Original Research Article

GROWTH AND EXPORT PERFORMANCE OF PINEAPPLE FROM INDIA: AN ECONOMIC ANALYSIS

ABSTRACT

The present study was undertaken to know the growth and export performance of pineapple. Pineapple (*Ananas Comosus*) is a tropical fruitbelongs belongingtothe Bromeliaceae family, and it is commercially cultivated worldwide as a high-value crop. India is a thesixth largest producer in the world. The objective of the study was is to elucidate the growth and export performance of the Pineapple from India.The study was carried out during 2022-23 incorporating time series data from 2013-14 to 2022-23. The results ofthe growth rate revealed a positive and increasing trend in pineapple exports from India during the study period, with an annual growth rate of 9.78 per cent percent in quantity and 6.39 per cent percent in value which is significant at a five percent percent level of probability. The results of the Cuddy Della Valle index indicated that pineapple exports from India exhibit moderate instability, with values of 17.17 and 19.90 per cent percent in quantity and value terms, respectively. It reveals that the average Full form of this abbreviation (NPC)?? value for pineapple was 0.53, indicating a moderate level of export competitiveness. Throughout the entire period, it is evident that India did not demonstrate competitiveness in pineapple exports, as indicated by the RCA values consistently being below unity and the full form (RSCA)?? values being negative. The direction of the Indian pineapple trade were wasconducted using the Markov chain framework. Among the major importers, the United Arab Emirates stood out as one of the most stable markets with a high probability of retention at 0.624.Overall, Indian pineapple stands out as a reliable and competitive player in the global market, with a strong performance and potential for growth. Therefore, efforts should be focused on enhancing the quantity of exports while ensuring they meet the quality standards and align with the consumer preferences of other countries.

Comment [U1]: What were the methods you used to collect your data? Clearly indicate here.....

Keywords: *Pineapple, CAGR, Export competitiveness, Transitional probability matrix*

1. INTRODUCTION

Pineapple (*Ananas comosus*) is a tropical fruit, and it is commercially cultivated worldwide as a high-value crop. The origin of the pineapple is the American continent i.e., Brazil. It has spread

throughout tropical and subtropical regions as a commercial fruit crop. Pineapple scientifically ~~call as~~ calledas *Ananas Comosus* of Bromeliaceae family, derived from the tupi word ‘nanas’ meaning ‘excellent fruit’ and also is named after the Spanish word 'Pina' due to its resemblance to a pine cone(Das *et al*.2021). The scientific name Ananas is believed to have originated from the Tupi Indian word 'Nana,' used to refer to this plant. As a member of the Bromeliaceae family, pineapple is fondly known as the 'queen of fruits' because of its excellent flavor, taste, and distinctive shape. It holds immense significance as one of the most important commercial fruit crops globally, available throughout the year (Priya *et al*. 2013). This fruit is very delicious in nature~~.~~and has excellent ~~flavour~~flavorand nutritive value.

This delightful tropical fruit is high in the enzyme Bromelain and the antioxidant vitamin C, both of which play a major role in the body's healing process. Bromelain is a natural anti-inflammatory that has many health benefits and encourages healing. Pineapple fruit is very low in saturated fat, cholesterol, and sodium. Pineapples are packed full of vitamin C and ~~fiber important~~ are important for the immune and digestive systems (Anon., 2014). The fruit is a good source of vitamin A and ~~and~~ calcium. It also contains phosphorus and iron.Over the years, the demand for pineapple has been steadily increasing worldwide. The global trade of pineapple is divided with approximately 50 ~~per cent~~ percent as fresh fruit, 30 ~~per cent~~ percent as canned products, and 20 ~~per cent~~ percent as a juice concentrate. Notably, the trade of fresh pineapple has shown a remarkable 100 ~~per cent~~ percent increase in the last decade.

Despite being the sixth largest producer of pineapple globally, with an 8 ~~per cent~~ percent share in production, India's presence in the world market remains negligible. The major pineapple-producing countries include Brazil, Thailand, the Philippines, Costa Rica, China, India, and Indonesia. Across Asia and the countries surrounding the Indian Ocean, the import of pineapple amounts to approximately two lakh tonnes annually, mostly sourced from distant nations. Leading exporters of pineapple include Costa Rica, Belgium, Cote d'Ivoire, Philippines, Ghana, Netherlands, USA, and France, while major importers consist of the USA, Belgium, France, Italy, Germany, Japan, and the UK.

