

The background of the cover features a photograph of a man in a grey t-shirt and light-colored shorts, crouching in a field and working with the soil. In the upper right, there is an inset image showing a pair of hands holding a large, knobby ginger root. A large, semi-transparent brown circle is positioned on the right side of the cover, partially overlapping the man and the ginger root image.

AN ANALYSIS OF GINGER'S GROWTH TRENDS IN INDIA

www.SwitchON.org.in

TABLE OF CONTENTS

Serial Number	Topic	Page Number
1	Introduction	1
2	Methodology	2
3	Results and Discussion	2
4	Conclusion	6
5	Reference	8

LIST OF TABLE

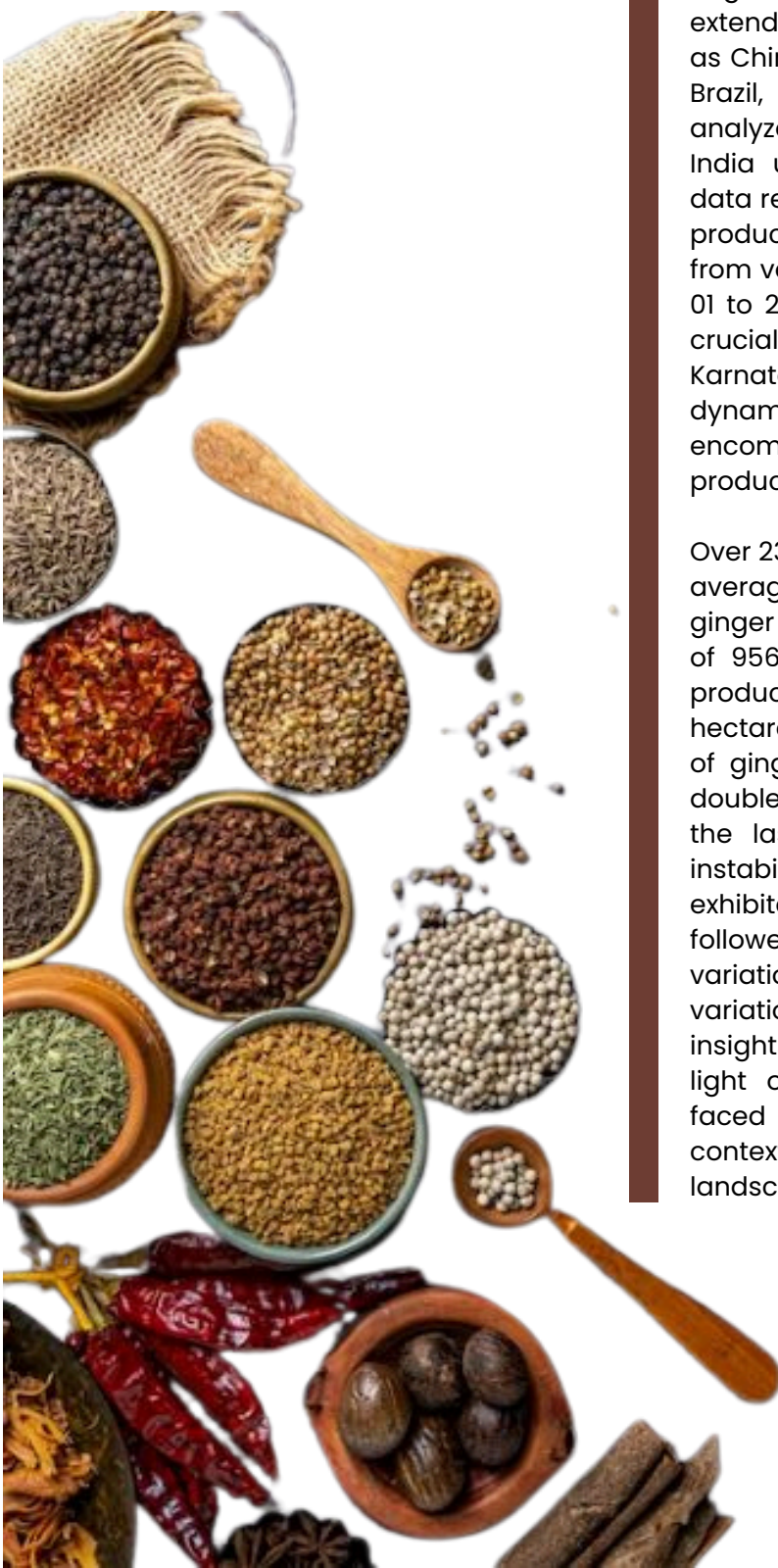
Table Number	Figure Name	Page Number
Table 1	Growth in area, production, and productivity of ginger in India	3
Table 2	Major state-wise share in area and production of Ginger in India	5



