Export Competitiveness of Indian Cereal: A Comparative Analysis

A Dissertation for

Course code and Course Title: ECO- 651 & Dissertation

Credits: 16

Submitted in partial fulfillment of Master's Degree:

Master of Arts (M.A) in Economics

By,

TUKARAM BABU REKDO

Seat No: 22P0100048

ABC ID:571759061773

PR NO:201912209

Under the Supervision of

PROF. (DR.) B.P. SARATH CHANDRAN

Goa Business School/ Economics

Department

Economics

GOA UNIVERSITY/GOA

BUSINESS SCHOOL

Date: April 2024

Seal Of The School

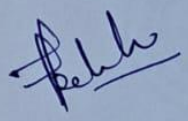
Examined By:

i

DECLARATION

I hereby declare that the data presented in this Dissertation report entitled, **"Export Competitiveness of Indian Cereal: A Comparative Analysis "** is based on the results of investigations carried out by me in the Economics at the Department of Economics, Goa University/Goa Business School under the supervision of Prof. (Dr.) B.P. Sarath Chandran and the same has not been submitted elsewhere for the award of a degree or diploma by me. Further, I understand that Goa University or its authorities /Goa Business School will not be responsible for the correctness of observations / experimental or other findings given the dissertation.

I hereby authorize the University / Goa Business School authorities to upload this dissertation to the dissertation repository or anywhere else as the UGC regulations demand and make it available to anyone as needed.



Date:

Mister. Tukaram Babu Rekdo

Seat no: 22P0100048

Place: Goa University/Goa Business School

COMPLETION CERTIFICATE

This is to certify that the dissertation report **"Export Competitiveness of Indian Cereal: A Comparative Analysis"** is a bonafide work carried out by Mister. Tukaram Babu Rekdo under my supervision in partial fulfillment of the requirements for the award of the degree of **Masters in Arts in the Discipline of Economics** at the Department of Economics, Goa University/ Goa Business School

Signature of Supervisor: Prof. (Dr.) B.P. Sarath Chandran

Date:

Goa Business School
Goa University

School Stamp

Signature of Dean /HOD of Goa Business School

Date: 4/05/2024

Place: Goa University/ Goa Business School

PREFACE

Indian agriculture is highly significant for the economy of India with special reference to cereal production and exporting them. This thesis explores the complex dynamics of Indian trends in cereal production and export with a view of making an all-inclusive analysis of the factors influencing competitiveness at the global market level. The study looks into major cereals like maize, rice, wheat, and millet, highlighting their quantities produced, export performance, and market trends.

The chapter on methodology in this thesis throws light on the data collection process, the analytical techniques used, and how data was interpreted. By relying on such secondary data sources as UN Comtrade; Ministry of Commerce and Industry; and APEDA this research aims to provide useful information regarding Indian export opportunities as well as policy recommendations for sustainable agricultural growth that is sustainable.

This study aims to undo the complexity surrounding India’s cereal exports through systematic analysis using compound annual growth rates (CAGR), revealed comparative advantage (RCA), instability index, and growth patterns. To ensure transparency and credibility of research findings, there are also limitations included in this report such as external factors impacting on it or use of secondary data.

This preface sets the stage for a detailed exploration of Indian cereal production and export trends, providing a foundation for policymakers, stakeholders, and researchers to gain a deeper understanding of India's position in the global agricultural market.

[TUKARAM BABU REKDO]

ACKNOWLEDGMENT

I would like to thank my respected teacher and guide, Prof. (Dr.) B.P. Sarath Chandran, Department of Economics, Goa Business School, Goa University, whose worthy guidance and professional attitude are appreciated in completing this dissertation.

I thankfully acknowledge the support and inspiration that I received from my teachers and the Head of the Department of Economics Discipline Prof. Heena Gaude Goa Business School Goa University.

My special thanks to my friends and colleagues for their support and people who allowed me to take samples from their boreholes. I am deeply grateful to my parents for their support, appreciation, encouragement, and strong moral support throughout the research work.

ABSTRACT

This dissertation delves into the export competitiveness of Indian cereals through a comparative analysis, shedding light on the performance and potential of key agricultural products in the Indian market. By examining factors such as production data, export statistics, and government policies, the study uncovers India's position as a major exporter of cereals, fresh fruits, vegetables, plantation crops, spices, oilseeds, food processing products, and meat. The research emphasizes the importance of infrastructure development, post-harvest management, and policy interventions to enhance the export competitiveness of Indian agricultural products. Through methodologies like compound annual growth rates (CAGR), revealed comparative advantage (RCA), instability index, and growth patterns, this study provides valuable insights for policymakers, stakeholders, and researchers aiming to understand and improve India's standing in the global agricultural market.

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1Introduction

India's agricultural sector is fundamental to the country's economic well-being and progress. Roughly 70% of households and 10% of the urban population rely on agriculture for their livelihood. As a major agricultural producer, India supplies a variety of commodities to the global market, including tea, coffee, rice, spices, oil meals, fresh fruits, fresh vegetables, meat products, and marine products. In terms of production quantity, India ranks first in the world for milk production and second for both wheat and rice. (J. Sheeba, Dr. R. Reena 2018 JETIR November 2018)

According to Alktheeb and Sultan (2015), India's agricultural prowess reached a new milestone in 2013, surpassing Australia to become the world's seventh-largest exporter of agricultural products. This achievement underscores India's crucial role in the global agricultural market. Not only is India a major exporter, but it also boasts a dominant position as a producer. India stands as the world's second-largest producer of rice, wheat, and other cereals, further solidifying its status as a key player in the global food supply chain. data from the Government of India (GOI) and the Agricultural and Processed Food Products Export Development Authority (APEDA) in 2015 reveals impressive yields for major cereals. Rice production reached 105.48 million tonnes, maize production reached 24.17 million tonnes, and bajra production reached 9.18 million tonnes. Furthermore, estimated total food grain production in India continued this upward trend, with GOI data from 2016-2017 indicating a production of 252.22 million tonnes. This represents a marginal increase of 0.20 million tonnes compared to the previous year's production of 252.02 million tonnes.

Historically, basmati rice has been steadily gaining ground on non-basmati varieties in India's total rice exports. This trend signifies a lucrative opportunity. By promoting basmati rice

cultivation, we can potentially achieve a significant boost in foreign exchange earnings in the coming years, without compromising on the very qualities that make it a premium product. The importance of rice exports to India's agricultural sector and overall balance of payments cannot be overstated. As Satishkumar et al. (2016) point out, a strong export market for rice strengthens the nation's financial well-being. By strategically focusing on basmati rice, we can further solidify this vital source of foreign exchange.

India holds the esteemed title of being the world's foremost producer and exporter of cereal

amounted to a staggering Rs. 111,062.37 Crore, equivalent to 13,857.95 USD Million. Within this expansive export portfolio, rice, encompassing both Basmati and Non-Basmati varieties, stands as the predominant contributor, constituting a striking 80% of the total export value. The remaining 20% comprises other cereals, including wheat. Historically, India had enforced a ban on the export of staple grains such as rice and wheat in 2008 to prioritize domestic consumption needs. However, in light of burgeoning global demand and India's surplus production capacity, the ban has been lifted, albeit with restrictions on export quantities to mitigate any adverse effects on domestic prices or storage capacities. Despite the limited export volume, the impact on domestic markets has been negligible. Notably, cereals and cereal preparations rank prominently among India's foreign exchange generators. Basmati and non-basmati rice emerge as primary agricultural export commodities, with their demand spanning various international markets. Recognizing the imperative to prevent stockpiling and diversify production, NITI Ayog has advocated for exporting 25% of food production, with a particular emphasis on nutri-cereals and bolstering food processing capabilities. An overwhelming majority, approximately 95%, of India's earnings from cereal exports derive from unprocessed varieties, with basmati and non-basmati rice commanding a significant share. The demand for unprocessed cereals remains robust, particularly in Asian countries, which constitute the largest and most stable market for Indian cereal exports. Traditional markets in Asia include

Bangladesh, Saudi Arabia, Iran, UAE, and Benin, while emerging markets encompass Pakistan, Vietnam, Nepal, and others. Dr. Sunny Thomas and Waheeda Sheikh further elucidate the evolving landscape of cereal trade, underscoring the pivotal role of Asia as both a historical stronghold and a burgeoning frontier for India's cereal exports**.**

1.2 Background of the study

Indian cereals production

More than 288 million metric tons of cereals were estimated to be produced in India at the end of the financial year 2022. These cereals include rice, wheat, barley, millets, and ragi among others Cereals are the Gramineae grass family's edible seeds or grains. Rye, oats, barley, maize, triticale, millet, and sorghum are among the cereals farmed in many nations. Cereals are often regarded as nutritious staple foods in both industrialized and developing countries. Grains, often known as cereals, are the world's most essential staple food. It is believed to give 48% of human calories, or dietary energy. Grains are also used to feed cattle and to manufacture some cooking oils, fuels, cosmetics, and alcoholic beverages. Cereals account for approximately 54% of total production in India. In terms of cereal production, India ranks third in the world, accounting for approximately 11% of total global production. In India, cereals are divided into coarse grains and fine grains.

International Market of Cereals

Over the last decade, the global rice trade has seen a gradual growth rate of 1.5% annually. However, this growth is anticipated to accelerate to around 2.6% annually, resulting in a significant increase in overall export volumes, reaching 62 million tons by 2030, an uptick of 16 million tons. Despite this expansion, the export share of the top five rice exporters are India, Thailand, Vietnam, Pakistan, and the United States is expected to slightly decrease from 74% to 70%.