The variety known as MD2 or Dinar pineapple, developed through hybridization by Del Monte scientists in Costa Rica, holds great popularity in the international market. Its superiority in terms of ~~colour~~color, ~~flavour~~flavor, shape, lifespan, and ripeness ~~sets~~set it apart from other varieties (Das *et al*.2021). In India, where the Portuguese introduced it in 1548 A.D. Approximately 27.92 million tonnes of pineapple are produced in 85 countries around the world. India holds the sixth position in global pineapple production, contributing approximately 8 ~~per cent~~ percent to the total output. With an extensive cultivation area of 84,000 hectares, India manages to produce around 13,41,000 tonnes of pineapples. The country exports its pineapples mainly to Nepal, Maldives, the United Arab Emirates, Saudi Arabia, Kazakhstan, Oman, Bahrain, Bangladesh, Zambia, Pakistan, and Qatar.

India primarily produces pineapple in states like Kerala, West Bengal, Assam, Tripura, Karnataka, Manipur, and Tamil Nadu. There are different varieties of pineapple ~~are~~ grown in India as

well as the whole world. About 80-90 varieties of pineapple are grown in different countries of the world. The main varieties of pineapple ~~which~~ thatare grown in India are- Kew, Giant Kew, Queen, Mauritius, Jaldhup, Lakhat, Amrutha, and MD-2. Having different varieties, they are grown in different ~~season~~ seasonsin different states of India. The states involved in pineapple cultivation are Karnataka, Meghalaya, West Bengal, Kerala, Assam, Manipur, Tripura, Arunachal Pradesh, Mizoram, and Nagaland. Additionally, there are limited cultivation areas in the coastal regions of Tamil Nadu, Goa, and Orissa. The main growing season ~~of~~ inthe whole of India is July-September ((Parvej*et al.,*2019).

Indian pineapples enjoy a consistently strong demand in international markets, with the processing industry also showing keen interest.While~~,~~ the domestic demand for pineapples remains ~~considerable~~ considerablyhigh a significant portion of India's pineapple production is allocated for exports mainly ~~middle east~~ in the Middle East countries.

2. METHODOLOGY

The secondary data on the area, production, and productivity of Pineapple for several years were collected from the records of the Directorate of Horticulture Lalbagh, Bangalore. Price data ~~of~~ forpineapple were obtained from AGMARKNET and NHB (National Horticultural Board). Export data were collected from the Agricultural and Processed Food Products Export Development Authority (APEDA).The study incorporated ~~s~~time series data from 2013-14 to 2022-23.

2.1 Analytical tools and techniques

2.1.1 Compound Annual Growth Rate (CAGR) ~~analysis~~ Analysis

~~In order to~~ To analyze the growth in area, production, and productivity of the pineapple in the Shivamogga district, the compound growth rates were computed using the formula given below.

$Y_t=AB^tu_t$

Where,

Y_t = Dependent variable (Area/Production/Productivity during time t)

A = Intercept/ constant indicating Y in the base period (t=0)

t = time

u_t = error term

B = (1+ r), where 'r' is the compound growth rate,

The above equation would become linear by taking the logarithm on both the sides.

$\ln Y_t = \ln A + t (\ln B) + \ln u_t$

Where, ln A and Ln b were the parameters of the function obtained by ordinary least square (OLS) method. Once the above equation is estimated, r can be computed as:

r = [Antilog (b) -1] x 100

Where,

r = Compound annual growth rate

b = Regression coefficient

2.1.2 Instability analysis

Instability means a lack of stability. Stability is the quality or characteristic of being stable. The value of any parameter, ~~which~~ that is not likely to move or change, is termed ~~as~~ stable.

Instability analysis represents the uncertainty with the help of indicators like Coefficient of Variation, Standard Deviation, various Instability Indices, etc. In the present study instability in export quantity and price of pineapple was analyzed using the Cuddy Della Valle Index (CDI).

2.1.3 Cuddy Della Valle Index (CDI)

The instability in the area, production, and productivity of pineapple was ~~analysed~~ analyzed using Cuddy-Della Valle Index using the modified coefficient of variation (CV) formula as given below (Cuddy and Valle, 1978),

$$CDI = [(S.D / Mean) * 100) * \sqrt{1 - adjusted\ R^2}]$$

Where,

S.D = Standard deviation

R^2 = Coefficient of determination

The extent of instability was categorized into three levels based on the values of CDI i.e.

