Original Research Article

Production, Import and Export Trend of the Mushroom Industry in India

ABSTRACT

Aims: The aim of this study is to analyze and present the production, import, and export trends within the mushroom industry in India. By examining these key aspects, the study intends to provide insights into the dynamics of the Indian mushroom market and its engagement with global trade, thereby contributing to a comprehensive understanding of the industry's growth and potential.
Place and Duration of Study: The data for the study was collected from official records, databases, and relevant sources that provide information on mushroom production, import, and export. The duration of the study spanned 25 years, covering historical data from the past two and a half decades.
Methodology: This study scrutinized India's mushroom industry dynamics. Data from official records and literature sources were gathered to assess growth potential, especially in Button mushrooms. A 25-year timeframe (1997-2021) was analyzed using Compounded Annual Growth Rate (CAGR) to decipher production, import, and export patterns.
Results: India's mushroom sector thrives due to conducive factors like resources and domestic demand. 2021 witnessed 243 metric tons of production. The study analyzed the growth trend and reveal a favorable upswing in mushroom production for India and Tamil Nadu, However unfavorable downward trend was found in both the import and export of mushrooms in India, as indicated by the Compounded Annual Growth Rate analysis.
Conclusion: Mushroom cultivation is simple yet profitable because it only needs a little expertise and is a highly valuable enterprise. The potential to increase mushroom cultivation across the nation is vast. Strengthening the mushroom industry could be one of the sustainable solutions for developing the rural economy, considering the country's limited land resources, excess population, and unemployment rate. It would also extend the range of business and job opportunities available in semi-urban and rural places. Enhanced strategies are necessary to boost exports and tap into this sector's full potential, aligning with the ascending production trend.

Keywords: Production, Mushroom, Trend, Import, Export, CAGR

1. INTRODUCTION

Indian agriculture has advanced significantly by adopting modern farming techniques. As a result of changes in the consumption pattern and increased demand for niche products, allied sectors have been focused and found to be economically feasible agribusiness solutions (Shirur et al., 2016). Opportunities for business and investment in the agriculture sector have multiplied manifold. In the current era of diet consciousness, mushrooms are increasingly regarded as a future vegetable due to their medicinal and nutritional value. Additionally, the demand for mushrooms has significantly raised in the 21st century. Mushroom production is significant as it provides non-agricultural employment and income opportunities to the farming community. Intensive mushroom farming could offer small family businesses and strong alternate revenue sources as they lack adequate area for crop cultivation and livestock production (Celik and Peker, 2009). Mushroom cultivation not only imparts diversification but also aids in resolving issues with food quality,

human health, and the environment. Recycling of agricultural waste, including agro-industrial waste, is one of the key areas that can help to attain the goals of resource management and increased productivity. The usage of these wastes for mushroom cultivation can boost income and ensures environmental sustainability. Commercial mushroom farming produces healthy food (mushrooms) by biologically converting domestic, industrial and agricultural wastes. This study has analyzed the trend of the mushroom sector in India and the production status of Tamil Nadu.

According to National Horticulture Board, The production of mushrooms in India has grown dramatically since 1961, reaching a peak in 2021 with a total output of 243 million tons. Notably, the state of Bihar emerges as the top producer, accounting for 28 million tons, or 10.82 per cent, of the country's total production, according to the National Horticulture Board. Maharashtra, Orissa, Haryana and Uttarakhand are the leading Mushroom Producing States in India whereas Tamil Nadu stands at the 11th position of 4.7 per cent of the Total share.

2. METHODOLOGY

The data on the Volume of mushroom production, import and export for a period of Twenty-Five Years (1997-2021) and the production status of Tamil Nadu were collected from various secondary sources like The National Horticulture Board, India stat, the FAO database issued by the Food and Agriculture Organization (FAO) etc., to get all the data for the study. Mushrooms are listed in the FAO database under the Item name Mushrooms and Truffles and FAOStat code 0449, which includes, *Boletus edulis, Agaricus campestris, Morchella spp., and Tuber magnatum* among other things.

