key words: Energy-infused farming, Holistic agriculture, Natural farming techniques, Prana, Pranic healing, Sustainable agriculture.

Pranic Agriculture (PA) stands as an innovative agricultural practice, offering a unique perspective on sustainable development by integrating ancient wisdom with modern agricultural techniques. By using prana, the life force energy, Pranic Agriculture aims to improve plant growth and create a sustainable farming method. The principles of Pranic Agriculture resonate with the growing global consciousness surrounding environmental conservation, resource optimisation and sustainable development (FAO, 2014). In recent years, the discourse on sustainable development has gained unprecedented momentum, driven by escalating concerns over climate change, biodiversity loss and food security challenges (Datta *et al.*, 2024). Traditional farming, with its reliance on chemicals and unsustainable practices, is harming the environment and threatening long-term food production. In this context, the emergence of Pranic Agriculture offers a compelling alternative, emphasising harmony with nature, ecological balance and holistic well-being (Prasad *et al.*, 2024).

Social equity, economic strength and environmental care are the key elements of sustainable development. Pranic Agriculture embodies these principles by fostering resilient Agro-ecosystems, enhancing soil fertility and promoting biodiversity conservation. In this pursuit, a review stands out as an essential tool for aggregating and evaluating the evidence. These methodologies provide a structured and rigorous means to uncover trends, patterns and insights into the effects of Pranic Agriculture practices

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on crop growth. Through this endeavour, we aspire to make a meaningful contribution to the ever-growing body of knowledge surrounding holistic and sustainable agricultural practices.

Study search and selection

This systematic review included a comprehensive search of multiple databases, including Web of Science, Scopus and Google Scholar. The primary keywords for the search were Prana and agriculture, Pranic agriculture, complementary treatment in agriculture, energy and agriculture. Duplicates and website information about PA was removed and the title/ abstract screening was performed by two researchers, including the first author.

Eligibility criteria (Inclusion/Exclusion Criteria)

Studies published in peer-reviewed journals between 2009 and 2024 were considered and indexed on Web of Science, SCOPUS, Google Scholar and the journals recognised by UGC and NAAS were included. This review excluded book chapters, books, dissertations, review articles, Web information and non-english journal articles.

Bias assessment

In this systematic review, all publications reporting significant and insignificant findings that are published are described.

Pranic agriculture procedure

Before planting, the seeds (Fig 1A), seedlings (Fig 1B), or suckers/ rhizome and the land in the Pranic group underwent Pranic treatment. This treatment was administered 4-8 times, biweekly, each session lasting approximately 15 minutes. The process involved techniques aimed at enhancing the quality and quantity of prana. The healer initiated the process by invoking blessings from the divine. Sensitising their hands, the healer scanned the seeds and soil, detecting any perceived heavy or contaminated energies, which was sensed by their palms. These energies were then cleansed using green prana, known for its purifying properties. Subsequently, the seeds, seedlings, or suckers, along with the soil, were energised with prana, recognised for its regenerative qualities (Sui, 2009, 2012). The energy is then stabilised to complete the treatment.

Search and screening results

Our search yielded 47 Pranic Agriculture related records by database search on Google Scholar, 3 in Web of Science,

10 in Scopus. 30 duplicates were removed and the remaining 17 records were reviewed. These articles are indexed in Scopus, Web of Science and recognised by UGC and NAAS.

Study characteristics

Pranic agriculture, a burgeoning field, underwent extensive research encompassing a diverse array of plants, ranging from vegetables (10- 52.63%), greens (2-10.53%), legumes (2-10.53%), millets (1-5.26%), flowers (1-5.26%), Cereals (1-5.26%) and fruits (2-10.53%). This comprehensive study utilised both hybrid (52.63%) and indigenous seeds (42.10%), examining the applicability of Pranic techniques across various plant species. These investigations were executed in multifarious environments, including field conditions (42.10%), greenhouse setups (15.79%), pot experiments (10.53%), Petri plates (5.26%) and even paper towels (15.79%), showcasing the adaptability of Pranic methodologies across different cultivation settings. The research methodologies incorporated a spectrum of farming approaches, encompassing chemical (57.89%), organic (15.79%) and natural farming (5.26%) techniques. Notably, the study areas varied significantly in size, spanning from vast expanses of land measuring up to one acre to more confined spaces, sometimes less than a quarter acre in size. This diverse scale of study areas emphasized the scalability and adaptability of Pranic agricultural methods across different farming sizes. Crucially, these studies encompassed varied soil types, incorporating the widely prevalent red loamy soil (36.84%). Ragi was cultivated in dark soil, with 21.05% of the soil type being unspecified. For the remaining plants, soil was unnecessary, with