Vietnam, with its shift towards cultivating higher-quality rice strains and diversifying its production, aims to reduce its reliance on China as a major export destination. Thailand will maintain its crucial role in rice exports but may face heightened competition in the market. Switching gears to wheat production, global output is predicted to rise to 840 million tons by 2030, with both developed and developing countries contributing to this increase. India is poised to be a significant contributor, driven by improvements in yield and expansion of cultivation areas in line with national self-sufficiency goals.

Notable production increases are anticipated in Russia, Ukraine, Australia, and Pakistan. The Black Sea region, including Russia, Ukraine, and Kazakhstan, is expected to witness substantial growth in wheat cultivation, with spring wheat also playing a role alongside winter wheat.

In terms of consumption, the global demand for cereals is projected to rise from 2.7 billion tons to 3 billion tons by 2030, mainly driven by increased feed and food use in developing countries. Export prices of cereals have been on the rise due to various factors, including disruptions from the COVID-19 pandemic and changes in supply and demand dynamics.

Looking ahead to 2032, global cereal production is forecasted to reach 3.1 billion tons, with maize and rice being the primary drivers of this growth. Asian countries are expected to continue leading in production increases, with Africa and Latin America also playing significant roles, particularly in maize production. while the short-term cereal market may experience volatility, the long-term outlook suggests a steady increase in production and consumption, with various regions contributing to this growth in different capacities.

Top 5 major cereals

A variety of cereals hold paramount importance in India's agricultural landscape, including wheat, paddy (rice), sorghum, millet (Bajra), barley, and maize, among others. According to the initial estimates provided by the Ministry of Agriculture for the year 2020-21, the production figures for key cereals such as rice, maize, and Bajra were reported at 102.36 million tonnes, 19.88 million tonnes, and 9.23 million tonnes, respectively. Although the most recent data available for wheat production pertains to the 2019-20 period, it indicates a substantial output of 107.49 million tonnes. These cereals play a vital role in sustaining India's food security and catering to domestic as well as international demand. Warm-season cereals, including rice and maize, thrive in tropical lowlands throughout the year, while in temperate climates, they are cultivated during the frost-free seasons. This diversified cultivation pattern ensures a steady supply of cereals to meet the varying needs of consumers across different regions and climatic conditions.

Rice is typically grown in flooded fields, though some strains are grown on dry land. Other warm-climate cereals, such as sorghum, are adapted to arid conditions. Cool-season cereals thrive in temperate climates. The majority of a species' varieties are either winter or spring varieties. Winter varieties are sown in the autumn, germinate and grow vegetatively, and then go dormant during the winter. They begin to grow again in the spring and reach maturity in the late spring or early summer. This cultivation system conserves water and frees up land for another crop early in the growing season. Winter varieties do not flower until the spring because they require vernalization or exposure to low temperatures for a genetically determined period. Farmers grow spring varieties where winters are too warm for vernalization or where the crop's hardiness (which varies by species and variety) is exceeded. Spring cereals are planted in early spring and mature later that summer, without vernalization. Spring cereals typically require more irrigation and yield less than winter cereals.

BASMATI RICE

“Basmati” is long grain aromatic rice grown for many centuries in a specific geographical area, in the Himalayan foothills of the Indian sub-continent, blessed with characteristics of extra-long slender grains that elongate at least twice their original size with a characteristics soft and fluffy texture upon cooking, delicious taste, superior aroma, and distinct flavor, Basmati rice is unique among other aromatic long-grain rice varieties. The specific environmental conditions and the way Basmati rice is grown, harvested, processed, and aged give it its distinct features. Because of these unique characteristics, Basmati rice is often referred to as the "scented Pearl" and adds a touch of elegance to any meal, turning even a simple dish into a gourmet experience.

India boasts a rich diversity of Basmati rice varieties, with 45 officially recognized under the Seeds Act of 1966. These include renowned names like Basmati 217, Punjab Basmati 1 (Bauni Basmati), Basmati 386, and many more. Basmati rice production in India is concentrated in states such as Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Uttarakhand, and western Uttar Pradesh.

As the leading exporter of Basmati rice globally, India has significantly contributed to the international market. In the fiscal year 2022-23 alone, India exported a substantial 4,558,972.23 metric tons of Basmati rice, valued at approximately Rs. 38,524.11 Crores or 4,787.50 million US dollars. Major export destinations during this period included Saudi Arabia, Iran, Iraq, the United Arab Emirates, and Yemen. The diverse range of Basmati varieties and India's consistent export performance highlight the country's pivotal role in the global Basmati rice market

NON-BASMATI RICE

Any rice other than Basmati Rice is named as non-Basmati rice. In the world, it has been reported that there are 10000 varieties of rice out of which the maximum number are in India.

In the world, it has been reported that there are 10000 varieties of rice, the maximum number being in India. In fact, basmati rice equals to only 1% production of the total rice grown in India.

Non-basmati rice comes in various shapes and sizes, differing from the long and slender grains of basmati rice. Some varieties are short and thick, while others resemble beads or are round in shape. Unlike basmati rice, they have distinct characteristics. Examples of non-basmati rice varieties include PR, 104 IR8, IR 64, and Masuri. During the fiscal year 2022-23, the country exported a significant amount of non-basmati rice, totaling 17,786,092.81 metric tons. This rice was valued at approximately Rs. 51,088.72 Crores or 6,355.74 million US dollars. Major export destinations during this period included Benin, China, Senegal, Cote D'Ivoire, and Togo.

This data illustrates that non-basmati rice also plays a crucial role in the country's rice exports, with diverse varieties meeting the demand of various international markets.

WHEAT

Wheat cultivation in India has traditionally been dominated by the northern region of India. The northern states of Punjab and Haryana Plains in India have been prolific wheat producers. While this cereal grass has been studied carefully in the past, recent years of painstaking research by India's finest scientific talent have paid off with the development of distinctly superior varieties of Durum Wheat.

This hard wheat is cultivated in clayey soil and is highly required for its physical characteristics. Its high gluten strength and uniform golden color make it ideal for bread making and pasta preparation unlike the softer commercially high-yielding wheat, which lacks the strength and consistency of durum. Today, India is exporting sufficient quantities of all types of wheat and extensive research efforts are underway for improving its cereals and grain output in the years to come. Wheat cultivation has traditionally been dominated by the northern region of India.

The northern states of Punjab and Haryana Plains in India have been prolific wheat producers. While this cereal grass has been studied carefully in the past, recent years of painstaking research by India's finest scientific talent have paid off with the development of distinctly superior varieties of Durum Wheat. With production reaching ten times in the past five years, India is today the second-largest wheat producer in the whole world. Various studies and researches show that wheat and wheat flour play an increasingly important role in the management of India’s food economy. It is sown in temperatures ranging from 10 to 26 degrees Celsius. This crop requires 75-100 cm of rainfall. Wheat production thrives in fertile loamy and clayey soil with high fertility. The top wheat-producing states are Uttar Pradesh, Punjab, Madhya Pradesh, Rajasthan, and Haryana.

A diverse array of wheat varieties such as WH-542, PBW-343, WH-896(d), PDW-233(d), UP-2338, PBW-502, Shresth (HD 2687), Aditya (HD 2781), HW-2044, HW-1085, NP-200(di), and HW-741 are cultivated by Indian farmers, each prized for its distinct attributes and adaptability to varied regional and climatic conditions across the country. The global wheat trade surpasses that of all other crops combined, underscoring its pivotal role in international commerce. Notably, the demand for Indian wheat in the global market has been on the rise. In the fiscal year 2022-23, India exported a substantial quantity of 4,693,264.09 metric tons of wheat to numerous countries, translating to an approximate value of Rs. 11,826.90 crores or 1,519.69 USD million. Key export destinations for Indian wheat during this period included Bangladesh, Indonesia, South Korea, United Arab Emirates, and Yemen. This robust export performance reflects the esteemed reputation of Indian wheat varieties and their consistent appeal to international buyers seeking quality and reliability.

MAIZE

Maize (Zea mays L.) is one of the most versatile emerging crops shaving wider adaptability under varied agro-climatic conditions. Globally, maize is known as the queen of cereals because it has the highest genetic yield potential among the cereals. It is cultivated on nearly 190 m ha in about 165 countries having wider diversity of soil, climate, biodiversity and management practices that contributes to 39 % of the global grain production. The United States of America (USA) is the largest producer of maize contributes nearly 30.99% of the total production in the world in 2020 and maize is the driver of the US economy. In India, Maize is grown throughout the year. It is predominantly a Kharif crop with 85 percent of the area under cultivation during the season. Maize is the third most important cereal crop in India after rice and wheat. It accounts for around 10 percent of total food grain production in the country. India is also the fifth largest producer of Maize in 2020 as per FAO data and India's share in world production accounted to be 2.59 per cent in the same year. In addition to staple food for human being and quality feed for animals, maize serves as a basic raw material as an ingredient in thousands of industrial products that includes starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries, etc.

In India, the major states where wheat is grown include Karnataka, Madhya Pradesh, Bihar, Tamil Nadu, Telangana, Maharashtra, and Andhra Pradesh. The production of maize in India is estimated to be 35.91 million tonnes in the 2022-23 period according to the 3rd Advance Estimate. In the year 2022-23, the country has sent 3,453,680.58 metric tons of maize to other countries around the world. The total value of these exports is Rs. 8,987.13 crores or 1,116.17 million US dollars. The main countries that received the exported maize during this period are Bangladesh, Vietnam, Nepal, Malaysia, and Sri Lanka.

MILLETS

Millet, a resilient grain popular across Africa and Asia, serves as a staple food for approximately 1.2 billion people worldwide, particularly in regions facing food insecurity. With a stable global production estimated at 28 million metric tons in 2020, millet remains crucially important, primarily cultivated in Africa and Asia. India leads in millet production, followed by Niger and China, with other significant producers including Burkina Faso, Mali, and Senegal. This drought-tolerant crop thrives in arid climates, offering vital nutrition due to its high fiber and essential mineral content.