Up to 15 % - Low instability

15-30 %- Moderate instability

>30 % - High instability

2.2 Export competitiveness

2.2.1 Nominal Protection Coefficient (NPC)

~~Nominal~~ The nominal protection coefficient (NPC) is defined as the ratio of the domestic price to the world reference price of the commodity under consideration. ~~Nominal~~ The nominal protection coefficient was computed from 2013-2021 to determine the extent of competitive advantage enjoyed by the commodity in the context of free trade. The coefficient ~~shed~~ sheds light on whether a country has a comparative advantage in the export of that commodity in the free trade scenario or not.

Symbolically,

$$NPC = P_d / P_b$$

P_d =Domestic wholesale price of pineapple

P_b = World reference (border) price of pineapple

If the nominal protection coefficient is greater than unity, then the commodity is protected, compared to the situation ~~which~~ that would prevail under free trade and if it is less than unity the commodity is globally competitive. The domestic prices here used the available wholesale prices of pineapple in the Indian market. Here, world ~~references~~ reference prices are derived by dividing the value of exports by their respective quantities. Patel *et al.* (2015) used this methodology for deriving NPC in the case of vegetable crops.

2.2.2 RCA (Revealed Comparative Advantage) index

The idea of RCA by Balassa in 1965, 1977, 1986, and 1989 relates to the comparative trade

routine of countries in selected supplies. On the hypothesis that the product design of trade imitates the internal changes in relative prices and ~~in~~ non-price aspects, this is presumed to "Reveal" the trade ~~advantage~~ advantagesand ~~disadvantage~~ disadvantagesof countries. The ~~factor~~ factorsthat ~~donates~~ contributeto actions in RCA is economic: operational changes, enhanced global demand, and trade concentration. The comparative advantage of ~~the~~ India with exporting countries has been calculated by using the RCA index.

The formula for RCA is:

$$RCA_{jk} = \frac{\frac{X_{jk}}{X_j}}{\frac{X_{kw}}{X_w}} = \frac{S_{it}}{S_{wt}}$$

Where;

X_{jk}= India's pineapple export

X_j= India's total agricultural export

X_{kw}=Exports of pineapple in the world

X_w= Total agricultural exports to the world

S_{it} = Share of pineapple trade in Indian Agricultural export

S_{wt} = Share of pineapple trade in the World's Agricultural export

RCA value lies between 0 and ∞. A country is said to have a comparative advantage if the value exceeds 1.

2.2.3 Revealed Symmetric Comparative Advantage (RSCA)

The major limitation of RCA is that its index varies from 1 to ∞ which is asymmetric. Dalum *et al.* (1998) anticipated the Revealed Symmetric Comparative Advantage (RSCA) index to lessen the skewness problem.

The formula for RSCA is:

$$RSCA = (RCA - 1) / (RCA + 1)$$

RSCA ranges from -1 to + 1 (-1< RSCA< +1) and evades the problematic 0 values. Positive indices show a comparative advantage while negative indices reflect a comparative disadvantage.

2.2.4 Markov chain analysis

The trade direction of exports has been analyzed by using the ~~first order~~ first-order Markov chain approach. Markov chain analysis is done by the estimation of the transitional probability matrix P. The elements $P_{ij}$of the matrix P ~~indicates~~ indicatethe probability that export will switch from country 'i' to country 'j' ~~with the passage of time~~ over time. The diagonal elements of the matrix measure the probability that the export share of a country is retained. Hence, an examination of the diagonal elements indicates the loyalty of an importing country to a particular country's exports. In the context

of the current application, structural changes will be treated as a random process with selectedimporting regional countries. The average exports to a particular regional country ~~is~~ areconsidered to be a random variable ~~which~~ thatdepends only on the past exports to that regional country, which can be denoted algebraically as

$E_{jt} = \sum_{i=1}^{n} Eit - 1 * Pij + ejt$

E_{jt}= Export from pineapple from India to j^{th} country during the year t

E_{it-1} = Exports of pineapple to i^{th}country during the period t-1

P_{ij}= Probability that the exports will shift from i^{th} country to j^{th} country

e_{jt}= The error term which is statistically independent of E_{it-1}

t = Number of years considered for the analysis

n = Number of importing countries

The transitional probability P_{ij}which can be arranged in a (c*r) matrix ~~have~~ hasthe following properties

$0 \leq Pij \leq 1$

$\sum_{i=1}^{n} Pij = 1$ for all i.