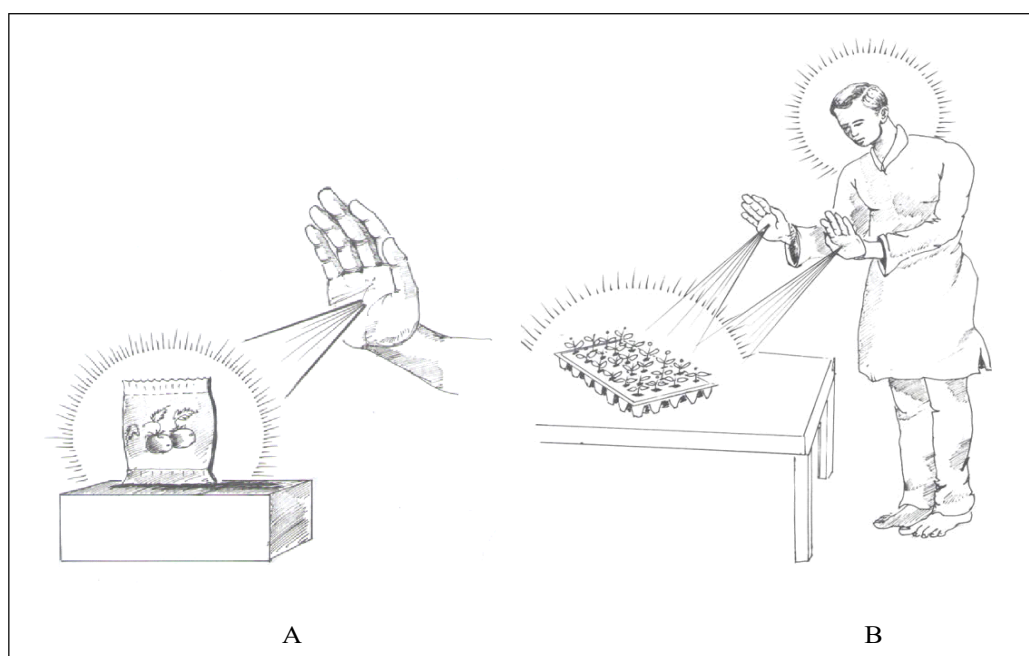


Fig 1: Pranic agriculture application on seeds (A) and seedlings (B).

distribution as follows: Cocopeat accounted for 5.26%, water for 21.05% and hydroponics for 5.26%. The overarching outcome of these diverse studies illuminated a crucial aspect: Pranic agriculture is versatile and applicable across a spectrum of plants, independent of factors such as soil conditions, seed variations, farming methodologies, or even the scale of cultivation. This robustness in application underscores the potential for Pranic agricultural techniques to be employed universally, offering promising prospects for sustainable and adaptable farming practices regardless of environmental or agricultural constraints (Table 1).

Germination

The germination percentages of various vegetables under both control and Pranic conditions yielded interesting results. European cucumber exhibited a significant increase from 94.1% in the control to 94.8% under Pranic conditions ($p < .05$). Pole Bean and drumstick displayed remarkable improvements in germination rates under Pranic conditions compared to the control, with pole bean increasing from 87.1% to 90.2% (highly significant at $p < .001$) and drumstick from 68% to 92% also highly significant at $p < .001$). Papaya similarly showed a substantial rise. Conversely, ridge gourd's germination rates, under Pranic conditions, did not demonstrate statistical significance. Paddy experienced a modest increase, while radish exhibited no notable change with both control and Pranic conditions. Notably, green gram demonstrated consistent improvements across studies under Pranic conditions. These findings underscore the varied effects of Pranic conditions on germination across different vegetables, highlighting notable enhancements in several cases (Table 2). Remarkably, 77.78% of the plants exhibited a noteworthy improvement in germination, except for radish and ridge gourd, where enhancements were deemed insignificant, accounting for 22.22% of the cases.

Germination, the process by which a seed sprouts and begins to grow, is a fundamental stage in a plant's life cycle (Wang *et al.*, 2024). Pranic Agriculture's impact on germination is significant as it directly influences early plant growth and establishment. Under Pranic methods, observed improvements in germination rates in crops like drumstick, papaya, tomato, cucumber and green gram indicate the potential positive effects on this crucial phase. Pranic techniques, involving the application of vital energy to stimulate plant vitality, might contribute to faster and more uniform germination. Enhanced germination rates could be attributed to accelerated metabolic processes within seeds, leading to quicker initiation of growth. Additionally, improved nutrient absorption and cellular activities promoted by Pranic treatments might aid in better seedling emergence. However, varying responses among different crops might stem from species-specific traits, genetic variability, or distinct requirements during germination. Environmental factors such as soil moisture, temperature and light conditions can

also interact with Pranic treatments, influencing germination differently across crops. Understanding the impact of Pranic Agriculture on germination is crucial, as it sets the stage for subsequent plant growth and development. Improved germination rates signify better establishment, higher seedling vigour and ultimately, potential enhancements in crop yield and quality.

Shoot length

Significantly increased shoot length was observed in tomato with a 20.5% growth improvement. Similarly, cucumber showed a 97% growth improvement. Drumstick, marigold and ridge gourd showed non-significant differences in Pranic treatments. Papaya displayed a 30.3% growth improvement. Chilli, cluster bean, lettuce, ragi and banana exhibited significant growth improvements ranging from 16.7% to 134% in Pranic treatments. Paddy, green gram and radish showed varied growth changes, with some exhibiting non-significant differences or decreases in growth under Pranic conditions (Table 3). Overall, 53.33% of eight studies found a significant impact of PA on shoot length of the plant, 26.67% four studies found no significant enhancement of shoot length compared to the control group plants. Unfortunately, three studies did not assess the significant difference with the help of statistical tool.

The observed enhancements in shoot length in various crops under Pranic Agriculture highlight the potential positive impact of this approach on plant development. The significant increases in shoot length in crops like tomato, cucumber, spinach, banana and ridge gourd suggest that Pranic methods might influence crucial physiological processes linked to vertical growth. Pranic Agriculture involves the directed application of prana or life force to stimulate plant vitality. This stimulation could contribute to improved cell elongation, increased nutrient uptake, or accelerated metabolic activities, all of which can foster shoot elongation (Massadeh *et al.*, 2024). The varying degrees of response among different crops may stem from species-specific characteristics, genetic makeup, or inherent growth patterns. Factors like the plant's growth stage, environmental conditions and sensitivity to energy treatments could also play pivotal roles in dictating the observed outcomes. Nevertheless, the absence of significant differences in shoot length in certain crops like chili and lettuce might suggest a less pronounced effect of Pranic methods on their vertical growth. Further investigation is crucial to discern the precise mechanisms governing shoot elongation and to determine why some crops exhibit significant responses while others do not under Pranic Agriculture.

Root length

The results showcase the diverse effects of Pranic conditions on the root length of various plant species. While drumstick and marigold didn't exhibit significant changes in root length under Pranic conditions compared to their

Table 1: Study characteristics.