In recent years, India has witnessed a surge in millet production, buoyed by government initiatives such as the National Food Security Mission and growing awareness among farmers of millet's drought-resistant qualities. As a result, India is poised for continued growth in millet production. Indian millets, categorized as coarse cereals, play a pivotal role in sustaining millions of resource-poor farmers, contributing significantly to India's ecological and economic stability. Rich in protein, vitamins, and minerals, millets offer a gluten-free, low glycemic index alternative, catering to dietary needs such as celiac disease and diabetes.

India's prominence in millet extends to global trade, ranking among the top five exporters worldwide. From a global export value of $400 million in 2020, millet exports surged to $470 million in 2021, with India exporting millets worth $75.46 million in 2022-23. Despite this, the contribution of millet-based value-added products remains negligible. Moreover, within India's overall cereal export market valued at Rs. 111,062.37 Crore or 13,857.95 USD Million in 2022-23, rice, particularly Basmati and Non-Basmati varieties, dominates with an 80% share, while other cereals like wheat constitute the remaining 20%. This underscores India's dual role as

both a major producer and exporter in the global cereal market, with millet playing a significant part in this dynamic landscape.

OTHER CEREALS

Coarse cereals are a broad sub-group of several short duration warm weather (Kharif) crops such as Jowar (Sorghum), Bajra (Pearl Millet), Maize, Ragi (Finger Millet) etc. They are used in food, fodder, fuel; value added products and also fast-food products.

In our country, the coarse cereals are mainly grown in poor agroclimatic regions, particularly rainfed areas of the country. These crops are grown in areas with high temperature and are called dryland crops because can be grown in areas with 50-100 cm rainfall. These crops are less sensitive to soil deficiencies and can be grown in inferior alluvial or loamy soil.

The specific products listed under this category are as follows:

- Rye seeds
- Barley seeds
- Oats seeds
- Grain Sorghum
- Jowar
- Buckwheat
- Bajra
- Ragi
- Canary seed

In the year 2022-23, India has seen growth in its export of cereal products to the international market. Specifically, the country exported 3,801.18 metric tons of cereals other than rice, wheat, maize, and millet, valued at Rs. 27.40 crores or 3.39 million US dollars. The Major

export destinations for these cereal products during this period were Vietnam, United Arab Emirates, Russia, Malaysia, and Qatar.

Share of Indian Cereals in India's Export

India's concerted efforts to broaden the horizons of cereal exports have begun to bear fruit, with significant strides witnessed in recent years. The notable surge in exports, particularly of rice (both basmati and non-basmati), wheat, and other cereals during 2020-21, is attributed to collaborative endeavors among various stakeholders, including farmers, millers, exporters, and government agencies, aimed at bolstering export capabilities. The Agricultural and Processed Food Products Export Development Authority (APEDA), in conjunction with stakeholders, has been actively exploring new avenues, ensuring market access, product quality adherence, and compliance with phytosanitary measures for cereal products.

Specifically focusing on rice exports, India made remarkable inroads into new markets during 2020-21, shipping non-basmati rice to nine countries previously unexplored or where previous shipments were of smaller volumes. The volume of rice exports to these nations surged from a mere 188 metric tonnes in 2018-19 to an impressive 1.53 lakh tonnes in 2020-21, showcasing the burgeoning potential of India's rice export market expansion initiatives.

The overall cereal exports from India experienced a substantial uptick in 2020-21, with non-basmati rice exports registering a remarkable 136.04% growth to USD 4794.54 million, wheat exports soaring by 774.17% to USD 549.16 million, and other cereals (including millets, maize, and other coarse grains) witnessing a robust 238.28% increase to USD 694.14 million. These figures underscore the significant contribution of cereals to India's export economy, with cereals accounting for over 3.94 trillion Indian rupees to the Indian economy in fiscal year 2021, marking a substantial increase compared to fiscal year 2012.

Within the agricultural sector, cereals hold a prominent position, contributing nearly 27.5% to the Gross Value Added (GVA) of crops in the same fiscal year. Moreover, India's cereal exports have showcased a remarkable growth trajectory over the past five years, witnessing a noteworthy Compound Annual Growth Rate (CAGR) of 11.8% from 2016 to 2020. In June 2022, India's total cereal exports to all destinations amounted to $1,449 million, constituting 3.43% of the country's total merchandise exports. This underscores the pivotal role of cereals in India's export portfolio, reflecting sustained efforts towards diversification and market expansion strategies in the global arena.

Policies and Schemes Implemented for Indian Cereals

- **Sub-Mission on Nutri-Cereals under National Food Security Mission (NFSM)**

  In order to increase production and productivity of Shree Anna, the Department of Agriculture and Farmers Welfare (DA&FW) is implementing a Sub-Mission on Nutri-Cereals under National Food Security Mission (NFSM) in all districts of 28 States & 2 Union Territories viz. Jammu & Kashmir and Ladakh. Under NFSM–Nutri Cereals, the incentives are provided to the farmers, through the States/UTs, on crop production and protection technologies, cropping system based demonstrations, production & distribution of certified seeds of newly released varieties/hybrids, Integrated Nutrient and Pest Management techniques, improved farm implements/tools/resource conservation machineries, water saving devices, capacity building of farmers through trainings during cropping season, organizing events/workshops, distribution of seed minikits, publicity through print and electronic media etc. The interventions such as formation of Farmer Producer Organizations (FPOs) for Shree Anna, setting up Centres of Excellence (CoE) and seed hubs for Shree Anna have also been supported under NFSM. In addition, states such as Assam, Bihar, Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttarakhand and Uttar Pradesh

have initiated Millet Missions in the States to promote Shree Anna. To make India a global hub for 'Shree Anna', the Indian Institute of Millets Research (IIMR), Hyderabad has been declared as the Centre of Excellence for sharing best practices, research and technologies at the national and international level.

- **Production Linked Incentive Scheme for Food Processing Industry for Millet-based products (PLISMBP)**

  Ministry of Food Processing Industries (MoFPI) has implemented the Production Linked Incentive Scheme for Food Processing Industry for Millet-based products (PLISMBP) during 2022-23 to 2026-27 with an outlay of Rs. 800 crores. The Pradhan Mantri Formalization of Micro Food Processing Enterprises (PMFME) Scheme, launched under the Atmanirbhar Bharat Abhiyan is currently being implemented in 35 States and Union Territories (UTs). The Government is also popularizing Agri-Infrastructure Fund Scheme to invite farmers/FPOs/Entrepreneurs to avail the benefit of interest subvention on loans up to 2 crores for setting up primary processing units in Shree Anna. Government is also promoting Shree Anna based startups to increase the demand of Shree Anna.

- **National Food Security Mission**

  NFSM scheme was started by the Government of India as per the guide line of 11th Five-year plan during the year 2007-08 to increase the cultivation area and Production of Pulses, Wheat and Rice crop. This scheme was 100 % Centrally Sponsored Scheme. NFSM scheme is implemented by the Government of India as per the guide line of 12th Five-year plan during the year 2014-15. In this scheme Pulses, Wheat, Rice as well as coarse cereal and commercial crops that is Sugarcane and cotton are included. Besides this, Nutri Cereal which is Jowar, Bajra and Ragi crops has been included by the Government of India from 2018-19. During the year 2014-15 NFSM scheme was

implemented as fifty percent state and fifty percent centre sharing pattern and from 2015-16 this scheme is implemented as sixty Central forty State sharing pattern. Objectives of this schemes is to increase the production of various crops such as rice, wheat, pulses, maize, cotton, sugarcane, and Nutri-cereals like Jowar, Bajra, and Ragi in specific districts of the country. This will be achieved by expanding the area of cultivation and improving productivity in a sustainable way. Additionally, efforts will be made to restore soil fertility and productivity at the individual farm level. The overall aim is to improve farm profits and boost the confidence of farmers.

- **The Open Market Sale Scheme (OMSS) For Wheat and Rice**

  The Open Market Sale Scheme (OMSS) is a program established by the Food Corporation of India (FCI) to sell excess food grains, mainly wheat and rice, from the central pool in the open market. Under this scheme, the FCI can sell these food grains to traders, bulk consumers, retail chains, and other entities at predetermined prices through e-auctions. Interested bidders can participate in these e-auctions to purchase specific quantities of food grains. Additionally, states have the option to procure grains through the OMSS, in addition to their allocation from the central pool, to distribute among beneficiaries of the National Food Security Act (NFSA). States across India are exploring alternative avenues for procuring wheat and rice due to the Food Corporation of India's (FCI) recent quantity restrictions and denial of permission to participate in the Open Market Sale Scheme (OMSS). While the Centre claims that these measures are aimed at curbing inflation and regulating supply, critics argue that they prioritize political interests over the welfare of marginalized beneficiaries.

- **Seed Sector Policy**

  The seed sector in India showcases a significant dominance of the public sector in the production of seeds for major crops like rice and wheat. The National Seeds

Corporation and State Farms Corporation play crucial roles in research, production, and distribution of seeds. On the other hand, the private sector primarily focuses on high-value crops and hybrid varieties. Currently, about 41% of the total quality seeds produced in the country come from private seed companies. This dual presence of both public and private sectors in the seed industry ensures a diverse range of seed varieties and options for farmers, contributing to the overall agricultural productivity in the country.

- **Agricultural Pricing Policy**

  The agricultural pricing policy in India revolves around the concept of Minimum Support Price (MSP) to protect the interests of farmers. MSP is set based on various criteria including Cost of Production (COP), demand-supply dynamics, and international market trends. However, there have been instances where MSP has been higher than international prices, leading to market distortions. Zonal restrictions in the movement of food grains have also been a common practice, impacting the efficiency of the agricultural pricing system and market operations.

