

## International Journal of Agriculture Extension and Social Development

Volume 7; Issue 4; April 2024; Page No. 15-19

Received: 21-01-2024  
Accepted: 27-02-2024

Indexed Journal  
Peer Reviewed Journal

### Trends in black pepper production in conventional and non-conventional regions of Karnataka

<sup>1</sup> Deekshith S, <sup>2</sup> Amrutha T Joshi, <sup>3</sup> DG Satihal, <sup>4</sup> Satishkumar M and <sup>5</sup> Basavaraj Hulagur

<sup>1</sup> Sr. M.Sc., Department of Agricultural Extension Education, UAS, Raichur, Karnataka, India

<sup>2</sup> Professor and head, Department of Agricultural Extension Education, UAS, Raichur, Karnataka, India

<sup>3</sup> Associate Professor, Department of Agricultural Extension Education, UAS, Raichur, Karnataka, India

<sup>4</sup> Assistant Professor, Department of Agricultural Economics, UAS, Raichur, Karnataka, India

<sup>5</sup> Associate Professor, Department of Agricultural Extension Education, UAS, Raichur, Karnataka, India

DOI: <https://doi.org/10.33545/26180723.2024.v7.i4a.495>

Corresponding Author: Deekshith S

#### Abstract

The study was conducted during 2022-23 to study the trends in area, production and productivity of black pepper in the conventional and non-conventional regions of Karnataka. For the study conventional regions were chosen as districts where black pepper cultivation has been practiced for more than 25 years and they possess scientifically prescribed agro-climatic conditions suitable for black pepper cultivation. Non-conventional regions, on the other hand, were identified as districts where black pepper cultivation began recently and lacked the specified agro-climatic conditions. The study area was selected based on the extent of area under black pepper cultivation, utilizing data published by the Directorate of Economics and Statistics Karnataka. The result of the trend analysis indicated that in Karnataka area, production, and productivity of black pepper has been increasing at the rate of 22.90, 30.24, and 6.08 per cent respectively from year 2011-2022. For conventional region area, production, and productivity had seen an increase of 28.06, 30.27, and 2.46 per cent respectively. And the same for non-conventional region was 42.60, 44.61, and 1.33 per cent respectively. This shows that the area under black pepper has been increasing rapidly over the years. This increase in area can be attribute to increased price for the black pepper.

**Keywords:** Substituted Li ferrite, magnetostatic and spin waves, microstrip array antenna, X-band frequency range

#### 1. Introduction

All the spices of India are closely connected to the culture, traditions and preservation since early human history. For India's external trade spices were a key component such as Egypt, Arabia & China. The spices find a mention in the Ramayana one of the prestigious Holy book of Hindus as well as in the writings dating back to 1st century AD of the Roman empire. In the ancient times caravans of camels on a regular basis moved from Calicut, Goa to transport the supply of spices to destinations such as Rome, Alexandria etc. In today's time these spices are very easily available whereas in earlier time people risked their lives to have the access to Indian spices.

Spices are ideal crop best fit to be integrated into small-scale farming systems and are suitable for small scale garden production. This enterprise can offer additional opportunities for employment within the family and income earned can be used as a 'safety net' in times of emergency. Spices are a particularly viable enterprise for farmers as they can conveniently be grown as an intercrop, in around the homestead as well as providing an opportunity for farmers to start a commercial enterprise and be able to participate in the local economy

Black pepper, christened the 'King of Spices' and 'black

gold', is the most important and most widely used spice in the world, occupying a position that is supreme and unique. In the past, black pepper ranked with gold and was used as barter money. It was so precious that only kings and others in the highest class were allowed to possess it. It was the lure of Indian pepper that brought the western world to the Indian sub-continent.