Abstract

India, renowned as the "home of spices," and is a leading producer, consumer, and exporter of spices, contributing to about 70% of the world's spice production. India is the largest producer and consumer of ginger worldwide, with nearly half of the global production originating from India. Ginger cultivation extends beyond India to countries such as China, Australia, Malaysia, Nigeria, Fiji, Brazil, and Mexico. The present study analyzed the growth trends of ginger in India using temporal data. Secondary data related to the area, production, and productivity of ginger were collected from various sources for the years 2000-01 to 2022-23. The insights highlight the crucial roles of Madhya Pradesh, Karnataka and Assam in the regional dynamics of ginger cultivation in India, encompassing both area coverage and production levels.

Over 23 years (2000-01 to 2022-23), India averaged 141 thousand hectares in ginger cultivation, producing an average of 956.81 thousand metric tons with a productivity of 6.08 metric tons per hectare. In India, the growth rate (CAGR) of ginger production was more or less double than area and productivity over the last sixteen years. Regarding the instability index, ginger production exhibited the highest variation at 72.34%, followed by productivity with a 47.30% variation, and area with a 27.61% variation. These results provide valuable insights into the dynamics, shedding light on the patterns and challenges faced by this important spice in the context of the country's agricultural landscape.



Introduction

India, renowned as the "home of spices," holds a prominent global position as the leading producer, consumer, and exporter of spices, contributing to approximately 70% of the world's spice production (FAO, 2010). Virtually every state in India engages in the cultivation of one or more spices, with Rajasthan and Gujarat standing out by contributing around 80% of the total seed spices produced nationwide, earning the title of the "Seed Spice Bowl of India."

The diverse climate across India creates an ideal environment for cultivating a wide variety of spices, making it the country with the highest number of spice varieties globally (Kumar et al., 2018). In terms of spice export destinations, the United States tops the list, followed by Vietnam, China, the UAE, and Malaysia. India also holds the distinction of being both the largest producer and consumer of ginger worldwide, with nearly half of the global production originating from India. Ginger cultivation extends beyond India to countries such as China, Australia, Malaysia, Nigeria, Fiji, Brazil, and Mexico (Sanderson et al., 2002). A unique feat for India is its position as the largest producer and exporter of dry ginger globally. In the 2018-19 period, India produced 1788.97 thousand metric tons of ginger, covering an acreage of 164.31 thousand hectares (Spices Board of India). In 2019, India alone contributed 43.87% to the total global ginger production, solidifying its position as the leading exporter of ginger globally (www.tridge.com). Key destinations for Indian ginger exports include the USA, Morocco, Spain, Bangladesh, the UK, Saudi Arabia, and the UAE. The major ginger-producing states in India are Kerala, Assam, Meghalaya, Arunachal Pradesh, and Orissa, collectively accounting for over 60% of the country's ginger production (Mishra et al., 2012).



Methodology

The study assessed ginger production trends in India using information from research articles, data tables, and the latest scientific findings. Extensive literature review and analysis of agricultural reports, online databases, and government publications provided insights into production volumes, yield per hectare, and regional distribution. Comparative studies highlighted geographical variations and the impact of technological advancements and climate change on ginger cultivation. The comprehensive approach ensured accurate assessment and valuable recommendations for enhancing ginger production and promoting sustainable practices.

Results and Discussion

An attempt is made to thoroughly examine the outcomes derived from the study, with a specific focus on the significant findings related to the production and productivity of ginger. The findings of this study are systematically presented under two key domains: production and productivity. To comprehensively understand the trends and dynamics, a meticulous analysis of the Compound Annual Growth Rate (CAGR) concerning the area, production, and productivity of ginger in India has been conducted. This analysis spans a substantial period of 23 years, ranging from 2000-01 to 2022-23, and the results are methodically illustrated in Table 1. The table provides a visual representation of the growth patterns and trends in the cultivation and yield of ginger over this extended timeframe.