3.RESULTS AND DISCUSSION

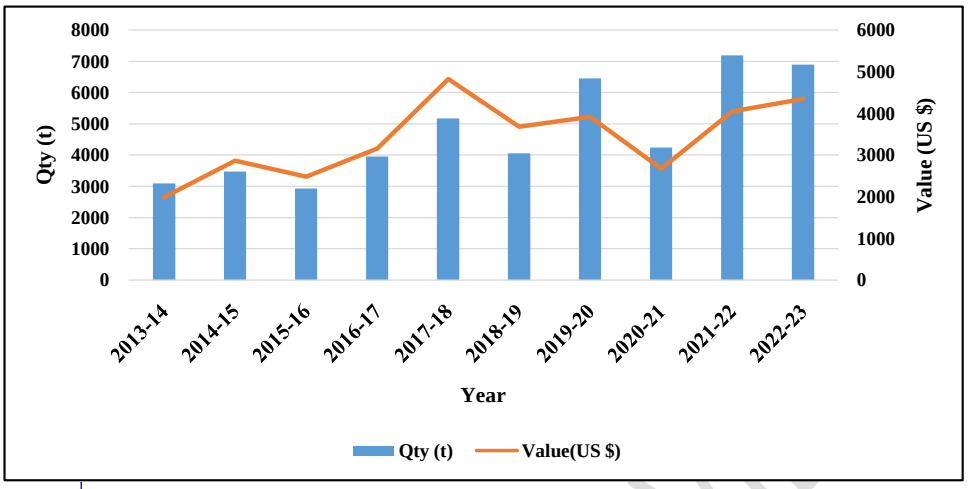
On average, India exported 4,745 tonnes of pineapple and earned Rs. 3399.6 US$ per year. The calculated CAGR revealed a positive and increasing trend in pineapple exports from India during the study period, with an annual growth rate of 9.78 ~~per cent~~ percent in quantity and 6.39 ~~per cent~~percent in value (Table 1).

Table 1: Growth and instability in the export of pineapple from India to different countries(2013-14 to 2022-23)

Particulars	Qty (t)	Value (US $)
Mean	4745	3399.6
CV (%)	33.47	26.74
CAGR (%)	9.78***	6.39***
Cuddy Della Valle Index (%)	17.17	19.90

Note: *** indicates significant at a one ~~per cent~~ percent level of probability

Over the past few years, there has been a significant rise in pineapple exports, increasing from 3,092 tonnes in 2013-14 to 6,894 tonnes in 2022-23. The export value of pineapple also experienced considerable growth, with earnings reaching US$ 4,354 in 2022-23, representing a substantial increase of US$ 2367 compared to the value of US$ 1,987 in 2013-14. This indicates a steep growth in the export value of pineapple over the last 10 years. However, it is important to note that the total quantity of pineapple exported from India remains negligible in the context of the global export scenario (Fig.1).



Comment [U2]: I dislike the interval in the X-axis. Make at least 2 years interval

Fig.1: Trends in pineapple exports from India (2013-14 to 2022-23)

The calculated coefficient of variation (CV) for quantity and value terms was found to be 33.47 ~~per cent~~percent and 26.74 ~~per cent~~percent, respectively. Considering that time-series data contains a trend element, it is suggested to use the coefficient of variation around the trend (CV_t) for ~~a more~~accurate measurement of instability. The Cuddy Della Valle instability index ($CV_t = CV\sqrt{1 - R2}$), which considers the trend element, was employed to assess the instability associated with pineapple exports to different countries.

The results of the Cuddy Della Valle index indicated that pineapple exports from India exhibit moderate instability, with values of 17.17 ~~per cent~~ percent and 19.90 ~~per cent~~ percent in quantity and value terms, respectively. Despite this moderate instability, the Indian trade in pineapples is experiencing positive growth. This growth can be attributed to the significant demand for domestic consumption of pineapple in India.

In conclusion, Indian fresh pineapple exports have shown a promising increasing trend during the study period, with substantial growth rates in both quantity and value. However, there remains room for further development, considering the relatively low export quantity compared to the global market. The moderate instability observed in the exports highlights the need to address various constraints and challenges in the international trade of pineapples.