2.1 Compound Annual Growth Rate (CAGR)

The trend in production, import and export of mushroom enterprise was predicted using the compound annual growth rate. For the past 25 years, data on mushroom production, export, and import have been used to calculate CAGR. The formula is used to determine the CAGR by using time as an independent variable and the production, export, and import of mushrooms as a dependent variable. The compound annual growth rate of mushrooms was worked out to examine the tendency of variables to increase, decrease or stagnant over a period of time. Compound annual growth rates are estimated by using the exponential growth function of the form: (James Paul. R, 2010)

$Y_t = a\, b_t\, U_t$ (1)

Where,

Y_t = Dependent variable for which the growth rate of the Mushroom was estimated

a = Intercept

b = Regression coefficient

t = Year which takes values of (1, 2, 3,….n)

U_t= Disturbance term in year 't'.

Equation (1) will be transformed into log-linear and written as:

$\log Y_t = \log a + t \log b + \log U_t$ (2)

Equation (2) will be estimated by using Ordinary Least Square (OLS) technique.

The compound annual growth rate (CAGR) will be then estimated by the identity given in equation (3)

$CAGR = (b-1) \times 100$ (3)

Where,

CAGR = Estimated compound growth rate per

annum in percentage.

b = Exponential of b

3. RESULTS AND DISCUSSION

Present Compound Annual Growth Rate of Mushrooms in India:

The trend of mushroom production, export and import from 1997 to 2021 in India is analysed and the results are discussed with the respective graphs.

Table 1: Mushroom Production, Export and Import of India

Year	Production in Tonne	Export Quantity in Tonne	Export Value in 1000 USD	Import Quantity in Tonne	Import Value in1000 USD
1997	9000	5712	5437	0	1
1998	13500	3198	2897	0	2
1999	14000	4420.57	4634	2.22	13
2000	24000	7599	8728	0	9
2001	30000	11798	11369	0	3
2002	40000	14335	10661	0	0
2003	40000	6581	5306	17	35
2004	40000	4128	3101	5	40
2005	40000	2325	1850	20	130
2006	35000	1651	1633	9	59
2007	37000	381	459	9	53
2008	37000	172	166	2	5
2009	37000	497	415	9	26
2010	40600	763	1239	16	42
2011	40600	385	469	37	27
2012	30000	260	432	59	41
2013	17000	2313	4340	2	4
2014	28000	1580.76	2084	0.16	1
2015	51000	1099.52	1289	0	0
2016	76000	524.15	821	0.1	1
2017	102020.79	400.42	764	0	0
2018	134000	388.52	754	0.15	0
2019	182000	1445.78	866	0	0
2020	211000	568.05	837	13.96	22
2021	243000	1070.26	1204	24.18	91

Table 2: CAGR Result

	Production in Million Ton	Export Quantity in Ton	Export Value in 1000 USD	Import Quantity in Ton	Import Value in 1000 USD
b	0.09	-0.11	-0.09	-0.01	-0.02
EXP b	1.10	0.89	0.91	0.99	0.98
(EXP b)-1	0.10	-0.11	-0.09	-0.01	-0.02
CAGR (%)	**9.78**	**-10.68**	**-8.76**	**-0.52**	**-2.11**

Production Scenario in India:

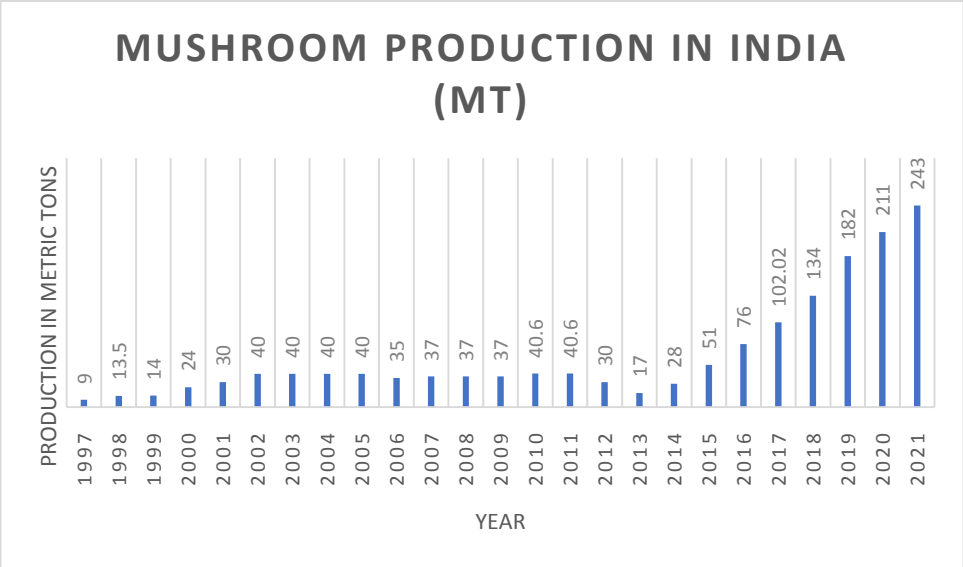

Figure 1.Mushroom production in India

The graph illustrates the production scenario of mushrooms in India over the years, revealing a dynamic trend. The mushroom production has displayed fluctuations ranging from 17 Million tons in 2013 to a peak of 243 Million tons in 2021. The Compound Annual Growth Rate (CAGR) of 9.77% underscores the overall upward trajectory in mushroom production in the country, suggesting a sustained effort to enhance production capacities. This growth could be attributed to factors such as increased demand, advancements in cultivation techniques, and expanding market opportunities. The CAGR highlights a steady, albeit not dramatic, growth over the years, indicating that the mushroom industry in India is gradually expanding its production capacity and contributing to the country's agricultural landscape.

Export Scenario in India:

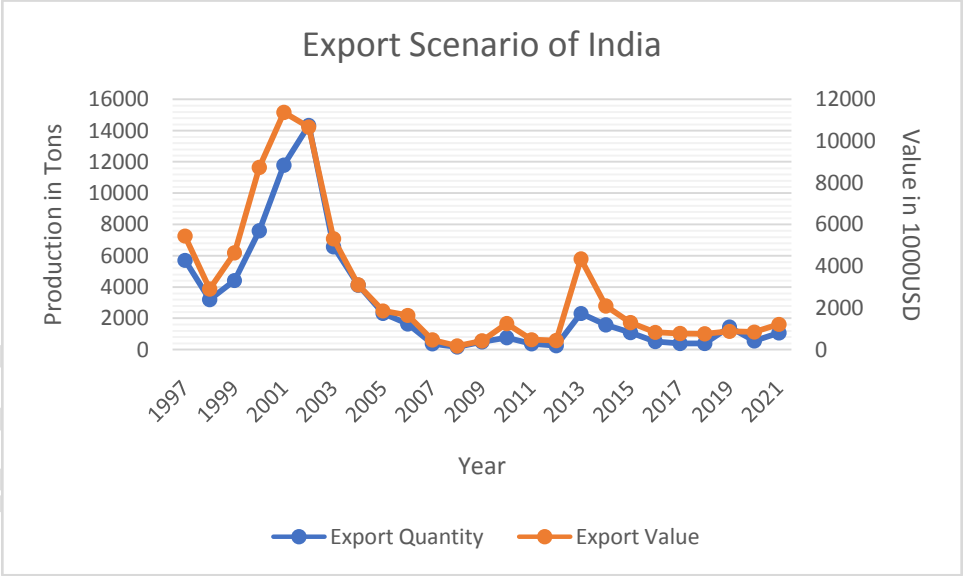

Figure 2. Export Scenario of mushroom in India

The export scenario in India's mushroom industry involves both quantity and value aspects. The export quantity has experienced variations, with a notable decline of -10.68 % CAGR, indicating challenges in maintaining a consistent level of export. The export value, which is directly related to the economic impact of exports, also presents a negative growth trend with a CAGR of -8.75 %. This suggests that despite fluctuations in export quantity, the value generated from mushroom exports has faced a decline over the years. This could be attributed to changing market dynamics, international competition, or fluctuations in demand. The CAGRs collectively underscore the need for strategies to

enhance export competitiveness, streamline trade practices, and potentially explore new markets to revitalize the export sector.