- **Procurement and Stocking Policy**

  The procurement and stocking policy in India, managed by the Food Corporation of India (FCI), aims to support farmers by ensuring a guaranteed floor price for their produce. This system was initially designed to complement the Green Revolution efforts and provide risk protection to farmers. However, over time, extensive government intervention in foodgrain management has led to skewed procurement towards rice and wheat crops. The system of procurement and stocking has faced challenges in adapting to changing market dynamics and international price trends, highlighting the need for reforms in the foodgrain management sector.

- **Nutrient-Based Subsidy Scheme (NBS)**

  The Nutrient-Based Subsidy Scheme (NBS), introduced in 2003, focuses on promoting efficient fertilizer production and soil health improvement. The scheme aims to move towards deregulation and reduce the subsidy burden on the government. While the NBS has shown promise, there is a need to extend its benefits to urea, which is a critical fertilizer for agricultural productivity. Enhancing the NBS to cover urea can further contribute to sustainable agricultural practices and balanced nutrient management in the country.

- **National Food Security Mission (NFSM)**

  The National Food Security Mission (NFSM) launched in 2007 targets the growth of rice, wheat, and pulses production in India. Through field demonstrations, incentives for modern technologies, and decentralized implementation in 312 districts across 17 states, the NFSM aims to boost agricultural productivity and ensure food security. By involving village panchayats and focusing on key crops, the NFSM plays a vital role in enhancing foodgrain production and addressing the nutritional needs of the population.

- **Rashtriya Krishi Vikas Yojna (RKVY):**

  The Rashtriya Krishi Vikas Yojna (RKVY), initiated in 2007, is a scheme aimed at promoting state-level agricultural growth in India. With a focus on integrated development of food crops, mechanization, soil health, and marketing, the RKVY incentivizes state plan investments in agriculture and allied sectors. By encouraging a balanced approach to agricultural development and investment, the RKVY contributes to enhancing agricultural productivity and rural livelihoods across different states in the country.

1.3 Objectives

- To compare the export performance of different cereals and identify the instability over the years.
- To highlight the leading cereals export variety and provide policymakers recommendations.
- To analyze global trends in cereals trade and their impact on India's export prospects.

1.4 Significance of the study

- Indian cereals have gained a comparative advantage in some of their varieties in the world market, while some cereals have a comparative disadvantage.
- Understanding cereal export performance helps shape policies for stable agricultural growth

1.5 Scope of the study

The scope of the study contains analyzing global trends in cereals trade and their impact on India's export prospects. It involves comparing the export performance of different cereals, identifying key factors influencing their growth rates, and highlighting the leading cereals export variety to provide policymakers with recommendations. Additionally, the study will examine the influence of specific consumer preferences on the export competitiveness of different cereals. the comparative advantage of Indian cereals in the world, and explore opportunities for diversifying production towards cereals and boosting exports through food processing.

1.6 Research Questions

- Which are the new top destinations for Indian cereals export?
- What is the impact of covid-19 pandemic on the performance of cereals export?

1.7 Limitations

- The study has been done only on the last 10 years' data which is from 2013 to 2023. Which has also the impact of COVID-19 from 2020 to 2022 which has impacted the cereals export.
- The findings of the study may specify that the Indian context may not be generalizable to other countries or regions. Factors unique to India's export market dynamics could limit the applicability of the results elsewhere.
- The study may not have fully accounted for external factors such as global trade dynamics, geopolitical issues, or climatic change, which could have a significant impact on India's export competitiveness in the cereal market.

1.8 Chapters Layout

Chapter 1:

Chapter 1 provides an introduction to India's agricultural sector, emphasizing its significance in the country's economy. It highlights that a large percentage of households and a portion of the urban population rely on agriculture for their livelihood. India is a major agricultural producer, exporting commodities such as tea, coffee, rice, spices, and more. The chapter also mentions India's ranking in milk, wheat, and rice production globally. Additionally, it discusses the country's achievements in becoming a significant exporter and producer of agricultural products. The chapter outlines the objectives, significance, scope, research questions,

methodology, and limitations of the study. It sets the stage for a detailed analysis of India's cereals trade and export performance.

Chapter 2: Literature of review

Chapter 2 is focused on the literature review related to India's agricultural sector, specifically analyzing the export potential, performance, and competitiveness of Indian agricultural products and cereals. The chapter discusses various research papers and studies that delve into these topics, utilizing data from sources such as the Agricultural and Processed Food Products Export Development Authority (APEDA) and the Ministry of Commerce. It highlights the methodologies used in these studies, including detailed examinations of export statistics, production data, and government policies. The chapter also presents key findings from different research papers, emphasizing the need for infrastructure development, policy interventions, and strategic trade relationships to enhance India's agricultural trade. Additionally, it identifies research gaps, such as the need for a more comprehensive analysis covering a wider range of cereal exports and the impact of the COVID-19 pandemic on cereals exports.

Chapter 3: Methodology

Chapter 3 tells us about the type of methods and data sources used for the study

Chapter 4: Data analysis and interpretation

Chapter 4 focuses on data analysis and interpretation related to Indian cereal production and export trends. It delves into the growth rates of different cereals from 2013 to 2023, showcasing the fluctuating nature of India's cereal export market. The chapter provides detailed tables presenting data on the growth rates of basmati rice, wheat, maize, and other cereals during this period. Additionally, it includes information on India's export values for different cereals in specific years, highlighting the trends and fluctuations in export values over time. The chapter

also discusses the top destinations for Indian cereal exports, providing insights into the countries importing Indian.

Chapter 5: Findings, conclusion, and suggestions

Chapter 5 presents the findings, conclusions, and suggestions based on the analysis of Indian cereal production and export trends. The chapter highlights India's emergence as a major player in the global agricultural market, particularly in the export of cereals such as rice, wheat, and maize. It emphasizes India's comparative advantage in certain cereal varieties and the importance of understanding factors influencing export competitiveness. The chapter discusses the steady growth in cereal production in India and the significance of diversifying production towards Nutri-cereals to capitalize on emerging market opportunities.

Chapter: 2 Literature Review

2.1 Introduction

The review includes various research papers and studies that analyse the export potential, performance, and competitiveness of Indian agricultural products and cereals. The methodologies employed include detailed examinations of export statistics, production data, and government policies, utilizing data from sources such as the Agricultural and Processed Food Products Export Development Authority (APEDA), the Ministry of Commerce, and FAOSTAT.

2.2. Review of related literature

- **Kumareswaran T, Jolia P, Maurya M, Maurya A, Abbasmandri S and Kamalvanshi (2018):** The paper titled "Export scenario of Indian agriculture: A review" provides a comprehensive analysis of the export potential of various agricultural commodities in India. The methodology involved a detailed examination of export statistics, production data, and government policies related to agricultural exports. The findings reveal that India is a major exporter of cereals, fresh fruits and vegetables, plantation crops, spices, oilseeds, food processing products, and meat. The data collection involved sourcing information from the Agricultural and Processed Food Products Export Development Authority (APEDA) and various research studies. The paper emphasizes the need for infrastructure development, post-harvest management, and policy interventions to enhance the export competitiveness of Indian agricultural products.
- (Suresh & Mathur, 2016)**:** The research paper “Export of agricultural commodities from India: Performance and prospects” investigates the performance and prospects of agricultural commodity exports from India, analyzing trends, changes in comparative

advantage, and the evolution of export composition over the past decade. It highlights significant growth in commodities exports like guar gum, meat, cereals, spices, and sugar, alongside declines in fish, fruits, and coffee exports. The study also examines India's revealed comparative advantage in various commodities and suggests that yield improvement through total factor productivity growth could boost export potential. The methodology involved analyzing the export performance of different commodity groups based on their contribution to total agricultural exports, using data from various sources like the Ministry of Commerce and FAOSTAT. Growth rates, indices of instability, and Revealed Comparative Advantage (RCA) were calculated to assess competitiveness. Recommendations include focusing on yield improvement to enhance export competitiveness.

- **Barbara Kutkowska, Tomasz Szuk (2020) :** The study on "Competitiveness In The Global Cereal Market From 1998 To 2017" utilized data from the United Nations Food and Agriculture Organization (FAO). The research focused on analyzing trends in cereal production, export, and import, as well as changes in the market shares of the largest producers, exporters, and importers. The authors assessed exporter competitiveness using quantitative measures such as Export Market Share (EMS), Export Orientation (OE), Relative Export Orientation (REO), Hypothetical Exports (HE), Trade Coverage (TC), and Relative Trade Advantage (RTA). These measures provided insights into the performance and competitiveness of the top twenty cereal producers and exporters globally during the specified period. Key findings from the study include: Cereals are fundamental agricultural crops globally, with a significant portion of arable land dedicated to their cultivation. In 2017, global cereal production exceeded 2,980 million tonnes, indicating the scale and importance of cereals in the agricultural sector. Countries like China, the United States, and India remained the

largest producers of cereals, while Russia, Ukraine, and Brazil saw significant increases in their production shares. The analysis revealed a strong concentration of countries in cereal production and export, with an increasing export orientation among the top twenty cereal exporters on the global market. Overall, the study provides valuable insights into the dynamics of the global cereal market, highlighting the competitiveness of key players and the evolving trends in production, export, and import of cereals over the examined period.