Table 1: Growth in area, production, and productivity of ginger in India

Years	Area (In ' 000 Hectare)	Production (In ' 000 MT)	Productivity (In MT/Hectare)
2000-01	83.40	303.40	3.6
2001-02	84.60	317.90	3.8
2002-03	85.90	307.40	3.6
2003-04	85.10	301.90	3.5
2004-05	95.30	359.00	3.8
2005-06	110.60	391.20	3.5
2006-07	106.10	393.40	3.7
2007-08	104.10	382.60	3.7
2008-09	143.90	610.40	4.2
2009-10	142.10	679.30	4.8
2010-11	167.40	702.00	4.2
2011-12	155.10	755.60	4.9
2012-13	136.30	682.60	5.0
2013-14	132.60	655.10	4.9
2014-15	141.70	760.30	5.4
2015-16	164.00	1109.00	6.8
2016-17	168.00	1076.00	6.4
2017-18	168.00	1345.36	8.01
2018-19	167.39	1851.09	11.06
2019-20	178.15	1868.35	10.49
2020-21	204.50	2219.81	10.85
2021-22	210.01	2503.32	11.92
2022-23	205.89	2431.52	11.81
MEAN	140.88	956.81	6.08
STDEV	38.90	692.16	2.88
R2	0.81	0.84	0.89
CAGR	5.64*(-0.0032)	8.71*(-0.0046)	3.65*(-0.0051)
CV	27.61	72.34	47.30

Source: Spices Board, India & Ministry of Agriculture and Farmers Welfare, Govt. of India

Note: figures in the parentheses indicate standard error.

*Significant at 1% level of probability.

**Significant at 5% level of probability.



Over the extensive span of 23 years, encompassing the time frame from 2000-01 to 2022-23, the cultivation landscape of ginger in India has exhibited consistent patterns. The average expanse dedicated to ginger cultivation during this period amounted to 140.88 thousand hectares. Within this substantial cultivation area, the average annual production of ginger stood at 956.81 thousand metric tons, reflecting the nation's sustained commitment to ginger farming. Furthermore, the average productivity recorded during this time frame was 6.08 metric tons per hectare, underscoring the efficiency and yield achieved within the cultivated land. This extended period encapsulates the various agricultural, environmental, and economic factors influencing ginger cultivation in India, providing valuable insights into the trends and dynamics of this significant crop over more than two decades.

In the context of the Indian scenario, a noteworthy observation emerges, revealing that the highest growth rate was witnessed in the production of ginger at an impressive 8.71% per annum. This substantial growth is followed by a robust expansion in the cultivation area, registering a growth rate of 5.64% per annum. Additionally, the productivity of ginger exhibited notable advancement, recording a growth rate of 3.65% per annum.

These growth rates, whether pertaining to the cultivation area, production, or productivity, were not only positive but also demonstrated statistical significance at both the 1% and 5% levels of probability. This signifies a robust and meaningful trend in the upward trajectory of ginger cultivation in India, emphasizing the positive momentum and the agricultural sector's noteworthy contributions to the nation's economic landscape. The findings underscore the resilience and adaptability of ginger cultivation practices, showcasing their ability to evolve positively over time.

When considering the instability index, it is noteworthy that the highest degree of variation was observed in ginger production, indicating a substantial 72.34% fluctuation. Following closely, the productivity exhibited a significant variation of 47.30%, while the variation observed in the cultivation area amounted to 27.61%.

These variations highlight the dynamic nature of ginger cultivation, showcasing the volatility in production, productivity, and cultivation area over the specified period. The observed fluctuations, particularly in production, underscore the potential impact of various factors such as environmental conditions, market dynamics, and agricultural practices on the stability of ginger farming in the Indian context. Analyzing these variations provides crucial insights into the inherent challenges and potential opportunities for stakeholders involved in the ginger cultivation sector.

Table 2 provides a comprehensive overview of the distribution of ginger cultivation across Indian states during the 2022-23 period.