Common name	Scientific name	Type	Seed type	Variety	Study site	Farming method	Study area	Soil type	References
Tomato	<i>Lycopersicon esculentum</i> L.	Vegetable	Hybrid	SHIVAM	Field	Chemical	ND	Red loamy soil	Jois <i>et al.</i> , 2016
Cucumber	<i>Cucumis sativus</i> L.	Vegetable	Hybrid	Malini	Field	Chemical	One acre	Red loamy soil	Jois <i>et al.</i> , 2017
European Cucumber	<i>Cucumis sativus</i> L.	Vegetable	Hybrid	ND	Green house	Chemical	ND	ND	Yathindra <i>et al.</i> , 2017a
Pole Bean	<i>Phaseoules vulgaris</i> L.	Vegetable	Local	ND	Green house	Chemical	ND	ND	Yathindra <i>et al.</i> , 2017b
Drumstick	<i>Morriga olifera</i> L.	Vegetable	Hybrid	PKM-1	Pot	Organic	10 ft × 10 ft	Cocopeat	Prasad and Jois, 2019
Marigold	<i>Tagetes erecta</i> L.	Flower	Hybrid	Tennis ball	Field	Chemical	One acre	Red loamy soil	Poornima <i>et al.</i> , 2020a
Papaya	<i>Carica papaya</i> L.	Fruit	Hybrid	Arka Surya	Pot	Organic	3 m × 3 m	Coco peat	Prasad and Jois, 2020a
Ridge gourd	<i>Luffa cylindrica</i> L. Roxb.	Vegetable	Hybrid	Naga	Field	Chemical	One acre	Red loamy soil	Poornima <i>et al.</i> , 2020b
Spinach	<i>Spinacia oleracea</i> L.	Greens	Local	ND	Field	Chemical	30 ft × 25 ft	ND	Prasad and Jois, 2020b
Cabbage	<i>Brassica oleracea</i> L.	Vegetable	Hybrid	Unnati	Field	Chemical	One acre	Red loamy soil	Poornima <i>et al.</i> , 2021a
Chillie	<i>Capsicum annum</i> L.	Vegetable	ND	ND	Field	Chemical	One acre	Red loamy soil	Poornima <i>et al.</i> , 2021b
Cluster bean	<i>Cyamopsis tetragonoloba</i> L.	Vegetable	Local	NA	Field	Organic	50 ft × 25 ft	ND	Prasad and Jois, 2021a
Lettuce	<i>Lactuca sativa</i>	Greens	Hybrid	Grand Rapids	Green house	Chemical	NA	Hydroponics	Poornima <i>et al.</i> , 2021c
Ragi	<i>Eleusine corocana</i> L.	Millet	Hybrid	MR-1	Field	Chemical	One acre	Black	Poornima <i>et al.</i> , 2021d
Paddy	<i>Oryza sativa</i>	Cereal	Local	NA	Paper towel	NA	NA	Water	Prasad and Jois, 2021b
Green gram	<i>Vigna radiata</i> L.	Legume	Local	NA	Paper towel	NA	NA	Water	Prasad and Jois, 2021b
Radish	<i>Raphanus sativus</i> L.	Vegetable	Local	NA	Paper towel	NA	NA	Water	Prasad and Jois, 2021b
Green gram	<i>Vigna radiata</i> L.	Legume	Local	NA	Perti plates	NA	NA	Water	Nadig <i>et al.</i> , 2021
Banana	<i>Musa</i> sp. var. (Nanjangudd rasabale)	Fruit	Local	NA	Field	Natural	One acre	Red loamy soil	Prasad <i>et al.</i> , 2024

ND: No data; NA: Not applicable.

control groups, several other plants displayed noteworthy alterations. Papaya, ridge gourd, spinach, chilli, cluster bean, lettuce, green gram, radish and cabbage demonstrated significant increase in root length under Pranic conditions. This suggests that these plants are particularly responsive to or benefit from the environmental factors or practices associated with Pranic agriculture. These significant enhancements, ranging from 21.8% to 48.2%, signify a positive impact on root development, potentially leading to better nutrient uptake, stability and overall plant health. Ragi, while showing a slight 8.9% increase in root length under Pranic conditions, did not exhibit statistical significance. This implies that ragi may not be as responsive to the specific conditions tested in this study, suggesting a potential limitation of Pranic practices in influencing its root growth. On the other hand, paddy and the second instance of green gram displayed notable and statistically significant increases in root length of 40% and 12.4%, respectively (Table 4). These results suggest that these plants are highly responsive to Pranic conditions, showing considerable improvements in root growth. This heightened root development could have positive implications for nutrient absorption, stress tolerance and overall plant vigour. The diverse responses observed among these plant species highlight the complexity of interactions between Pranic conditions and plant biology. In general, 57.14% studies found a significant difference in root length enhancement, while 21.43% showed no significant difference, whereas statistical assessment were not done to the remaining study.

The increased root length in plants like papaya, ridge gourd, spinach, chilli, cluster bean, lettuce, green gram, radish and cabbage might indicate that these species are particularly responsive to or benefited from the energy dynamics or other elements associated with Pranic agriculture. The enhanced root development could potentially lead to better anchorage, increased nutrient absorption and improved water uptake, contributing to overall plant health and vigour (Wei *et al.*, 2024). Conversely, the lack of a significant changes in root length in species like drumstick, marigold and ragi under Pranic conditions could suggest that these plants might be less responsive or

influenced differently by the specific set of factors or energies incorporated in the Pranic practices applied in this study. Understanding the specific mechanisms behind these varied responses requires further exploration. It involves detailed analyses of soil properties, nutrient availability, microbial activity and genetic factors, combined with investigations into the specific Pranic agricultural techniques utilised. Overall, the observed differences in root length between the control and Pranic groups highlight the potential impact of Pranic agricultural methods on root development, emphasising the need for continued research to decipher the precise mechanisms and optimise these practices for different plant species.