Import Scenario in India:

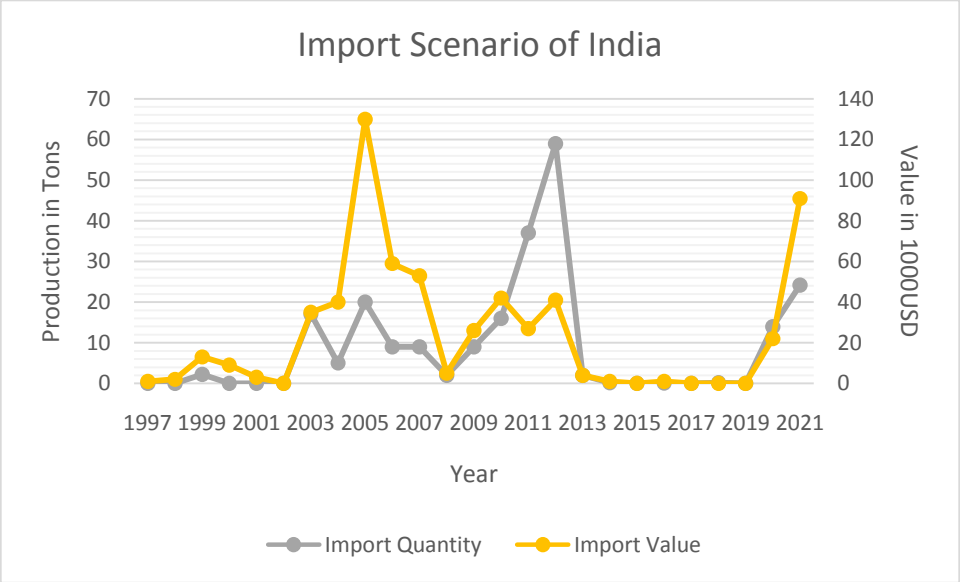

Figure 3. Import Scenario of Mushroom in India

The import scenario in India reflects the nation's dependence on mushroom imports, particularly highlighted by the CAGRs. Import quantities have displayed a relatively stable trend, with a minimal decline of -0.52 % in CAGR. Import values, on the other hand, have shown a more pronounced negative growth with a CAGR of -2.1 %. This signifies that while the quantities of imported mushrooms remain relatively stable, the economic implications of these imports have declined over time. The consistent import quantities could be attributed to specific market demands that domestic production might not entirely meet. The declining import value highlights the need to assess the cost-effectiveness of imports, potentially exploring opportunities to substitute imports with domestic production or exploring avenues to enhance the quality and competitiveness of domestically produced mushrooms.

Production scenario in Tamil Nadu:

Table 3: Mushroom Production in Tamil Nadu

Year	Production (In ' 000 Metric Tonne)	
	Tamil Nadu	India
2018-2019	11.48	182
2019-2020	11.48	210.9
2020-2021	11	242.9
2021-2022	13.52	285.1
2022-2023(Adv Estimate)	13.8	299.2