Table 2: Major state-wise share in area and production of Ginger in India 2022-23

State	Area(In ' 000 Hectare)	Percent share	Production(In ' 000 MT)	Percent share
Madhya Pradesh	33.49	16.26	544.53	22.39
Karnataka	40.00	19.43	500.00	20.56
Orissa	17.68	8.59	227.48	9.36
Assam	18.56	9.01	173.25	7.13
West Bengal	12.55	6.09	137.21	5.64
Maharashtra	9.16	4.45	131.47	5.41
Gujarat	5.04	2.45	111.30	4.58
Sikkim	15.28	7.42	81.80	3.36
Meghalaya	10.16	4.93	67.11	2.76
Kerala	3.22	1.56	65.64	2.70
Mizoram	8.56	4.16	60.13	2.47
Uttaranchal	4.51	2.19	44.92	1.85
Telangana	2.04	0.99	21.20	0.87
Arunachal Pradesh	3.64	1.77	19.20	0.79
Andhra Pradesh	0.52	0.25	2.80	0.12
Total Including Others	205.90	100.00	2431.52	100.00

Source: Spices Board, India & Ministry of Agriculture and Farmers Welfare, Govt. of India

Notably, Madhya Pradesh emerged as the leading state in terms of ginger cultivation area, contributing the highest percentage share at 22.39%, followed closely by Karnataka at 20.56%, and Orissa at 9.36% (Keelery 2023). In the production aspect, Madhya Pradesh claimed the top position with a significant share of 22.39%, showcasing its prowess in ginger output. Following closely, Karnataka secured the second position with a substantial production share of 20.56%, while Orissa attained the third position with a notable contribution of 9.36%. These state-wise insights illuminate the regional dynamics of ginger cultivation in India, highlighting the prominent roles played by Karnataka, Madhya Pradesh, and Orissa in both area coverage and production levels.

Conclusion

The secondary research conducted revealed that compound growth rates for area, production and productivity for a period of 23 years were found to be positive and significant at both 1% level of probability. The instability in ginger productivity exhibited less variation than area and production over the years. Whereas, production witnessed the highest instability as compared to area and productivity, over the period of time.

1. Compound Growth Rates:

- The analysis revealed that the compound growth rates for the area under ginger cultivation, overall production, and productivity (yield per hectare) were positive and statistically significant at 99% confidence interval (C.I.), where $p < 0.01$. The data show a meaningful and highly reliable increase in both total production and productivity per hectare. This indicates a consistent and robust increase in these parameters over the studied period.

Area Under Cultivation:

- The area dedicated to ginger farming has expanded, reflecting increasing interest and investment in ginger cultivation.

Production:

- The total production of ginger has grown, showcasing the sector's ability to scale up and meet rising demand.

Productivity:

- Improvements in agricultural practices, technology, and possibly seed quality have contributed to higher productivity levels, meaning more ginger is produced per unit area.

2. Instability in Ginger Production:

- The research highlighted varying degrees of instability in ginger production parameters over the years.

Productivity:

- The instability in productivity exhibited less variation compared to the area and production. This suggests that while the amount of land used for ginger cultivation and total production levels may fluctuate, the efficiency of production (yield per hectare) has been relatively stable.

Area Under Cultivation:

- The area under ginger cultivation showed some instability, indicating fluctuations in the amount of land farmers dedicate to ginger each year. This could be due to various factors such as changes in market prices, climatic conditions, or shifts to other crops.

Productivity:

- The highest instability was observed in total production. This suggests that while the area and productivity may show relatively moderate fluctuations, the total output of ginger is more susceptible to variations. Factors contributing to this instability could include weather conditions, pest outbreaks, and changes in agricultural practices or input availability.

3. Implications of Findings:

Agricultural Planning

- The positive growth rates indicate a thriving sector, but the instability, particularly in production, underscores the need for better agricultural planning and risk management strategies. Enhancing resilience against factors causing production volatility can help stabilize the supply chain.

Resource Allocation:

- Understanding these dynamics can guide policymakers and stakeholders in allocating resources more effectively. For instance, interventions to stabilize production could focus on improving irrigation systems, pest control measures, and access to reliable inputs.

Market Stability:

- Addressing the causes of production instability can lead to more predictable market conditions, benefiting both, producers and consumers. Consistent production levels can help maintain stable prices and supply, fostering a more reliable market environment.

Overall, the findings from the secondary research underscore the growth and potential of ginger production in India, while also highlighting areas that require attention to ensure sustainable and stable growth in the sector.