Black pepper originated in the tropical evergreen forests of the Western Ghats; and the Malabar coast of India was the centre of the pepper trade from time immemorial. From here, pepper was carried to Indonesia and Malaysia by traders and travellers, and these countries became major producers during the first half of the present century. India has approximately 48 per cent of its area under pepper, but its share in production is only about 27.3 per cent. The productivity is highest in Thailand followed by Malaysia, China, Indonesia, Vietnam and Brazil. In the next 50 years, the producing countries should gear up to double their pepper production to meet the global demand

The key black pepper-producing states in India included Kerala, Karnataka, Tamil Nadu and Andhra Pradesh. In the fiscal year 2022, Karnataka was projected to claim the title of the largest pepper producer in India, with an estimated output of approximately 30 thousand metric tons. The

perennial woody vine of pepper was anticipated to be cultivated across an expanse of about 190 thousand hectares of land in Karnataka.

Black pepper is a very important spice and medicinal crop of India. The country produces about 90000 tonnes of black pepper annually, of which 10–12% is exported. This study is being conducted in view of bringing non-conventional area under black pepper cultivation to further increase the production of pepper.

## Methodology

### Locale of the study

The study was carried out in eight districts of Karnataka state namely, Chamarajanagara, Chitradurga, Davanagere, Tumakur, Hassan, Kodagu Chikkamagaluru and Dakshinakannada. These districts were categorized into conventional and non-conventional regions for black pepper cultivation. Chitradurga and Davanagere were classified as non-conventional regions, while Kodagu and Chikkamagaluru were designated as conventional black pepper growing regions.

The study area was selected based on the extent of area under black pepper production, utilizing data published by the Directorate of Economics and Statistics Karnataka. Conventional regions were chosen as districts where black pepper cultivation has been practiced for more than 25 years and they possess scientifically prescribed agro-climatic conditions suitable for black pepper cultivation. Non-conventional regions, on the other hand, were identified as districts where black pepper cultivation began recently and lacked the specified agro-climatic conditions.

### Nature and source of data

This study is mainly based on secondary data for evaluating the objectives of the study, data such as the black pepper production, area and other relevant information was gathered from the Directorate of Economics and Statistics, Government of Karnataka and other published sources.

### Statistical analysis

Growth in area, production & productivity (Compound Annual Growth Rate):

Trend of growth in area, production and productivity of black pepper were analysed using time series data from 2011-12 to 2021-22 in conventional and on conventional regions of Karnataka.

Growth in area, production & productivity was calculated using the following formula –

$$Y = abt \quad (1)$$

Where

Y = Refers to area/ production/ productivity in 1st year

a = Refers to intercept

t = Refers to year (time period) (say t = 1, 2, 3, ..., n)

b =  $1 + r/100$ ,

Where 'r' refers to the percentage rate of compound growth rate of area, production, productivity per annum.

By taking logarithms both side of the equation, it has been reduced to following linear form with log 'Y' as dependent variable and 't' as independent variable:

$$\log Y_t = \log a + t \log b$$

For convenience, if we put 'log a' = A and 'log b' = B, then this can be written as -

$$\log Y_t = A + Bt \quad (2)$$

This is semi log function with time 't' as independent variable. Then by using OLS technique, we have normal equations of the type.

$$\sum \log Y_t = nA + B \sum t$$

$$\sum \log Y_t t = A \sum t + B \sum t^2 \quad (3)$$

Where 'n' is the number of observations (years)

By solving equation (3), the values of 'A' and 'B' have been computed. For deriving compound growth rate from the computed regression coefficients, the following procedure has been adopted.

$$r = (b-1) \times 100$$

$$r = (\text{Antilog 'B'} - 1) \times 100$$

This represented a uniform rate of change from observation to observation.