3.1 Nominal Protection Coefficient (NPC)

The Nominal Protection Coefficient (NPC) for pineapple is calculated based on two price factors: domestic prices, which are determined by averaging the major pineapple market prices in India, and international or world reference prices, which are captured by the value of pineapple exports in the same year.

To assess the export competitiveness of pineapple, the NPC ratio was utilized. When the NPC ratio is less than 0.5, it indicates a highly competitive market, while a ratio between 0.5 and 1 suggests a moderately competitive market. On the other hand, if the NPC ratio exceeds one, the market is considered non-competitive.

Upon analyzing the NPC, it reveals that the average NPC value for pineapple was 0.53, indicating a moderate level of export competitiveness. It is worth noting that during the ~~year~~ years2017-18 and 2019-20, the trade of pineapples was highly protected, with an NPC value of 0.63, ~~among~~ inthe years 2013-14 to 2022-23 (Table 2).

Year	Domestic market (Rs. /q)	World price (Rs. /q)	NPC
2013-14	2148.56	4151.06	0.52
2014-15	2436.21	4438.03	0.55
2015-16	2336.38	4734.55	0.49
2016-17	2594.93	5025.24	0.52
2017-18	2633.60	4198.47	0.63
2018-19	2751.05	4608.97	0.60
2019-20	2563.86	4055.49	0.63
2020-21	1422.97	4367.15	0.33
2021-22	2233.70	4327.32	0.52
2022-23	2637.43	5049.96	0.52
Average	**2375.87**	**4495.62**	**0.53**

Table 2: Exportcompetitiveness of pineapple in the international markets (NPC)

Source: www.apeda.gov.in

3.2Revealed Comparative Advantage (RCA) and Revealed Symmetric Comparative Advantage (RSCA) of India in ~~pineapple exports~~ Pineapple Exports

It provides an overview of India's pineapple export competitiveness in the global market, analyzed through the Relative Comparative Advantage (RCA) and Relative Symmetric Comparative Advantage (RSCA). Throughout the entire period considered, it is evident that India did not demonstrate competitiveness in pineapple exports, as indicated by the RCA values consistently being below unity and the RSCA values being negative. Over time, India's comparative advantage and competitiveness in the pineapple market appear to have declined.

Several factors could influence these ratios, including both internal and external trade policies of individual countries, such as government interventions, import restrictions, subsidies, and tariffs (Serin and Ciyan, 2008). The presence of a disadvantage in the RCA and RSCA values may not necessarily reflect the true comparative status but could indicate that trade policies do not support the export of pineapples.Specifically, the computed average RCA for pineapple exports during the study period was 0.09, which is less than one, and the RSCA value was calculated as -0.83, indicating a negative value. These findings confirm the non-competitiveness of India's pineapple exports in the

global market. The primary reason for this comparative disadvantage lies in the high domestic demand for pineapples, which limits the quantity available for export (Tt~~t~~able 3).

Table 3: Revealed Comparative Advantage and Revealed Symmetric Comparative Advantage of ~~pineapple exports~~ Pineapple Exports from India

Year	S_{it}	S_{wt}	RCA	RCA-1	RCA+1	RSCA
2012-13	5.02478E-06	9.28761E-05	0.05	-0.95	1.05	-0.90
2013-14	5.90295E-06	9.56672E-05	0.06	-0.94	1.06	-0.88
2014-15	9.01606E-06	9.80848E-05	0.09	-0.91	1.09	-0.83
2015-16	9.40926E-06	9.98825E-05	0.09	-0.91	1.09	-0.83
2016-17	1.2109E-05	0.000120631	0.10	-0.90	1.10	-0.82
2017-18	1.63184E-05	0.000111139	0.15	-0.85	1.15	-0.74
2018-19	1.13581E-05	0.000107355	0.11	-0.89	1.11	-0.81
2019-20	1.21299E-05	0.000116543	0.10	-0.90	1.10	-0.81
2020-21	9.69187E-06	0.000114728	0.08	-0.92	1.08	-0.84
2021-22	1.0258E-05	9.68092E-05	0.11	-0.89	1.11	-0.81
Average	**RCA**		**0.09**	**RSCA**		**-0.83**

Note: S_{it} – Share of Indian pineapple trade in Indian Agriculture export

S_{wt}- Share of world pineapple trade in world's Agriculture export

3.3 Markov Chain ~~analysis~~Analysis

The study on the direction of the Indian pineapple trade with different importing countries ~~were~~ wasconducted using the Markov chain framework. It provides insights into changes in trade patterns over ~~a ten-year period~~ ten years. Nine major countries were considered ~~as~~ importers of Indian pineapple, including Nepal, the United Arab Emirates, Qatar, Maldives, Bhutan, Bahrain~~ Is~~, Oman, Kuwait, and Saudi Arabia (Table 4).