References

- Keeleri S 2023, Statista, Volume of ginger produced across India in the financial year 2022, by leading state, <https://www.statista.com/>
- Afshari, A.T., Shirpoor, A., Farshid, A. and Kharajo, R.S. 2007. The effect of ginger on diabetic nephropathy, plasma antioxidant capacity and lipid peroxidation in rats, *Food Chem.*, 101(1): 148-153. Retrieved From: <https://scirp.org/>
- Ahmad, N., Sulaiman, S., Mukti, N.A., Murad, N.A., Hamid, N.A.A. and Yusof, Y.A.M. 2006. "Effects of ginger extract (*Zingiber officinale* roscoe) on antioxidant status of hepatocarcinoma induced rats. *Malays. J. Biochem. Mol. Biol.*, 14: 7-12. Retrieved From: <https://dlwqtxts1xzle7.>
- Al-Amin, Z.M., Thomson, M., Al-Qattan, K.K., PeltonenShalaby, R. and Ali, M. 2006. Antidiabetic and hypolipidaemic properties of ginger (*Zingiber officinale*) in streptozotocin-induced diabetic rats. *Br. J. Nutr.*, 96: 660-666. Retrieved From: <https://doi.org/10.1079/BJN20061849>
- Ambia, N. 2006. Control of rhizome rot of ginger through selected chemicals: Bio-agent, plant extract, and soil amendment. M.Sc. Thesis, Sher-e-Bangla Agriculture University, Dhaka. Bhutia et al. Print ISSN : 0424-2513 504 Online ISSN : 0976-4666 Retrieved From: <https://www.scirp.org>
- Boyal VK, Pant DC, Burrak SS, Mehra J. Growth and instability in area, production, and productivity of fenugreek in Rajasthan, *Int. J Seed Spices*. 2015; 5(1):18- 23. Retrieved From: <https://ndpublisher.in/admin/issues/EAv66n4p.pdf>
- Camacho, H.E. and Brescia, A. 2009. The Australian ginger industry of market trends and opportunities. The State of Queensland, Department of Employment, Economic Development and Innovation, Australia, pp. 54. FAOSTAT <https://www.tridge.com/production/intro>
- Karthick V, Alagumani T, Anbarassan A. Growth and export performance of ginger in India – an economic analysis. *Economic affairs*. 2015; 60(2):207-214. Retrieved From: <https://www.researchgate.net/publication/>
- Kumar, S., Singh, S.P. and Sharma, R.R. 2018. Constraints perceived by the farmers in the adoption of improved ginger production technology study of low hills of Himachal Pradesh. *Int. J. Bio-resour. Stress Manag.*, 9(6): 740-744. Retrieved From: <https://www.indianjournals.com>
- Malu, S.P., Obochi, G.O., Tawo, E.N. and Nyong, B.E. 2009. Antibacterial activity and medicinal properties of ginger (*Zingiber officinale*). *Global J. of Pure and App. Glob. J. Pure Appl. Sci.*, 15 (3&4): 365- 368. Retrieved From: <https://www.ajol.info/index.php>
- Mishra, P.K., Maurya, B.R. and Kumar. 2012. Studies on the biochemical composition of *Parthenium hysterophorus* L. in different seasons. *J. Funct. Environ. Botany*, 2(2): 1-6. Retrieved From: <https://www.indianjournals.com/>
- Rajesh SR, Raveendran N, Ajjan N. An analysis: Trends in area, production, productivity and export of major spices in India, *Spice India*. 2002; 15(2):19-22. Retrieved From: <https://www.researchgate.net/profile/M-Krishnadas/publication>
- Sanderson, Bartlett, L.A. and Whitfield, P.J. 2002. In vitro and in vivo studies on the bioactivity of a ginger (*Zingiber officinale*) extract towards adult Schistosomes and their egg production. *J. Helminthol.*, 76: 241-247 Retrieved From: <https://pubmed.ncbi.nlm.nih.gov/12363378/>



www.SwitchON.org.in     @SwitchONIndia

SwitchON Foundation, established in 2008, is a leading non-profit organisation focusing on Environment Sustainability and Equal Opportunities. Operating in 10 Indian states. It leads initiatives in Clean Energy Access, Sustainable Agriculture, Skilling, Clean Air and Sustainable Cities. Key strengths encompass innovative project implementation, capacity building, field support, awareness and advocacy.