Number of leaves

In drumstick, papaya, spinach, cluster bean, lettuce and ragi, Pranic conditions exhibited varied effects on leaf count compared to their respective control groups. Drumstick and spinach showed non-significant differences in leaf count, while papaya, cluster bean, lettuce and ragi displayed significant increases under Pranic conditions. These increases ranged from 19.5% to 82% compared to their controls, highlighting the positive impact of Pranic conditions on leaf production in these plants. However, in banana, although the results were insignificant, a 16.7% increase in leaf count was observed under Pranic conditions compared to the control (Table 5). Despite the lack of statistical significance, the consistent trend of higher leaf count suggests a potential positive influence of Pranic conditions on leaf production. The findings underscore the potential benefits of Pranic conditions in enhancing leaf count in several plant species. Further research into the specific mechanisms behind these effects could provide valuable insights into optimising Pranic agricultural practices to promote leaf production in various crops. Among the studied crops, 57% of them should significant changes, while the remaining 42.8% make insignificant changes.

Days to flowering

The induction of earlier flowering observed in plants treated with Pranic Agriculture (PA) compared to control groups represents a significant finding with implications for plant

Table 2: Germination (%).

Common name	Scientific name	Control	Pranic	References
European cucumber	<i>Cucumis sativus</i> L.	94.7	94.8*	Yathindra <i>et al.</i> , 2017a
Pole bean	<i>Phaseoules vulgaris</i> L.	87.1	90.2**	Yathindra <i>et al.</i> , 2017b
Drumstick	<i>Morniga olifera</i> L.	68	92**	Prasad and Jois, 2019
Papaya	<i>Carica papaya</i> L.	78	92**	Prasad and Jois, 2020a
Ridge gourd	<i>Luffa cylindrica</i> L. Roxb.	88.4	89.1 ^{NS}	Poornima <i>et al.</i> , 2020b
Paddy	<i>Oryza sativa</i>	82	84*	Prasad and Jois, 2021b
Green gram	<i>Vigna radiata</i> L.	98	100*	Prasad and Jois, 2021b
Radish	<i>Raphanus sativus</i> L.	96	96 ^{NS}	Prasad and Jois, 2021b
Green gram	<i>Vigna radiata</i> L.	92	98.6*	Nadig <i>et al.</i> , 2021

*p<.05, **p<.01, ^{NS}Not significant

Table 3: Shoot length.

Plant name	Common name	Scientific name	Unit	Days at readings taken	Control		Pranic		Difference (%) ^a	References
					Mean	SD	Mean	SD		
Tomato		<i>Lycopersicon esculentum</i> L.	cm	-	92.9	7.9	114.2**	6.4	20.5 ^b	Jois et al., 2016
Cucumber		<i>Cucumis sativus</i> L.	inches	-	14.6	6.9	28.7**	7.5	97	Jois et al., 2017
Drumstick		<i>Moringa olifera</i> L.	cm	15	8.7	1.3	11.9 ^{NS}	1.2	31	Prasad and Jois, 2019
Marigold		<i>Tagetes erecta</i> L.	cm	75	43.6	6.9	45.1 ^{NS}	8.1	3.3	Poornima et al., 2020a
Papaya		<i>Carica papaya</i> L.	cm	30	5.6	0.4	7.3**	0.2	30.3	Prasad and Jois, 2020a
Ridge gourd		<i>Luffa cylindrica</i> L. Roxb.	m	-	5.6	-	6.0 ^{NS}	-	6.8 ^b	Poornima et al., 2020b
Spinach		<i>Spinacia oleracea</i> L.	cm	40	8.7	0.4	20.4**	1.1	134	Prasad and Jois, 2020b
Chillie		<i>Capsicum annuum</i> L.	cm	75	43.5	3.5	53*	6.4	21.9	Poornima et al., 2021b
Cluster bean		<i>Cyamopsis tetragonoloba</i> L.	cm	60	80.3	4.1	89.1**	0.2	10.3	Prasad and Jois, 2021a
Lettuce		<i>Lactuca sativa</i>	cm	35	23.4	5.8	29.8*	5.8	27	Poornima et al., 2021c
Ragi		<i>Eleusine corocana</i> L.	cm	-	129.4	18	163.6*	11.3	24	Poornima et al., 2021d
Paddy		<i>Oryza sativa</i>	mm	14	23.3	-	25.6 ND	-	9.4 ^b	Prasad and Jois, 2021b
Green gram		<i>Vigna radiata</i> L.	mm	12	205.2	-	232.0 ND	-	12.2 ^b	Prasad and Jois, 2021b
Radish		<i>Raphanus sativus</i> L.	mm	10	30.26	-	25.8 ND	-	-15.6 ^b	Prasad and Jois, 2021b
Banana		<i>Musa</i> sp. var. (Nanjangud rasabale)	cm	365	161.5	31.3	191.1 ^{NS}	45.2	16.7 ^b	Prasad et al., 2024

*p<.05, **p<.01, ND-Not determined, ^{NS}-Not significant, -No data, ^a-When compared with control, ^b-based on calculation

Table 4: Root length.