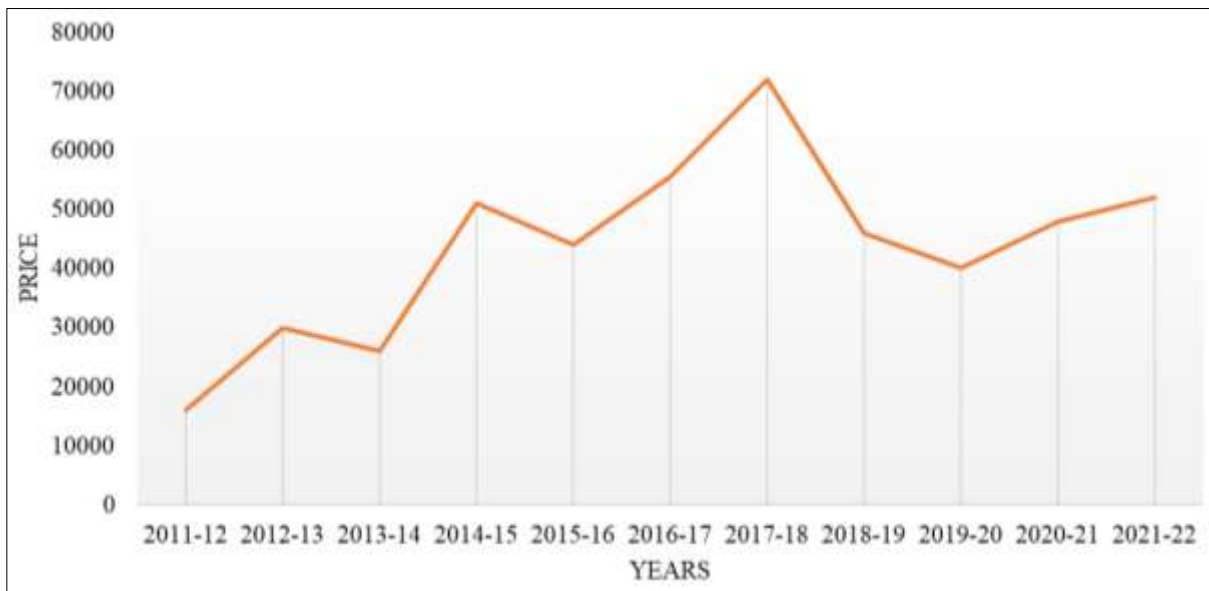
## Results and Discussions

Table 1 provides a comprehensive overview of black pepper price trends in Karnataka from 2011-12 to 2021-22. During this period, black pepper prices exhibited notable fluctuations, reflecting the dynamic nature of the market influenced by diverse factors.

In the initial year, 2011-12, the price was recorded at ₹16,000 /q, experiencing a sharp surge to ₹30,000 in 2012-13. However, it declined to ₹26,000 in 2013-14 before witnessing a significant spike to ₹51,000 in 2014-15. The upward trend continued, reaching ₹72,000 in 2017-18. Subsequently, there was a decline to ₹46,000 in 2018-19 and a further drop to ₹40,000 in 2019-20. Despite these fluctuations, there was a modest recovery in 2020-21, with the price rising to ₹48,000, followed by a slight increase to ₹52,000 in 2021-22. These variations underscore the market's sensitivity.

Factors such as agricultural practices, weather patterns, international trade, and consumer demand likely contributed to these price fluctuations. Additionally, government policies, export-import regulations, and geopolitical events could have influenced the market sentiment, leading to the observed trends.

Figure 1 serves as a visual representation of the data presented in Table 1, offering a clearer perspective on the fluctuations in black pepper prices over the years. The graph vividly illustrates the market's volatility, highlighting periods of rapid increases and declines in prices. Notably, in the year 2017-18, there was a remarkable all-time high in black pepper prices. This spike acted as a significant incentive for numerous farmers, encouraging them to invest in and expand their black pepper production. The prospect of higher profits likely prompted many agricultural entrepreneurs to enter the market, capitalizing on the favourable price conditions.



**Fig 1:** Black pepper prices in Karnataka over the year

**Table 1:** Average black pepper prices in Karnataka over the years

Year	Average price (₹/q)
2011-12	16000
2012-13	30000
2013-14	26000
2014-15	51000
2015-16	44000
2016-17	55500
2017-18	72000
2018-19	46000
2019-20	40000
2020-21	48000
2021-22	52000

Table 2 and Figure 2 gives the year wise trends in area, production and productivity of black pepper in Karnataka. Over the years, Karnataka's black pepper cultivation has experienced significant growth, evident in the expanding cultivation area and escalating production figures. The cultivation area steadily increased, from 21,701 hectares in the year 2011-12 to 209,709 hectares in year 2021-22, indicating increasing interest and investment in black pepper cultivation by the farming community. Simultaneously, production soared from 61,488 metric tonnes in 2011-12 to an impressive 1,125,423 metric tonnes in 2021-22. This remarkable increase can be attributed to a harmonious blend of expanded cultivation areas and the implementation of advanced farming techniques.