In the transitional probability matrix, the diagonal elements represented the probability of trade retention, indicating the likelihood of a country continuing to import Indian pineapples. The row elements indicated the probability of loss of trade to other countries, reflecting the chances of reduced imports from India. Conversely, the column elements represented the probability of gaining trade from other countries, suggesting potential increases in imports.

It emphasizes the global popularity of pineapples due to their rich taste, flavor, and size. Among the major importers, the United Arab Emirates stood out as one of the most stable markets with a high probability of retention at 0.624, meaning there was a 62.4 ~~per cent~~percent chance that the UAE would maintain its share of Indian pineapple imports over the study period. Consequently, the United Arab Emirates was considered a loyal market for the Indian pineapple trade. The study also highlighted that Nepal, Oman, and Saudi Arabia had relatively high probabilities of retention at 58.6

~~per cent~~ percent, 51.7 ~~per cent~~ percent, and 38.4 ~~per cent~~ percent, respectively.Countries that imported Indian pineapples in smaller quantities were grouped under the category of "others," and they exhibited a lower probability of retention at just 0.140 (14.00 %). This suggested that these countries were less consistent in their imports of Indian pineapples (Table 4).

Countries	Nepal	United Arab Emirates	Qatar	Maldives	Bhutan	Bahrain	Oman	Kuwait	Saudi Arab	Other
Nepal	**0.586**	0.125	0.076	0.179	0.013	0.000	0.000	0.007	0.000	0.012
United Arab Emirates	0.375	**0.624**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Qatar	0.552	0.000	**0.151**	0.107	0.054	0.126	0.003	0.000	0.003	0.000
Maldives	1.000	0.000	0.000	**0.000**	0.000	0.000	0.000	0.000	0.000	0.000
Bhutan	0.000	0.914	0.000	0.085	**0.000**	0.000	0.000	0.000	0.000	0.000
Bahrain	0.000	0.000	0.732	0.000	0.000	**0.009**	0.258	0.000	0.000	0.000
Oman	0.000	0.000	0.436	0.000	0.000	0.000	**0.517**	0.000	0.000	0.046
Kuwait	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.018**	0.000	0.981
Saudi Arab	0.000	0.000	0.046	0.000	0.000	0.148	0.166	0.000	**0.384**	0.255
Other	0.000	0.000	0.601	0.000	0.049	0.016	0.000	0.000	0.191	**0.140**

Table 4: Transitional probability matrix of Indian pineapple exports (2013-14 to 2022-23)

These results are ~~in~~ consistent with the findings of Afzal and Siddiqui (2018), who reported that a significant portion of India's pineapple production was specifically exported to Middle Eastern countries, including the UAE, Saudi Arabia, Oman, Qatar, and Nepal, which served as loyal markets for pineapple trade. Qatar emerged as a prominent country involved in the pineapple trade over the years. It managed to retain its original share of 15.1 ~~per cent~~ percent and also gained shares from Nepal (7.6%), Bahrain ~~is~~ (73.2%), Oman (43.6 %), and Saudi Arabia (4.6 %).Furthermore, the entire pineapple market share of the Maldives, Bhutan, and Bahrain was directed toward countries like UAE, Nepal, and Oman.

4. CONCLUSION

From the above discussion, we can conclude that the export of pineapple is profitable and it is competitive in the international market.Indian pineapple exhibits a strong export competitiveness in the international market. It maintains a stable market presence, particularly in the United Arab Emirates, showcasing a high probability of retention. The quantity of Indian pineapple exports consistently grows and the earnings from Indian pineapple exports steadily increase, indicating its profitability and competitiveness. The export competitiveness of Indian pineapple is assessed as moderate based on the Nominal Protection Coefficient (NPC) ratio, indicating a reasonable level of competition. Overall, Indian pineapple stands out as a reliable and competitive player in the global market, with a strong performance and potential for growth. Therefore, efforts should be focused on enhancing the quantity of exports while ensuring they meet the quality standards and align with the consumer preferences of other countries.