Plant name	Common name	Scientific name	Unit	Control		Pranic		Difference (%) ^a	References
				Mean	SD	Mean	SD		
Drumstick		<i>Moringa olifera</i> L.	cm	6.9	1.1	9.3 ^{NS}	1.1	29.6	Prasad and Jois, 2019
Marigold		<i>Tagetes erecta</i> L.	cm	11.2	2.9	14 ^{NS}	3	24.5	Poornima et al., 2020a
Papaya		<i>Carica papaya</i> L.	cm	11.4	1.2	16.1*	0.7	41.2	Prasad and Jois, 2020a
Ridge gourd		<i>Luffa cylindrica</i> L. Roxb.	cm	12.8	1.7	17.8*	0.6	32.2 ^b	Poornima et al., 2020b
Spinach		<i>Spinacia oleracea</i> L.	cm	6.5	0.6	9.7*	0.7	48.2	Prasad and Jois, 2020b
Chillie		<i>Capsicum annuum</i> L.	cm	13.2	2.8	19.1*	2.9	44.3	Poornima et al., 2021b
Cluster bean		<i>Cyamopsis tetragonoloba</i> L.	cm	11.4	0.7	14.2**	0.4	21.8	Prasad and Jois, 2021a
Lettuce		<i>Lactuca sativa</i>	cm	11.8	1.4	14.9*	2.4	25.7	Poornima et al., 2021c
Ragi		<i>Eleusine corocana</i> L.	cm	23.5	4.2	25.6 ^{NS}	4.1	8.9	Poornima et al., 2021d
Paddy		<i>Oryza sativa</i>	mm	17.6	-	26.5	-	40 ^b	Prasad and Jois, 2021b
Green gram		<i>Vigna radiata</i> L.	mm	121.4	-	137.5	-	12.4 ^b	Prasad and Jois, 2021b
Radish		<i>Raphanus sativus</i> L.	mm	136.1	-	184.6	-	30.2 ^b	Prasad and Jois, 2021b
Green gram		<i>Vigna radiata</i> L.	mm	21.8	.04	30.4*	1.7	39.4	Nadig et al., 2021
Cabbage		<i>Brassica oleracea</i> L.	cm	13.2	1.4	18.2*	0.2	37	Poornima et al., 2021a

*p<.05, **p<.01, ^{NS}-Not significant, -No data, ^a-When compared with control, ^b-based on calculation

growth, development and ultimately, agricultural productivity. Across various plant species, Pranik application facilitated a notable advancement in the flowering stage, ranging from 3 days in pole beans to 9 days in bananas, when compared to the control groups. While flowering advancement in chilies was not statistically significant, it was significant in pole beans, marigold and bananas (Table 6). Furthermore, early flowering can expedite the overall reproductive cycle of plants, leading to earlier harvests and reduced time to market. This is particularly relevant in regions with short growing seasons or in crops with a limited window of optimal climatic conditions for growth and development. By accelerating the reproductive phase, early flowering can help farmers optimise their production schedules, mitigate risks associated with adverse weather events or pest pressures and improve overall crop resilience.

Overall, the induction of earlier flowering through Pranik Agriculture represents a promising avenue for enhancing agricultural productivity, sustainability and resilience. By leveraging subtle energies to modulate plant physiological processes, Pranik Agriculture offers a holistic approach to crop management that aligns with the principles of ecological harmony and environmental stewardship. As we continue to explore the potential of Pranik Agriculture in optimising plant growth and development, early flowering emerges as a compelling outcome with far-reaching implications for sustainable agriculture and food security in a rapidly changing world.

Yield

The yield of plants, influenced by various factors including genetics, environmental conditions and cultivation practices,

serves as a critical metric for farmers as it directly impacts their livelihoods and economic well-being. In the context of Pranik Agriculture, the observed variations in yield across different plant species underscore the complex interplay between energetic treatments and plant response. Across a range of plant species, Pranik application yielded promising results, with a significant improvement in yield observed in the majority of cases. For instance, the yield increment ranged from 36.3% in ragi to 16.7% in chili, demonstrating substantial enhancements facilitated by Pranik treatments (Table 7). Such improvements are of immense significance to farmers as they translate into increased harvests (Chandrakala *et al.*, 2024) higher marketable surplus and improved profitability. However, it is noteworthy that in certain plant species such as pole beans, ridge gourd and lettuce, the enhancements in yield, although observed, did not reach statistical significance. While these outcomes may appear less conclusive, they still hold value in understanding the nuanced responses of different plant varieties to Pranik treatments. Such insights contribute to the refinement of agricultural practices, enabling farmers to make informed decisions regarding crop selection and management strategies. The overarching finding that 64% of the plants exhibited a significant increase in yield underscores the transformative potential of Pranik Agriculture in enhancing agricultural productivity and sustainability. This is particularly crucial in the context of global food security challenges and the imperative to meet the nutritional needs of a growing population. By harnessing subtle energies and optimizing plant physiological processes, Pranik Agriculture offers a promising avenue for addressing these pressing concerns.

Table 5: Number of leaves (cm).

Plant name		Control		Pranic		Difference (%) ^a	References
Common name	Scientific name	Mean	SD	Mean	SD		
Drumstick	<i>Moringa olifera</i> L.	6.8	1.3	10.2 ^{NS}	1.3	40	Prasad and Jois, 2019
Papaya	<i>Carica papaya</i> L.	5.1	0.5	7.6*	0.6	49	Prasad and Jois, 2020a
Spinach	<i>Spinacia oleracea</i> L.	5.2	0.3	5.9 ^{NS}	0.5	13.4	Prasad and Jois, 2020b
Cluster bean	<i>Cyamopsis tetragonoloba</i> L.	22.2	6.6	27**	9.4	19.5	Prasad and Jois, 2021a
Lettuce	<i>Lactuca sativa</i>	9.5	1.0	11.5**	1.2	21.6	Poornima <i>et al.</i> , 2021c
Ragi	<i>Eleusine corocana</i> L.	10.9	4.0	20.0**	9.7	82	Poornima <i>et al.</i> , 2021d
Banana	<i>Musa</i> sp. var. (<i>Nanjangud rasabale</i>)	8.2	1.2	9.7 ^{NS}	1.4	16.7 ^b	Prasad <i>et al.</i> , 2024

*p<.05, **<.01, ^{NS}-Not significant, ^a-When compared with control, ^b-based on calculation.

Table 6: Days to flowering.