The metric of productivity, gauged in kilograms per hectare, provides valuable insights into the efficiency of black pepper cultivation practices. Beginning at 286 kg/ha in 2011-12, productivity peaked at 762 kg/ha in 2014-15, showcasing the region's potential for high-yield farming. Although fluctuations occurred, productivity stabilized around 500-600 kg/ha, demonstrating a balance between sustainable practices and optimal resource utilization. The consistent yield, reaching 548 kg/ha in 2021-22, underscores the effectiveness of Karnataka's agricultural strategies, influenced by diverse factors including technological

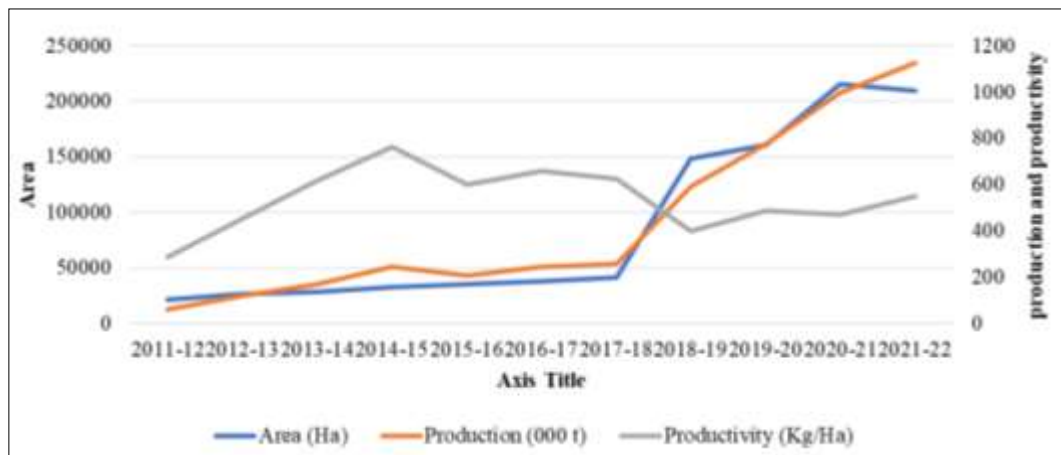
advancements, research initiatives, and farmer expertise.

The graph vividly illustrates a significant surge in both cultivation area and production, notably prominent in the year 2017-18. This spike can be directly linked to the heightened market price of black pepper during that period, as evidenced in Table 1. The increased profitability acted as a powerful incentive, luring more farmers into black pepper cultivation, thereby resulting in the substantial expansion of cultivation areas and a subsequent boost in production figures.

Despite the expansion in both cultivation area and production, the productivity trend exhibits a decline. This phenomenon can be attributed to the unique nature of black pepper as a perennial crop. Unlike annual crops, black pepper begins yielding only four years after planting. Therefore, during the initial years, while the plant is establishing its roots and structure, the yield might not be proportionate to the increased cultivation area. This lag in productivity growth, characteristic of perennial crops, explains the decreasing trend in spite of the expansion in cultivation, highlighting the need for a long-term perspective when assessing productivity in such agricultural contexts.

**Table 2:** Area, production and productivity of Black pepper in Karnataka

Year	Karnataka		
	Area	Production	Productivity
2011-12	21701	61488	286
2012-13	26837	120316	453
2013-14	27960	170420	616
2014-15	32659	246418	762
2015-16	34985	207758	600
2016-17	37736	246482	660
2017-18	41554	257462	626
2018-19	148379	589630	401
2019-20	160774	774224	486
2020-21	215813	996224	471
2021-22	209709	1125423	548