REFERENCES

Anonymous, 2013, Benefits, processing, preservation and pineapple recipes. Annual report, Pineapple research station Vazhakulam, pp: 22-23

Afzal MD, Faiyaz, Siddiqui, Farrukh, Sania.Growth analysis of productivity, dispersal and profitability of Pineapple in India. Am. Int. J. Humanit. A. Soc. Sci. 2018;25(1): 76-82.

Dasa B,Dasb KK,Royb TN. Study on Marketing System and Value Addition of Pineapple Fruit in West Bengal. Agric. Eco. Res. Rev. 2016;29(2): 279-285.

Datarkar SB, Darekar AS, Dangore UT,Parshuramkar KH. Economic of production and marketing of mango in Gadchiroli district of Maharashtra. Int. Res. J. Agric. Econ & Stat. 2014;5(2):278-283.

Das U, Bhattacharyya RK, Sen D, Bhattacharjee P,Choudhury P. Organic Pineapple Production Technology in Tripura – The lone AEZ for Fruits in North East India. Int. J. Agric. Env. Biotech. 2021;14(2): 149-158.

Hadolikar SB, More SS, Jadhav VG. Export performance of fresh papaya in India: Markov chain approach. J. pharm. Innov. 2021;10(11):12-14.

Mhaskey AV, Yadav LC, Kumari R, Meena S Chavan SD, SinghH,Meena GL. Export Performance of Seed Spices in India. Agricultural Mechanization in Asia. 2022;**53**(4):6987-6994.

Majumder R, Kumar A, Zechariah J,Jhariya PN. A case study on marketing of pineapple on the behalf of marketing margin, marketing cost, marketing efficiency, price spread, producer's share in consumer rupee in Gomati District of Tripura. J. pharm. Innov.2022;11(4): 704-707.

Mathew S,Wadkar SS, Kshirsagar PJ. Economic analysis of pineapple production in Sindhudurg district of Maharashtra.Int. Res. J. Agric. Econ & Stat. 2017;8(2): 351-356.

Parvejalam, DR, Tariq M, Usmani, Mohammad D. Growth of Pineapple Cultivation: A Spatio-Temporal Analysis in India. Int. J. Trend Sci. Res.Dev. 2020;4(2):505-511.

Patil RS, Deshmukh RG, Bhaskar KR, Jahagirdar SW.Growth and Export Performance of Mango in India. Int. J. Curr. Microbiol. App. Sci. 2018;2(6): 2667-2673

DeviPS, Thangam M, Ladaniya MS, Singh NP. Pineapple – a profitable fruit for Goa. Tech. Bull. No. 35, ICAR (RC), Goa, 2013; pp: 18.

Sharma A, KichuY, Chaturvedi BK. Economics and constraints of pineapple cultivation in Dimapur district of Nagaland. J. Rural Agric. Res. 2016;16(1):72-75.

Singh NA, Singh R, Feroze SM, Singh RJ. Economic evaluation of pineapple cultivation in Manipur. Econ. Aff. 2016;61(1):41-44.

Sundariya M, Umamaheshwari L, Narsurudeen P,Paradis G. Export performance and competitiveness of fruits and vegetables from India. Agric. Econ. Res. Rev. 2021;34(4):1-4

Thulasiram R, Alaguamani T. Structural changes in Indian tomato exports a markov chain approach. Int. J. farm sci.,2018;8(2):75-78.

Vanitha SM,Kumari G,Singh R. Export competitiveness of fresh vegetables in India. Int. J. Veg. Sci. 2014;20(3):227-234.

Vidanapathirana, Ruvini, WijesooriyaW, Priyadharshana, RambukwellaD,Roshini. Value Chain Analysis of Pineapple: Evidence from Gampaha District of Sri Lanka. Am. J. App. Sci.,2021;4(2): 73-87.

Wilcox GI, Omojola JT,Okpoebo JN. Profitability of pineapple marketing in Port Harcourt Local Government area of Rivers State, Nigeria. Int. J. Innov. Agri. & Bio. Res. 2015;3(2):25-33.