Plant name		Control		Pranic		Difference in days	References
Common name	Scientific name	Mean	SD	Mean	SD		
Pole beans	<i>Phaseolus vulgaris</i> L.	31.3	0.3	30.4**	0.4	-2.2	Yathindra <i>et al.</i> , 2017b
Marigold	<i>Tagetes erecta</i> L.	68.2	7.8	64.1*	6.5	-6.09	Poornima <i>et al.</i> , 2020a
Chillie	<i>Capsicum annum</i> L.	25.36	1.99	24.5 ^{NS}	2.59	-3.08	Poornima <i>et al.</i> , 2021b
Banana	<i>Musa</i> sp. var. (<i>Nanjangud rasabale</i>)	365.96	2.5	356.4**	1.92	-9.0	Prasad <i>et al.</i> , 2024

**P<0.01, *P<0.05, ^{NS}Not significant.

Table 7: Yield.

Common name	Measuring unit	Scientific name	Control		Pranic		Difference (%) ^a	References
			Mean	SD	Mean	SD		
Tomato	kg/row	<i>Lycopersicon esculentum</i> L.	80.5	18.9	117.07**	22.7	31.1	Jois <i>et al.</i> , 2016
Cucumber	kg/row	<i>Cucumis sativus</i> L.	52.8	13.4	63.8**	14.4	20.7	Jois <i>et al.</i> , 2017
European cucumber	Kg/plant	<i>Cucumis sativus</i> L.	1.5	0.1	1.9**	0.1	18	Yathindra <i>et al.</i> , 2017a
Pole beans	g/plant	<i>Phaseolus vulgaris</i> L.	0.44	.03	0.49 ^{NS}	.03	10.7	Yathindra <i>et al.</i> , 2017b
Marigold	t/acre	<i>Tagetes erecta</i> L.	4.6	0.8	6*	0.8	30.6	Poornima <i>et al.</i> , 2020a
Ridge gourd	t/acre	<i>Luffa cylindrica</i> L. Roxb.	12.66	1.63	13.4 ^{NS}	1.63	6.1 ^b	Poornima <i>et al.</i> , 2020b
Chillie	t/acre	<i>Capsicum annuum</i> L.	12.21	0.81	14.25*	0.81	16.7	Poornima <i>et al.</i> , 2021b
Cluster bean	fruits/plant	<i>Cyamopsis tetragonoloba</i> L.	2.6	1.8	3.4**	1.4	26.6	Prasad and Jois, 2021a
Lettuce (g)	g/plant	<i>Lactuca sativa</i>	14.83	3.20	19.21 ^{NS}	5.8	30	Poornima <i>et al.</i> , 2021c
Ragi	g/plant	<i>Eleusine corocana</i> L.	13.02	3.31	18.81*	4.2	36.3	Poornima <i>et al.</i> , 2021d
Cabbage	t/acre	<i>Brassica oleracea</i> L.	15.26	0.81	18.48*	0.81	21	Poornima <i>et al.</i> , 2021a
Banana	kg/plant	<i>Musa</i> sp. var. (Nanjangud rasabale)	4.90	0.65	6.35**	0.57	29.5	Prasad <i>et al.</i> , 2024

*p<.05, **p<.01, ^{NS}Not significant, ^aWhen compared with control, ^bbased on calculation

The importance of yield to farmers cannot be overstated. Yield serves as a measure of agricultural success, influencing farmers' income, food security and overall well-being. A higher yield not only ensures a stable source of income for farmers but also contributes to food availability and affordability, thus positively impacting communities and economies at large. Furthermore, improved yield can empower farmers to invest in better agricultural inputs, adopt sustainable practices and enhance resilience to environmental stresses. It also fosters rural development by creating employment opportunities and stimulating economic growth in agricultural regions. In conclusion, the significance of yield in agriculture extends beyond mere productivity metrics; it embodies the aspirations and livelihoods of farmers worldwide. The advancements facilitated by Pranic Agriculture in augmenting yield underscore its potential to revolutionise farming practices, promote sustainable food production and contribute to the well-being of farming communities globally. As we navigate the complexities of agricultural systems, prioritising strategies that optimise yield while ensuring environmental sustainability remains paramount in achieving food security and rural prosperity.

Chlorophyll content

Pranic treatment has been shown to significantly elevate chlorophyll content in leaves compared to control samples (Table 8), indicating a potential mechanism for enhanced photosynthetic activity. A notable increase in chlorophyll content ranging from 9% to 26% following Pranic treatment is noticed. Chlorophyll, a green pigment crucial for photosynthesis, plays a pivotal role in capturing light energy and converting it into chemical energy. This surge in chlorophyll levels likely contributes to the enhancement of photosynthetic processes, ultimately fostering greater growth and yield in treated plants. The observed improvement in chlorophyll content suggests that Pranic energy may enhance the energy and ion equilibrium processes associated with photosynthesis. These processes involve the conversion of light energy into chemical energy and the synthesis of carbohydrates and ATP, essential for plant growth and development. By bolstering these fundamental mechanisms, Pranic energy creates a conducive environment for optimal photosynthetic efficiency and metabolic activity, thereby promoting robust plant growth and productivity. Continued research into the intricate interplay between energy treatments and plant physiology promises to unlock new insights into sustainable agricultural practices and optimize crop production in an increasingly resource-constrained world.

RAPD analysis

In ridge gourd, a total of forty-three scoreable bands, including twenty polymorphic bands and twenty-four monomorphic bands between pranic and control groups were noticed. The per cent polymorphism obtained by arbitrary primers GE 2, GE 3, OPL-12 and RPL-19A ranged

from 36.4% to 53.8%, with the highest observed in the RPL 19A primer. The size of the amplified product varied from 400 bp to 3000 bp. An average percent polymorphism of 47.3% was obtained between the groups, indicating substantial variability (Table 9). The pranik treatment induced considerable variability not only in plant morphology and chlorophyll content but also in plant DNA (Fig 2).

In chilli, a total of eighteen scorable bands using molecular markers were identified. Among these, five bands exhibited polymorphism, while the remaining thirteen were monomorphic (Fig 3). The percentage of polymorphism varied among the primers used: GE2 showed 0%, GE3 exhibited 57% and OPL-12 displayed 14%. The total polymorphism across all primers was 27%, with an average polymorphism rate of 24% (Table 9). The GE3 primer demonstrated the highest polymorphism, whereas GE2 showed no detectable polymorphism. The amplified product sizes ranged from 400 bp to 3000 bp.