**Fig 2:** Trends in area production and productivity of black pepper in Karnataka

**Table 3:** Area, Production and Productivity of Bk pepper in conventional region.

Year	Conventional region											
	Chikmagalur			Dakshina Kannada			Hassan			Kodagu		
	A (ha)	P (t)	Y (kg/ha)	A (ha)	P (t)	Y (kg/ha)	A (ha)	P (t)	Y (kg/ha)	A (ha)	P (t)	Y (kg/ha)
2011-12	3585	10151	286	2146	11111	312	3574	10402	314	10643	24972	237
2012-13	7649	34303	453	2183	10611	491	4165	16411	398	10797	52269	489
2013-14	7746	77376	660	2241	11625	524	4730	20838	445	11002	49014	450
2014-15	7788	81573	662	2546	9578	380	4790	63876	660	14934	65644	444
2015-16	8003	69564	878	2736	7286	269	5301	42614	812	15096	61723	413
2016-17	8194	75929	860	3122	17927	580	7800	61544	797	15219	66294	440
2017-18	8199	62014	764	3558	7045	200	9614	100699	786	15875	65694	418
2018-19	34097	101268	300	5322	22498	427	33788	163906	490	65605	263693	406
2019-20	40520	215818	538	7146	29996	424	30665	248635	510	70757	217153	412
2020-21	49260	265019	538	13428	56935	424	34926	286044	612	97979	303735	412
2021-22	48396	266180	550	15037	82704	550	31643	262639	602	98445	446940	512

**A: Area**

**P: Production**

**Y: Yield**

Upon reviewing Table 4, it is evident that there is a discernible upward trend in the area, production, and productivity of black pepper within the conventional regions. Particularly noteworthy is the sudden spike in these

trends during the 2018-19 period. This surge can be closely linked to the concurrent increase in black pepper prices. The escalating prices serve as a significant driving force, prompting farmers in conventional regions to expand their cultivation efforts. As a result, there is a notable increase in both the area under cultivation and overall production, leading to enhanced productivity levels.

**Table 4:** Area, Production and Productivity of Black pepper in conventional region

Year	Non-conventional regions											
	Chamarajanagara			Chitradurga			Davanagere			Tumkur		
	A (ha)	P (t)	Y (kg/ha)	A (ha)	P (t)	Y (kg/ha)	A (ha)	P (t)	Y (kg/ha)	A (ha)	P (t)	Y (kg/ha)
2011-12	28	79	286	1	3	286	18	51	286	1	3	286
2012-13	28	126	453	1	4	453	2	9	453	1	4	453
2013-14	50	305	616	8	49	616	45	276	616	1	6	616
2014-15	37	279	762	48	362	762	25	189	762	31	234	762
2015-16	142	843	600	75	446	600	487	2893	600	36	214	600
2016-17	141	921	660	1	7	660	115	751	660	15	93	660
2017-18	142	880	626	24	149	626	205	1270	626	71	464	626
2018-19	137	549	401	24	95	401	420	1667	401	36	143	401
2019-20	134	651	486	24	115	486	429	2064	486	44	212	486
2020-21	128	602	471	58	264	471	348	1606	471	76	353	471
2021-22	130	712	548	41	220	548	279	1498	548	98	537	548

**A: Area**

**P: Production**

**Y: Yield**

Upon careful examination of Table 3, it is apparent that there are notable disparities in the area, production, and productivity trends of black pepper across non-conventional

regions in Karnataka. However, a broad analysis reveals a consistent upward trajectory beginning from the fiscal year 2017-18. This positive trend can predominantly be attributed to the upward surge in black pepper prices within the market. With prices on the rise, farmers are incentivized to intensify their cultivation efforts, consequently leading to

increased production levels across these regions. This phenomenon underscores the intricate relationship between market dynamics and agricultural practices, emphasizing the

significant impact of economic factors on shaping crop trends. Notably, fluctuations in market prices play a pivotal role in influencing production levels.