- **A.K. Giri, (2006):** The paper titled "Cereal Consumption Over Time in the Country and Across the States" presents a comprehensive analysis of the consumption patterns of cereals in India over time, based on data collected from various rounds of the National Sample Survey (NSS). The study examines the trends in cereal consumption from rural and urban areas, as well as variations across different states. The data reveals a decline in cereal consumption up to 2002, followed by an increase in 2003 and 2004. The study also explores the relationship between cereal consumption and calorie availability, highlighting that a small percentage of the population may not be obtaining the required calories from their cereal consumption. Additionally, the paper compares cereal consumption with the net availability of cereals in the country, indicating that surplus stock of foodgrains and foodgrains exports cannot be solely attributed to the reduction in consumption levels. The findings suggest that the self-sufficiency in foodgrains needs further examination, especially in light of the government's recent decision to import essential commodities to address inflationary pressures. The research methodology involves the analysis of data from NSS reports and publications of the Government of India, providing valuable insights into the changing patterns of cereal consumption in India**.**

- **Ashok Gulati, Surbhi Jain, and Shweta Saini (2010):** The study on "The Demand and Supply of Cereals in India from 2010-2025" focuses on projecting the future supply and demand for rice and wheat. It aims to address the critical issue of assessing the impact of continuous growth in demand on the future balance of demand and supply in the food sector. The methodology employed in the study includes the use of a two-stage budgeting framework and a quadratic almost ideal demand system (QUAIDS) model to model household consumption behaviour. Data for the study is collected from the National Sample Survey (NSS) of the 32nd and 43rd rounds for the periods 1977-78 and 1987-88. The study also incorporates feed estimates from previous research by Kumar (1998) and projections from Mittal (2006, 2008) to enhance the accuracy of the demand and supply forecasts. The findings of the study provide insights into the potential challenges and opportunities in the cereal market in India, emphasizing the importance of accurate demand and supply projections for formulating effective long-term policies to ensure food security in the country**.**
- **ANKHILA R HANDRAL, ALKA SINGH, D R SINGH, A SURESH, and G K JHA (2017):** The paper "Scenario of changing dynamics in production and productivity of major cereals in India" presents a comprehensive analysis of the trends in area, production, and productivity of rice, wheat, and maize in India from 1990 to 2013. The data was collected from the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, and the study was divided into two periods for comparison. The compound annual growth rate (CAGR) and coefficient of variation were used to analyse the growth patterns and instability in the production and productivity of these cereals over time. The findings revealed that while rice and wheat showed increasing growth trends in area and productivity, instability also increased in these crops. Maize, on the other hand, exhibited an increase in area, yield, and

production, attributed to its growing commercial value and the emergence of promising new hybrids. The study emphasizes the need for policy intervention to maintain stability in India's food security, particularly in the context of increasing demand for rice and wheat by 2020.

- **(Kumar & Gopalsamy, 2018):** The research paper on "The Export of Cereal Preparations In India With A Focus On BRICS Countries" utilized an analytical and empirical approach, collecting data from secondary sources such as books, reports, journal articles, and the internet, particularly from the Agricultural Export Processed Development Authority (APEDA). The study aimed to analyse the country-wise export performance of cereal preparations to BRICS countries and provide suggestions to enhance India's exports in this sector. The findings revealed fluctuating trends in export quantities to countries like Russia and Brazil, with varying growth rates over the years. The study highlighted the importance of leveraging science and traditional knowledge to develop novel food products with health-benefiting properties, emphasizing the potential of cereal-based media as carriers for probiotics and fibers.

- **(Shreedhar, n.d.)**The paper "A Review of Input and Output Policies for Cereals Production in India" provides a comprehensive review of input and output policies for cereal production in India, aiming to address the country's food security concerns and higher growth objectives. The review is based on an analysis of trends in foodgrain production and productivity, as well as an examination of the evolution of foodgrain policies in India. The methodology involves a detailed review of input policies related to seed, fertilizer, water, agricultural equipment, research, extension, and agricultural credit, along with an overview of policies and programs related to agricultural output markets. The findings highlight the need to balance food security concerns with higher

growth objectives, emphasizing the importance of sustainable supply augmentation and strategic management of food grains. The data collection involves the use of various sources, including government reports, surveys, and academic studies, to provide a comprehensive analysis of the past performance and policies of India's foodgrain sector.

- **(Dastagiri et al., n.d.):** The research paper “Trading prices for India’s major cereals during WTO regime: Growth rates, TOT, elasticities and foreign trade policies” examines the trading prices for India's major cereals during the WTO regime, focusing on growth rates, terms of trade, price elasticities, and trade destinations. The study finds that India has a comparative advantage in wheat, with export prices exceeding import prices. The terms of trade for wheat and total cereals have improved, indicating favorable trading conditions. The research also identifies top export and import destinations for India's cereals, suggesting that multilateral trade agreements with high CAGR countries would facilitate smooth trade. Additionally, the study highlights the importance of considering price elasticities and instability in exports and imports to guide trade policies and strategies. Overall, the findings provide valuable insights for policymakers and traders, emphasizing the need for strategic trade relationships and policies to enhance India's agricultural trade.
- (**A. K. Singh et al., 2017):** The paper "Indian Cereals Saga: Standpoint and Way Forward" provides a comprehensive analysis of the past, present, and future prospects of cereals in India. The study utilizes data from various sources such as the Directorate of Economics and Statistics, the Ministry of Agriculture, and the Department of Agriculture, Cooperation and Farmers Welfare. The methodology involves analyzing trends in the consumption, production, and productivity of cereals, with a focus on rice, wheat, and maize. The findings

reveal a significant increase in production and productivity of cereals over the past six decades, with a particular emphasis on the growth of maize. The paper also highlights the need for policy revisions, increased investment in research and education, and the importance of addressing the challenges of modern agriculture, especially under the climate change scenario. Overall, the study provides valuable insights into the role of cereals in Indian agriculture and the necessary steps for future development.

- **(Jha et al., 2007):** The Economic Research Report Number 41 examines the Indian wheat and rice sectors, focusing on the implications of recent policy changes and potential reforms. The study finds that weak growth in food grain production and consumption, along with market cycles, has led to pressure for reform of India's longstanding food grain policies. The report analyzes the impacts of three policy reform options, including changes in price support policy, decentralization of government food grain operations, and a shift to a U.S.-style deficiency payment program. The study utilizes a spatial model of India's wheat and rice sectors, drawing data and information from published literature and publicly available Indian data sources. The model accounts for differences in supply, demand, and prices across various states of India. The findings suggest that the major reform options available to the Indian Government have the potential to deliver significant cost savings and improved overall welfare, with implications for domestic supply, demand, trade, and government costs in the wheat and rice sectors.
    - **(Sheeba & Reena, 2018):** the research paper focuses on the performance and determinants of the export of cereals products from India, specifically analyzing the export of Basmati Rice, Non-Basmati Rice, Cereals, Wheat, Maize, and Pulses. The study utilizes secondary data obtained from the APEDA in the

Export statistics from the years 2008 to 2018 and employs statistical tools such as growth rate and Pearson's correlation coefficient for analysis. The findings reveal fluctuating growth rates in the export of different cereals products, with Basmati Rice and Non-Basmati Rice showing a strong positive correlation, while Other Cereals and Pulses exhibit a weak relationship. Additionally, the study highlights the price sensitivity of rice exports from India and identifies major determinants of cereals products export, emphasizing the need for competitive export prices and adherence to quality and sanitary standards to sustain in the international market.

- **Runa Kumari and Suseela K (2023) :** The study on the "Export Competitiveness of Important Cereals in India" examines the export performance of key cereals, particularly rice, in India's agricultural sector. It highlights the significant role of cereals in India's export market, with rice dominating the export share. The research employs various analytical tools to assess the growth, instability, and export competitiveness of cereals, revealing varying levels of competitiveness over different periods. Recommendations include policy interventions to enhance competitiveness, such as increasing Minimum Support Prices and promoting modern agricultural practices. Overall, the study emphasizes the importance of understanding and improving the export competitiveness of Indian cereals to strengthen India's position in the global market.
- **(Parte et al., n.d.):** presented a paper on “Export Status of Cereals and its Preparations from India: An Overview” The research paper analyses the export status of cereals and their preparations from India over 30 years, noting significant growth in rice, other cereals, and cereal preparations exports. High market price fluctuations are observed, emphasizing the need to enhance export strategies, increase production, and diversify

towards Nutri-cereals to meet domestic and global demands. The study highlights India's potential as a major cereal exporter and recommends focused efforts to capitalize on this position. Overall, the research underscores the importance of aligning government and industry initiatives to boost India's export competitiveness in the global cereals market.

- **Aruna Kumari and Suseela (2023)**: The paper titled "Export Competitiveness of Important Cereals in India" published in the Indian Journal of Economics and Development in 2023 aims to assess the export competitiveness of important cereals from India. The study collected secondary data on area, production and productivity, export quantity, domestic prices, and border prices of cereals from various sources including FAO, and agricultural prices in India yearbooks, for the period from 2000-01 to 2020-21. The methodology employed compound growth rates, the Cuddy Della Valle Index, and the Nominal Protection Coefficient to estimate the growth in area, production, and productivity, instability in area, production, productivity, and quantity exported, and the export competitiveness of important cereals from India. The findings of the study revealed that among the selected cereals, maize showed better growth in area, production, and yield during the first period, while rice showed positive and significant growth in production and yield during the second period.

2.3 Research Gap

The research gaps in the literature review include the need for a more comprehensive analysis covering a wider range of cereal exports from India. The impact of the COVID-19 pandemic on cereals export has not been thoroughly examined in growth rate and instability index also

Which are the top new largest exporters of each cereal in the world and also the top new exporting partners of India for cereals?

CHAPTER 3:METHODOLOGY

3.1 Introduction

The present study is based on secondary data. The secondary data is from various sources such as the Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Directorate General of Commercial Intelligence and Statistics (DGCI&S), UNCOMTRADE, and WITS. For the analyses of the study, the data is taken from 2023 to 2023 from the above source, and the study is based on these years of data. The major analytical techniques used in the study were Compound Annual Growth Rate (CAGR) Revealed Comparative Advantage (RCA), Cuddy Valle Instability, and Growth Rate. The key variables in the study are the export value of different cereal commodities. Interpreted results of the CAGR and RCA analysis will used to identify the cereal commodities that have comparative advantages or disadvantages in the world market and how India reaches from the fifth position to the top.