In cabbage, a total of twenty-six bands were obtained. Among these, six bands were polymorphic, while the remaining twenty were monomorphic between the control and pranik-treated groups. The total percent polymorphism was 23% with all three primers. The average polymorphic bands were 2 and monomorphic bands were 6.6, resulting in a 22% polymorphism between control and pranik treatments. Per cent polymorphism by arbitrary primers

GE 1, GE 2 and GE 3 was 25%, 30% and 12%, respectively (Table 9). The size of the amplified product varied from 400 bp to 1000 bp (Fig 4).

The results of the RAPD analysis provide fundamental insights and confirm that the pranik treatment induces remarkable changes in plants at the DNA level. These findings serve as a baseline for further understanding the mechanisms and sites of action of pranik treatment on plants at the cellular level. The additional DNA bands found in pranik-treated plants may be associated with increases in yield, root length, number of leaves and other plant characteristics. Similarly, the increase in chlorophyll content may also correlate with the presence of additional polymorphic bands in pranik-treated plants.

Chemical fertilisers (N: P: K) was applied only as basal dose during sowing, but not given any fertiliser during growth stages. With minimum fertiliser application, pranik treatment has given growth and yield on par with the expected yield of the variety whereas in control, there was no increase in growth and yield. Thus, pranik energy application can compensate with the reduced application of fertiliser and give a higher yield. PA can reduce the application of chemical fertiliser and farmers could benefit from a reduction in the cost of cultivation. Environmental sustainability also can be achieved. The integration of Pranik Agriculture into sustainable agricultural practices

Table 8: Chlorophyll content (mg/g fresh weight).

Common name	Scientific name	Control		Pranic		Difference (%) ^a	References
		Mean	SD	Mean	SD		
Marigold	<i>Tagetes erecta</i> L.	3.42	0.28	3.75 ^{NS}	0.1	9.65	Poornima <i>et al.</i> , 2020a
Chillie	<i>Capsicum annum</i> L.	3.74	0.20	4.25*	0.26	13.64	Poornima <i>et al.</i> , 2021b
Ridge Gourd	<i>Luffa cylindrica</i> L. Roxb.	2.48	0.22	3.14*	0.38	26.6	Poornima <i>et al.</i> , 2020b

*p<.05, ^{NS}-Not significant, ^a-When compared with control.

Table 9: DNA polymorphism detected by RAPD analysis for ridge gourd, chillie and cabbage.

Polymorphism	Primer				Total	Average
	GE2	GE3	OPL-12	RPL19A		
Ridge gourd						
No. of scorable bands	12	11	13	7	43	10.8
No. of polymorphic bands	5	4	7	4	20	5
No. of monomorphic bands	7	7	6	4	24	6
Per cent polymorphism (%)	41.7	36.4	53.8	57.1	189	47.3
Chillie						
No. of scorable bands	4	7	7	-	18	6
No. of polymorphic bands	0	4	1	-	5	1.7
No. of monomorphic bands	4	3	6	-	13	4.3
Per cent polymorphism (%)	0	57	14	-	27	24
Cabbage						
	GE1	GE2	GE3	-		
No. of scorable bands	8	10	8	-	26	8.6
No. of polymorphic bands	2	3	1	-	6	2
No. of monomorphic bands	6	7	7	-	20	6.6
Per cent polymorphism (%)	25	30	12	-	23	22

is a topic of growing interest, as it offers unique insights into the potential synergy between energetic treatments and plant growth enhancement. Research indicates that healers generate magnetic fields during their practice (Srinivasan 2017) which can impact plant hormones like Indole-3-acetic-acid (IAA) and Gibberellic acid (GA), known to stimulate plant growth. These magnetic fields also influence soil pH and the release of organic acids, thereby enhancing nutrient availability for plants (Hafeez *et al.*, 2023). Such findings underscore the potential of Pranic treatments to positively influence soil health and plant nutrition, aligning with the principles of sustainable agriculture. Pranic treatment has been shown to augment root length, facilitating better nutrient absorption and enhancing plant vigour, ultimately leading to increased crop yield. Seedling vigour, which strongly correlates with higher crop productivity, is notably impacted by the application of Pranic energy. The infusion of energy, such as qi or chi, influences cellular growth rate, ATPase activity during germination and cellular metabolism, potentially fuelling enhanced plant growth. While evidence

suggests various energetic impacts on cellular structures and processes, further investigation is warranted to unravel the precise mechanisms behind the enhanced growth observed in Pranic-treated plants.

Moreover, magnetic fields produced by healers have been linked to alterations in enzyme activity and pH levels, which can potentially affect cellular functions (Bai *et al.*, 2000). Treatment methods involving pyramid structures alongside distant intent healing have shown accelerated germination in beans, presumably due to the combined effects of psychotropic generators and consciousness-driven energy on plant biology (Rubik and Jabs, 2016). These findings hint at the intricate interplay between energetic treatments and plant physiology, offering novel avenues for sustainable agricultural practices. Additionally, the Pranic Agriculture has the potential to bring about alterations in cellular structures, influence gene expression and impact enzyme activity. These changes can have a significant effect on cellular processes, ultimately resulting in enhanced growth within the treated cells. Structured water, altered by subtle energies, could potentially impact DNA structure, influencing plant and cell growth in culture (Enache *et al.*, 2019). When Pranic agriculture protocols are applied to seeds, they are believed to enhance the seed's energy level, impacting germination and cellular processes, thus contributing to the observed improvements in plant growth. Pranic Agriculture offers a holistic approach to sustainable farming by combining energy-based treatments with traditional practices. This method aims to boost plant growth, improve soil health and increase crop productivity while reducing environmental impact. Further research is needed to understand the specific mechanisms behind these effects. As we strive towards more resilient and regenerative agricultural systems, the integration of Pranic principles into sustainable agriculture warrants further research and exploration, promising innovative solutions to the challenges of food security and environmental sustainability.