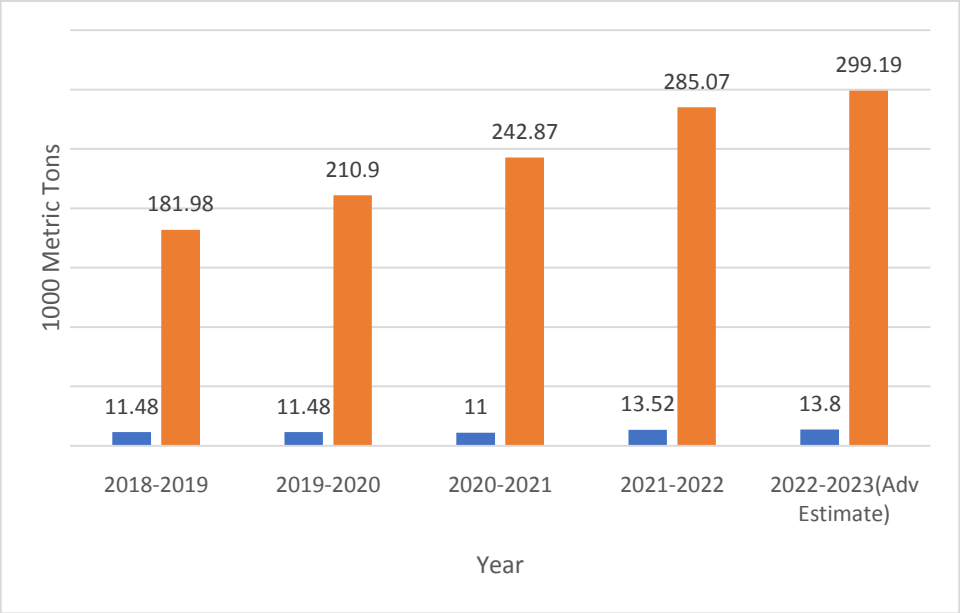

Figure 4. Production of Mushroom in Tamil Nadu and India

The production data for mushrooms in Tamil Nadu over the years 2018 to 2023 indicates a consistent level of production, with slight variations observed in different years. The Compound Annual Growth Rate (CAGR) of 5.46 % underscores the overall upward trajectory in mushroom production in Tamil Nadu. The production remained stable at 11.48 Million tons in both 2018-2019 and 2019-2020. However, there was a slight decrease in production to 11 Million tons in 2020-2021. Subsequently, the production rebounded and increased to 13.52 Million tons in 2021-2022, showing a notable growth trend. The advanced estimate for 2022-2023 projects a further increase in production to 13.8 Million tons, reflecting the potential for continued growth in mushroom production in Tamil Nadu.

The steady production levels in the initial years suggest a consistent demand for mushrooms in the region. The slight fluctuations in production might be attributed to various factors, such as climatic conditions, availability of resources, and market demand. The significant increase in production in 2021-2022 and the projected growth in 2022-2023 indicate a positive market outlook and potential opportunities for mushroom cultivation in Tamil Nadu.

4. CONCLUSION

India's mushroom industry is developing. An attractive and practical option appears to be India's rising production and export of mushrooms. Growing mushrooms might play a significant role in sustainable forestry and agriculture. The study analyzed the growth trend and reveal a favorable upswing in mushroom production for India and Tamil Nadu, contrasted with an unfavorable downward trajectory in both the import and export of mushrooms in India, as indicated by the Compounded Annual Growth Rate analysis. the study reveals a nuanced perspective on the production, export, and import dynamics in India's mushroom industry. The Compound Growth Rates provide insights into the trends and changes in these aspects over time, urging policymakers and stakeholders to consider targeted strategies that align with the industry's growth, economic impact, and market demands. Thus, the mushroom industry has a huge scope to impact the socioeconomic development of the country. India may take advantage of this potential by establishing a suitable and extensive national policy and plan for mushrooms According to the study, the following are recommended: The mushroom industry in India can be developed in a variety of ways, including by enhancing technical assistance to farmers, facilitating access to funding, increasing the supply of high-quality spawn, establishing a marketing structure, promoting mushrooms in new areas, establishing storage facilities, and enhancing institutional capacity. The government should launch more extension initiatives to boost mushroom production and public awareness campaigns.

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