3.2 Techniques of Analysis

Compound Annual Growth Rate

CAGR It is a measure used to understand the annual growth rate of an investment, business metric, or any other variable that changes over time. CAGR provides a smoothed annual growth rate over a specified period, assuming that the growth happens steadily over the entire period, compounding at the same rate each year.

$$CAGR = \left(\frac{BG}{EV}\right)^{\frac{1}{n}} - 1$$

Where:

BV = is the beginning value of an investment

EV= is the ending value of an investment

n = number of years

Revealed Comparative Advantage (RCA) Index

There are numerous methods to compute export competitiveness such as revealed comparative advantage; market share; unit value realization; and labour productivity indices (Prasad, 1997). The present study uses the RCA index developed by Balassa (1965). RCA index is the most frequently used tool in the academic literature. The RCA index also provides a clear picture regarding the specialization of countries in particular commodities. Balassa (1965) used the RCA index for the first time to calculate the RCA of the United States, Canada, Sweden, and Japan. RCA index is calculated as:

$$RCA_{it}^{A} = \frac{X_{it}^{A} / X_{t}^{A}}{X_{it}^{W} / X_{t}^{W}}$$

where,

RCA_{it}^{A} = Country A's Revealed comparative advantage index of commodity i

X_{it}^{A} = Country A's export of product i

X_{t}^{A} = Total exports of country A

X_{it}^{W} = World exports of product i

X_{t}^{W} = Total world exports

Instability Index: Cuddy- Della Valle Index

Cuddy Della Valle Index corrects the coefficient of variation in long-term trend. The Cuddy Della Valle Index de-trends show the exact direction of the instability. Therefore, it is a better measure to capture the instability. Cuddy- Della Valle Index corrects the CV as:

$$cuddy - Della\ \ Valley\ Instabilty\ Index(\%): CV\ \sqrt{(1 - R^2)}$$

Where,

R2 was the coefficient of determination from a time trend regression adjusted by its degrees of freedom. The present study divided the CDI value into three categories, which present the different range of instability (Sihmar,2014)

The ranges of Cuddy Della Valle Index are given as follows

Low instability=0 to 15

Medium instability= 15 to 30

High instability=30 and above

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1 GROWTH RATE OF DIFFERENT CEREALS FROM 2013 TO 2023

The growth rates of various cereals from 2013 to 2023 illustrate the fluctuating nature of India's cereal export market. Basmati rice exports started strong but faced challenges, with intermittent positive growth and a recent rebound. Non-basmati rice exports showcased similar patterns, with significant rebounds in recent years. Wheat exports experienced drastic declines followed by recoveries, albeit with a decrease in 2022-2023. Maize exports exhibited volatility, with notable rebounds in recent years. Millets and other cereals also experienced fluctuations but saw growth in 2022-2023. these trends underscore the dynamic factors shaping India's cereal export landscape.

4.1.1 GROWTH RATE OF BASMATI RICE FROM 2013 TO 2023

Table number 4.1.1 describes the growth rate of basmati rice from the period 2013 to 2023 which is for 10 years the data taken for calculation is from APEDA and DGCIS values are in US $ millions. Which contributes the largest share in cereals export from India.

Table No:4.1.1 growth rate of basmati rice from 2013 to 2023

	YEAR	VALUE IN $ MILLIONS	GROWTH
HS CODE 100630	2013-2014	4866.3	100%
	2014-2015	4518.11	-8%
	2015-2016	3477.98	-30%
	2016-2017	3216.59	-8%

PRODUCT	2017-2018	4169.48	23%
BASMATI RICE	2018-2019	4722.52	12%
	2019-2020	4330.69	-9%
	2020-2021	4018.71	-8%
	2021-2022	3540.4	-14%
	2022-2023	4787.5	26%

Source: APEDA, DGCIS

Chart No. 4.1.1 GROWTH RATE OF BASMATI RICE FROM 2013 TO 2023

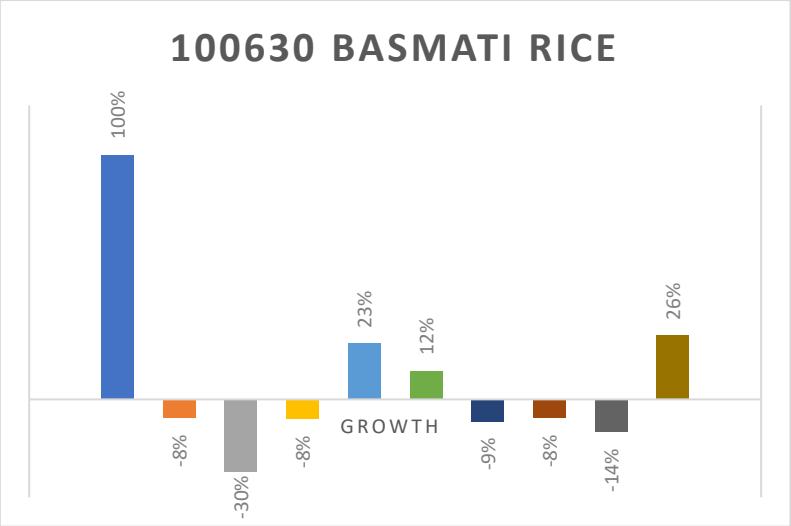


table 4.1.1 tells us the Basmati rice exports from 2013 to 2023, showcasing annual values in million dollars and the corresponding growth rates. Basmati rice exports started at $4866.3 million in 2013-2014, witnessing a 100% growth rate. However, subsequent years saw fluctuations: a decline of 8% in 2014-2015, followed by a significant drop of 30% in 2015-2016. The downward trend continued with decreases of 8% in 2016-2017 and 9% in 2019-2020. There were intermittent positive growth years, such as 23% in 2017-2018 and 12% in 2018-2019, indicating periods of recovery. Nevertheless, the export value faced challenges

again with consecutive years of decline in 2020-2021 and 2021-2022, dropping by 8% and 14% respectively. The most recent data for 2022-2023 shows a notable rebound with a 26% growth rate, culminating in an export value of $4787.5 million. Overall, the data underscores the volatility and fluctuations in Basmati rice exports over the examined period, impacted by various factors such as market demand, trade policies, and global economic conditions.

4.1.2 GROWTH RATE OF NON-BASMATI RICE FROM 2013 TO 2023

Table number 4.1.2 describes the growth rate of non-basmati rice from the period 2013 to 2023 which is for 10 years the data taken for calculation is from APEDA and DGCIS values in US $ millions. Which plays a significant role in the export of cereals

Table No. 4.1.2

	YEAR	VALUE in $ MILLIONS	GROWTH
HS CODE 100630 PRODUCT NON -BASMATI RICE	2013-2014	2917.76	100%
	2014-2015	3334.71	13%
	2015-2016	2368.64	-41%
	2016-2017	2531.47	6%
	2017-2018	3564.39	29%
	2018-2019	3047.83	-17%
	2019-2020	2014.6	-51%
	2020-2021	4799.91	58%
	2021-2022	6124.27	22%
	2022-2023	6355.74	4%

Source: APEDA, DGCIS

Chart No. 4.1.2

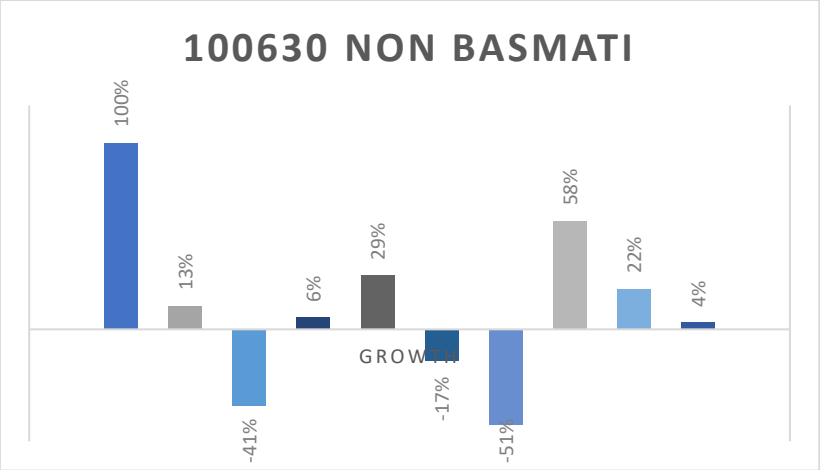


Table number 4.1.2 tells us about the Non-Basmati rice exports from 2013 to 2023, showcasing annual values in million dollars and the corresponding growth rates. Non-Basmati rice exports began at $2917.76 million in 2013-2014, with a growth rate of 100%. Subsequent years witnessed fluctuations: an increase of 13% in 2014-2015, followed by a significant decrease of 41% in 2015-2016. The export value then increased by 6% in 2016-2017 and surged by 29% in 2017-2018. However, there was a decline of 17% in 2018-2019, followed by a substantial decrease of 51% in 2019-2020. The export value rebounded strongly in 2020-2021 with a remarkable growth rate of 58%, further increasing by 22% in 2021-2022. The most recent data for 2022-2023 shows a modest growth rate of 4%, culminating in an export value of $6355.74 million.