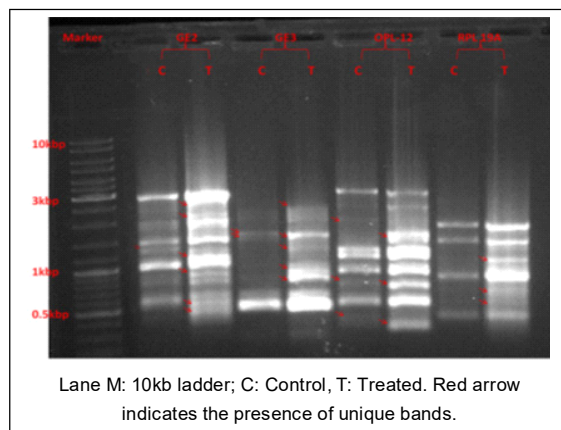


Fig 2: RAPD banding patterns of ridge gourd using primers GE2, GE3, OPL-12, RPL 19A.

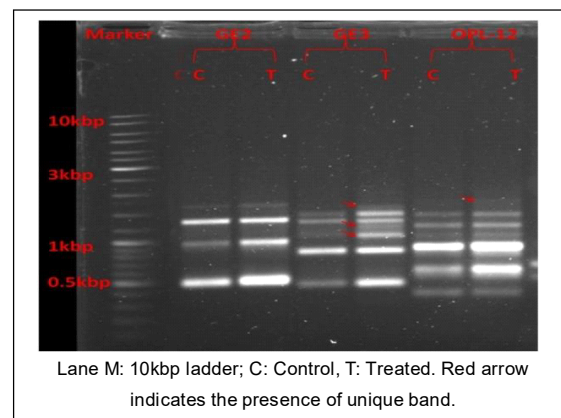


Fig 3: RAPD banding patterns generated for chilli using primers GE2, GE3 and OPL-12.

Implications

The implications of Pranic Agriculture are vast and multifaceted. Some key implications include.

Enhanced crop growth

Pranic Agriculture techniques aim to improve various aspects of plant growth, including germination rates, seedling vigour, root and shoot development, leaf morphology and overall plant health. This could potentially lead to increased agricultural productivity.

Sustainability

Pranic agriculture emphasises natural and energy-based methods rather than solely relying on synthetic chemicals. This approach may reduce dependence on conventional agricultural practices, promoting sustainable and eco-friendly farming.

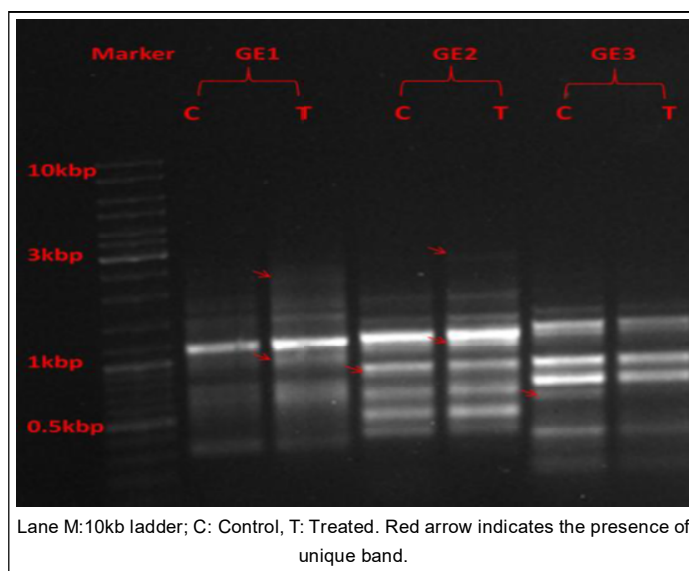


Fig 4: RAPD banding patterns generated for cabbage using primers GE1, GE2, GE3.

Adaptability and universality

Pranic Agriculture techniques have been applied across diverse plant species and cultivation conditions. This suggests the potential for widespread applicability, irrespective of soil types, climatic conditions, or crop varieties.

Potential economic benefits

Improved crop yields and healthier plants could translate into economic benefits for farmers. Higher productivity and healthier produce might fetch better prices in the market, potentially improving farmers' incomes.

Research and development

The concept of Pranik Agriculture opens doors for further scientific investigation. It encourages research into the mechanisms behind its effects on plants, which could lead to innovative farming techniques and advancements in agricultural sciences.

Supplementary farming methods

Pranic Agriculture offers a complementary approach to conventional farming methods. It complements traditional farming by introducing techniques that can improve efficiency when integrated with existing practices.

Healthier ecosystems

By reducing reliance on synthetic chemicals and promoting a more natural approach, Pranik Agriculture may contribute to healthier ecosystems, reducing the environmental impact of farming practices.

Potential for food security

Increased agricultural productivity and resilience to environmental stressors through Pranik Agriculture

methods could contribute to food security by ensuring stable crop yields, especially in regions susceptible to climate variability.

Limitations

Pranic Agriculture shows promise in improving plant growth but faces limitations, mainly due to a lack of extensive scientific research and standardised studies. Current research often varies in methods, treatment protocols and designs, making it difficult to draw consistent conclusions. Differences in study populations, interventions and outcomes, along with potential biases, add to these challenges. Systematic and standardised research is essential to enhance its credibility and broader use in agriculture.

CONCLUSION

Pranic Agriculture shows potential to improve plant growth by enhancing germination, root and shoot development, leaf structure, flowering, yield and chlorophyll content. It offers benefits like higher crop yields, sustainability and eco-friendly farming. However, more scientific validation, standardised methods and long-term studies are needed to confirm its effectiveness and understand its mechanisms for sustainable agriculture.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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