**Table 5:** Compound growth rates in area, production and productivity of black pepper in Karnataka (2011-22)

	Area (Ha)	Production (t)	Productivity (Kg/Ha)
<b>State as a whole</b>			
Karnataka	29.14**	30.74**	1.33
<b>Conventional regions</b>			
Chikkamagaluru	29.46**	28.88**	1.49
Dakshina Kannada	22.38**	21.34**	1.42
Hassan	30.78**	40.95**	4.42
Kodagu	29.62**	29.90**	2.52
Overall	28.06**	30.27**	2.46
<b>Non-conventional regions</b>			
Chamarajanagara	19.21**	20.95**	1.33
Chitradurga	38.18**	40.01**	1.33
Davanagere	51.75**	53.59**	1.33
Tumkur	61.28**	63.89**	1.33
Overall	42.60**	44.61**	1.33

**Note:** \*\* - significant at 5 percent

The results given in the Table 3 indicated the trends in black pepper area, production and productivity. In Karnataka, area under black pepper had shown an increased from 21,701 hectare in the year 2011 to 2,09,709 hectares in the year 2022 with an annual growth rate of 29.14 per cent which was significant at 5 per cent level whereas production had shown an increase from 61,488 tonnes in the year 2011 to 11,25,423 tonnes in the year 2022 with a significant growth rate of 30.74 per cent annually and productivity had shown an increase from 286 kg per hectare in the year 2011 to 548 kg per hectare in the year 2021 with a compound annual growth rate of 1.33 percent.

In the case of conventional region, it was observed that area, production and productivity had an annual positive growth rate of 28.06 percent, 30.27 percent and 2.46 per cent respectively whereas in the case of non-conventional region, area, production and productivity had an annual increase of 42.60 percent, 44.61 percent and 1.33 per cent respectively for the period from 2011-2022.

This data suggested that the growth in area and production in case of non-conventional region was greater than that of conventional region, whereas in the case of productivity conventional region had more increase than non-conventional region for the period from 2011-2022. This can be attributed to more experienced farmers and skilled labourers in conventional region which increased the productivity over the years.

### Conclusion

The expansion of black pepper cultivation in Karnataka can be linked to the rising prices of this commodity. This increase in prices has incentivized numerous farmers in the non-conventional region to embrace black pepper cultivation as a viable and profitable option which resulted in rapid increase of area under black pepper even in non-conventional region. Black pepper, a vital spice globally, boasts significant export potential. Its widespread usage has led to a surge in demand worldwide. Karnataka, a prominent producer, has witnessed a notable uptrend in black pepper area (29.14), production (30.74) and productivity (1.33). This increase can be directly linked to rising market prices,

acting as a driving force. Remarkably, in non-conventional regions, the cultivation area has surged by 42.60%, surpassing the 28.06% increase in conventional regions. Similarly, production in non-conventional areas has spiked by 44.61%, outpacing the 30.27% rise in conventional regions. This disparity underscores the impact of escalating black pepper prices. The attractive market rates have incentivized farmers in non-conventional areas, leading to a significant uptake of black pepper cultivation. Simultaneously, even in conventional regions, farmers expanded their cultivation areas, collectively contributing to the overall growth. This trend highlights the profound influence of market dynamics on agricultural decisions, shaping the landscape of black pepper cultivation in Karnataka.

### References

1. Anonymous. Karnataka at a glance. Directorate of Economics and Statistics, Karnataka; 2022. pp. 81-83.
2. Joshi D, Singh HP. An empirical analysis of growth and instability in major spices in India. *International Journal of Agriculture Sciences*. 2015;7(2):440-444.
3. Krishnamoorthy B, Parthasarathy VA. Improvement of black pepper. *CABI Reviews*. 2010, 1-12.
4. Rajanbabu R, Ganesan S. Growth and instability in production of Indian spices. *International Journal of Management and Social Development*. 2015;2(9):42-50.
5. Sabu SS, Kuruvila A, Manojkumar K. Status of production and export of Indian black pepper. *Indian Journal of Arecanut, Spices & Medicinal Plants*. 2022;22(4):9-20.
6. Sabu SS, Kuruvila A, Subash SP. Price volatility of black pepper in Kerala: could institutional mechanism such as contract agreement be a solution. *Indian Journal of Agricultural Economics*. 2020;72(2):166-185.
7. <https://agmarknet.gov.in/>