4.1.3 GROWTH RATE OF WHEAT FROM 2013 TO 2023

Table number 4.1.3 describes us the growth rate of wheat from the period 2013 to 2023 that is for 10 years the data taken for calculation is from APEDA and DGCIS values are in US $ millions

Table No. 4.1.3

	YEAR	VALUE in $ MILLIONS	GROWTH
HS CODE 100191 PRODUCT WHEAT	2013-2014	1566.49	100%
	2014-2015	828.76	-89%
	2015-2016	164.22	-405%
	2016-2017	67.24	-144%
	2017-2018	96.72	30%
	2018-2019	60.54	-60%
	2019-2020	61.84	2%
	2020-2021	549.7	89%
	2021-2022	2121.75	74%
	2022-2023	1519.69	-40%

Source: APEDA, DGCIS

Chart No. 4.1.3

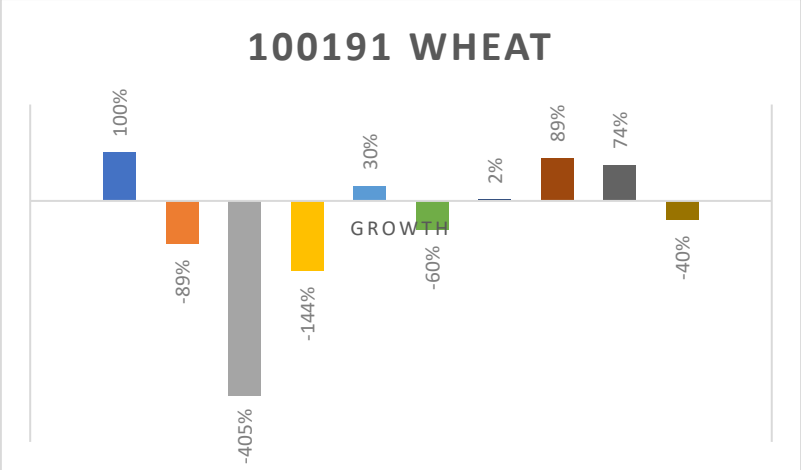


Table number 4.1.3 tells us about the wheat exports under HS Code 100191 from 2013 to 2023, showcasing annual values in million dollars and the corresponding growth rates. Wheat exports commenced at $1566.49 million in 2013-2014, marking a growth rate of 100%. However, subsequent years witnessed significant fluctuations: a steep decline of 89% in 2014-2015, followed by an even more drastic decrease of 405% in 2015-2016. The export value continued to decline in 2016-2017, dropping by 144%. However, there was a modest increase of 30% in 2017-2018, but the export value decreased again by 60% in 2018-2019. The following years showed some recovery, with a 2% increase in 2019-2020, a substantial increase of 89% in 2020-2021, and a further increase of 74% in 2021-2022. However, the most recent data for 2022-2023 indicates a decrease of 40%, culminating in an export value of $1519.69 million.

4.1.4 GROWTH RATE OF MAIZE FROM 2013 TO 2023

Table number 4.1.4 describes the growth rate of maize from the period 2013 to 2023 which is for 10 years the data taken for calculation is from APEDA and DGCIS values are in US $ millions.

Table No. 4.1.4

	YEAR	VALUE in $ MILLIONS	GROWTH
HS CODE 100510 PRODUCT MAIZE	2013-2014	1004.18	100%
	2014-2015	666.72	-51%
	2015-2016	177.99	-275%
	2016-2017	153.57	-16%
	2017-2018	190.34	19%
	2018-2019	270.3	30%
	2019-2020	142.78	-89%
	2020-2021	634.85	78%
	2021-2022	1020.88	38%
	2022-2023	1116.17	9%

Source: APEDA, DGCIS

Chart No. 4.1.4

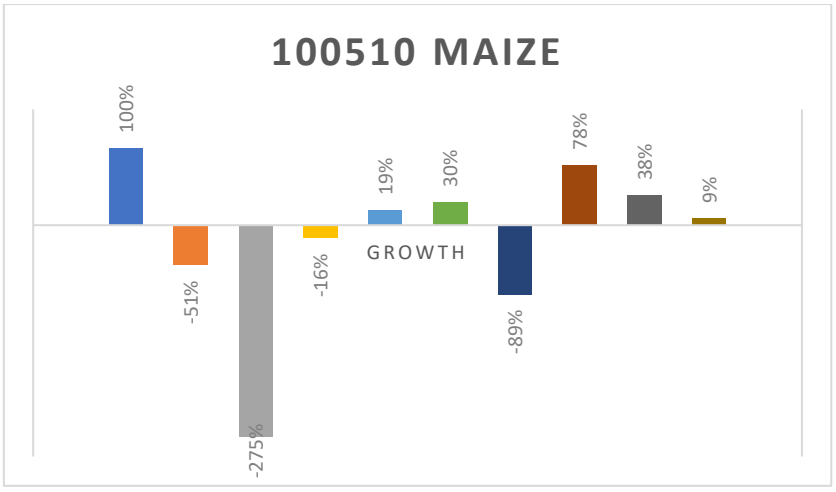


Table number 4.1.4 tells us about the Maize exports under HS Code 100510 from 2013 to 2023, showcasing annual values in million dollars and the corresponding growth rates. Maize exports initiated at $1004.18 million in 2013-2014, with a growth rate of 100%. However, the following years witnessed significant fluctuations: a decline of 51% in 2014-2015, followed by an even more substantial decrease of 275% in 2015-2016. The export value continued to decline in 2016-2017, dropping by 16%. However, there was a modest increase of 19% in 2017-2018, followed by a further increase of 30% in 2018-2019. The succeeding years showed volatility, with a notable decrease of 89% in 2019-2020, followed by a strong rebound of 78% in 2020-2021 and an additional increase of 38% in 2021-2022. The most recent data for 2022-2023 indicates a more moderate growth of 9%, culminating in an export value of $1116.17 million.

4.1.5 GROWTH RATE OF MILLETS FROM 2013 TO 2023

Table number 4.1.5 describes the growth rate of millets from the period 2013 to 2023 that is for 10 years the data taken for calculation is from APEDA and DGCIS values are in the US $ millions

Table No. 4.1.5

	YEAR	VALUE in $ MILLIONS	GROWTH
HS CODE 100821 PRODUCT	2013-2014	74.85	100%
	2014-2015	88.5	15%
	2015-2016	64.16	-38%
	2016-2017	58.53	-10%
	2017-2018	57.36	-2%

MILLETS	2018-2019	77.99	26%
	2019-2020	59.45	-31%
	2020-2021	58.82	-1%
	2021-2022	62.95	7%
	2022-2023	75.46	17%

Source: APEDA, DGCIS

Chart No. 4.1.5

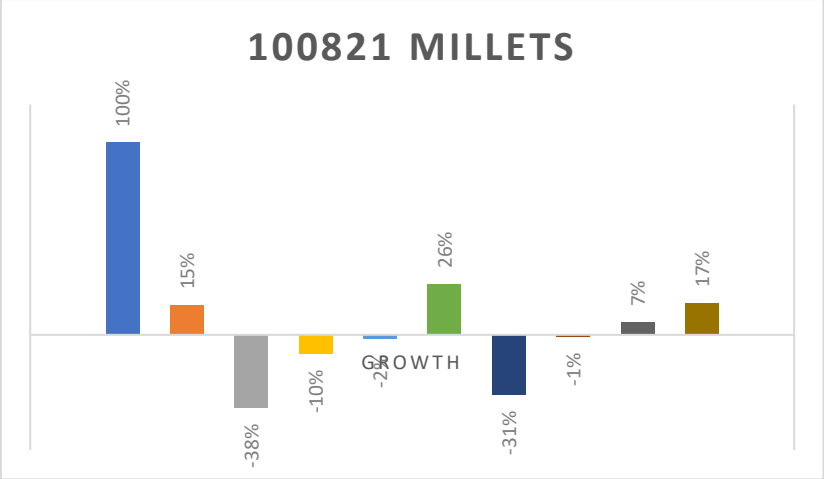


Table number 4.1.5 tells us about the millet exports under HS Code 100821 from 2013 to 2023, showcasing annual values in million dollars and the corresponding growth rates. Millets exports began at $74.85 million in 2013-2014, with a growth rate of 100%. Subsequent years witnessed fluctuations: an increase of 15% in 2014-2015, followed by a decrease of 38% in 2015-2016. The export value continued to decline in 2016-2017, dropping by 10%, and further decreased by 2% in 2017-2018. However, there was a notable increase of 26% in 2018-2019, followed by a decrease of 31% in 2019-2020. The export value remained relatively stable in 2020-2021, with a marginal decrease of 1%, followed by a modest increase of 7% in 2021-2022. The most recent data for 2022-2023 indicates a more substantial growth of 17%, culminating in an export value of $75.46 million.

4.1.6 GROWTH RATE OF OTHER CEREALS FROM 2013 TO 2023

Table number 4.1.6 describes the growth rate of other millets from the period 2013 to 2023 which is for 10 years the data taken for calculation is from APEDA and DGCIS values are in US $ millions**.**

Table No. 4.1.6

	YEAR	VALUE IN $ MILLIONS	GROWTH
HS CODE 100829 PRODUCT OTHER CEREALS	2013-2014	119.06	100%
	2014-2015	113.79	-5%
	2015-2016	19.03	-498%
	2016-2017	0.71	-2580%
	2017-2018	0.56	-27%
	2018-2019	1.7	67%
	2019-2020	1.74	2%
	2020-2021	2.04	15%
	2021-2022	2.34	13%
	2022-2023	3.39	31%

Source: APEDA, DGCIS

Chart No. 4.1.6

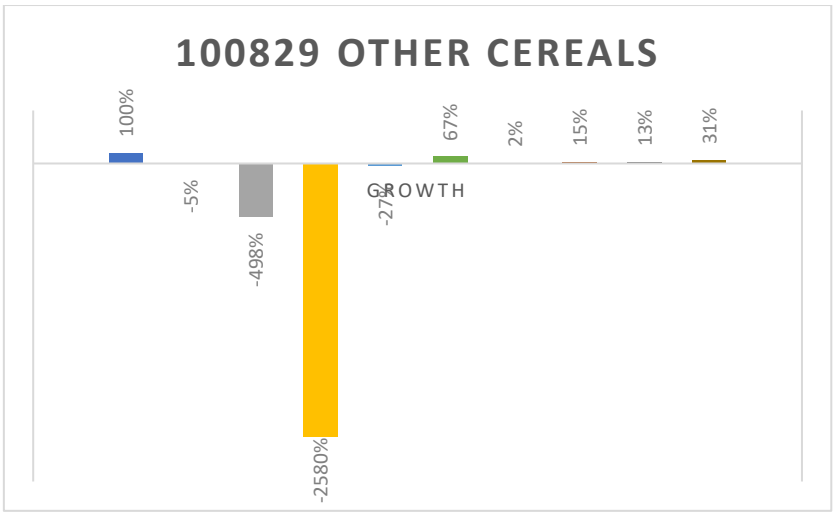


Table number 4.1.6 tells us about the Exports of other cereals under HS Code 100829 from 2013 to 2023, showcasing annual values in million dollars and the corresponding growth rates. Other cereals exports commenced at $119.06 million in 2013-2014, with a growth rate of 100%. Subsequent years saw fluctuations: a decrease of 5% in 2014-2015, followed by a substantial decline of 498% in 2015-2016. The export value continued to plummet in 2016-2017, dropping by 2580%, and further decreased by 27% in 2017-2018. However, there was a notable increase of 67% in 2018-2019, followed by a modest increase of 2% in 2019-2020. The export value continued to grow in 2020-2021, with a 15% increase and further increased by 13% in 2021-2022. The most recent data for 2022-2023 indicates a significant growth of 31%, culminating in an export value of $3.39 million.

4.2 REVEALED COMPARATIVE ADVANTAGE

This research investigates the export competitiveness of Indian rice, wheat, maize, millet and other cereals from 2017 to 2021. The Revealed Comparative Advantage (RCA) metric is employed to analyse trade data obtained from the Agricultural and Processed Food Products Export Development Authority (APEDA) of India. This study aims to determine whether India has a comparative advantage in exporting these cereals during the specified time period. The

findings will contribute to the ongoing dialogue about India's role in the global cereal market. All values are in USD millions.

4.2.1 REVEALED COMPARATIVE ADVANTAGE FOR THE YEAR 2017

Revealed Comparative advantage for cereals for the year 2017. RCA metric in the context of cereal exports from India analyses the country's competitive position in the global market. By examining trade data, RCA assesses whether India has a comparative advantage in exporting cereals compared to other countries during a specific timeframe. A positive RCA value suggests that India specializes in exporting a particular cereal relative to other countries, indicating a competitive edge in that product. A negative RCA value suggests a comparative disadvantage.

Table No. 4.2.1

HS CODE	PRODUCT	INDIAS EXPORT IN MT	GLOBAL EXPORT 2017 IN MT	INDIAS EXPORT VALUE $ MILLIONS	WORLD EXPORT VALUE IN $ MILLIONS	YEAR 2017 RCA
100510	MAIZE	190.34	32142.65	2,94,364	1,93,89,118	0.39
100191	WHEAT	96.72	40332.57	2,94,364	1,93,89,118	0.16
100630	RICE	7733.87	20621.94	2,94,364	1,93,89,118	24.70
100821	MILLETS	57.36	8590.77	2,94,364	1,93,89,118	0.44
100829	OTHER CEREALS	0.56	2326.07	2,94,364	1,93,89,118	0.02

Source: UN Comtrade, DGCIS

Table No. 4.2.1 suggests Among the listed commodities, rice emerged as a significant contributor to India's export portfolio in 2017, with an export value of $7733.87 million,

representing a substantial portion of India's total export value of $2,94,364 million. This is further underscored by rice's high Relative Comparative Advantage (RCA) score of 24.70, indicating a strong competitive position in the global market. wheat and maize also make notable contributions to India's agricultural exports, although to a lesser extent compared to rice. Wheat, with an export value of $96.72 million, and maize, with $190.34 million, demonstrate India's participation in the global market for these staple grains. However, their RCA scores of 0.16 and 0.39 respectively suggest a comparatively lower level of comparative advantage. Millets and other cereals, while representing smaller export values, still contribute to India's agricultural trade landscape. Millets, with an export value of $57.36 million and an RCA score of 0.44, show potential for position markets or specialized trade relationships. Other cereals, with a minimal export value of $0.56 million and an RCA score of 0.02, indicate a limited presence in the global export market.

4.2.2 REVEALED COMPARATIVE ADVANTAGE FOR THE YEAR 2018

Overall Revealed Comparative advantage for cereals for the year 2018. RCA metric in the context of cereal exports from India analyses the country's competitive position in the global market. By examining trade data, RCA assesses whether India has a comparative advantage in exporting cereals compared to other countries during a specific timeframe. A positive RCA value suggests that India specializes in exporting a particular cereal relative to other countries, indicating a competitive edge in that product. A negative RCA value suggests a comparative disadvantage.

Table No. 4.2.2

HS CODE	PRODUCT	INDIAS EXPORT IN MTY	GLOBAL EXPORT 2018 IN MT	INDIAS EXPORT VALUE IN $ MILLIONS	WORLD EXPORT VALUE IN $ MILLIONS	YEAR 2018 RCA
100510	MAIZE	270.3	35351.38	3,22,292	2,12,64,863	0.50
100191	WHEAT	60.54	39334.42	3,22,292	2,12,64,863	0.10
100630	RICE	7770.35	22214.71	3,22,292	2,12,64,863	23.08
100821	MILLETS	77.99	8303.7	3,22,292	2,12,64,863	0.62
100829	OTHER CEREALS	1.7	1993.99	3,22,292	2,12,64,863	0.06

Source: UN Comtrade, DGCIS

Table No. 4.2.2 suggests in 2018, India's agricultural export dynamics revealed intriguing insights across various commodities. Rice, a keystone of India's agricultural exports, continued to exhibit healthy performance, exporting 7770.35 million worth, against a backdrop of global export valued at $22214.71 million. This maintained India's substantial presence in the rice export market, evidenced by its high Relative Comparative Advantage (RCA) score of 23.08. Meanwhile, maize emerged as a standout performer, with export values reaching $270.3 million, marking a significant increase compared to the previous year. This growth was complemented by a notable rise in India's RCA score for maize to 0.50, signaling an improved comparative advantage in this commodity. Equally, wheat experienced a downturn in exports, dropping to $60.54 million, despite a stable global export scenario. This decline underscores

potential challenges in India's wheat export domain, deserving further investigation into underlying factors, millets and other cereals maintained their presence in India's export portfolio, albeit at relatively modest levels. Millets, with export values of $77.99 million, showcased a slight increase from the previous year, accompanied by a notable rise in the RCA score to 0.62, indicating a strengthening comparative advantage. Similarly, other cereals witnessed a marginal increase in export value, reaching $1.7 million. Despite their modest contributions, millets and other cereals represent opportunities for niche market development and diversification within India's agricultural export sector.

4.2.3 REVEALED COMPARATIVE ADVANTAGE FOR THE YEAR 2019

Revealed Comparative advantage for cereals for the year 2019. RCA metric in the context of cereal exports from India analyses the country's competitive position in the global market. By examining trade data, RCA assesses whether India has a comparative advantage in exporting cereals compared to other countries during a specific timeframe. A positive RCA value suggests that India specializes in exporting a particular cereal relative to other countries, indicating a competitive edge in that product. A negative RCA value suggests a comparative disadvantage.

Table No. 4.2.3

HS CODE	PRODUCT	INDIAS EXPORT IN MT	GLOBAL EXPORT 2019 IN MT	INDIAS EXPORT VALUE IN $ MILLIONS	WORLD EXPORT VALUE $ MILLIONS	YEAR 2019 RCA
100510	MAIZE	142.78	34905.32	3,23,251	2,06,44,645	0.26
100191	WHEAT	61.84	36423.07	3,23,251	2,06,44,645	0.11
100630	RICE	6345.29	17293.64	3,23,251	2,06,44,645	23.43

100821	MILLETS	59.45	7205.41	3,23,251	2,06,44,645	0.53
100829	OTHER CEREALS	1.74	1236	3,23,251	2,06,44,645	0.09

Source: UN Comtrade, DGCIS

Table No. 4.2.3 suggests in 2019, India's agricultural export landscape showcased varying performances across different commodities. Rice maintained its significant presence in the global market, with exports totaling $6345.29 million, supported by a high Relative Comparative Advantage (RCA) score of 23.43. However, maize and wheat experienced declines in export values, with maize dropping to $142.78 million and wheat to $61.84 million. The RCA scores for maize (0.26) and wheat (0.11) reflected weakening comparative advantages in these commodities. Millets and other cereals, though representing smaller export values, demonstrated resilience, with millets exporting $59.45 million and other cereals $1.74 million. The RCA scores for millets (0.53) and other cereals (0.09) indicated potential for niche market development. Overall, while rice-maintained dominance, the declines in maize and wheat exports highlight challenges, emphasizing the need for strategic interventions to enhance competitiveness. Millets and other cereals offer opportunities for diversification, suggesting avenues for targeted market development strategies in India's agricultural export sector.

4.2.4 REVEALED COMPARATIVE ADVANTAGE FOR THE YEAR 2020

Overall Revealed Comparative advantage for cereals for the year 2020. RCA metric in the context of cereal exports from India analyses the country's competitive position in the global market. By examining trade data, RCA assesses whether India has a comparative advantage in exporting cereals compared to other countries during a specific timeframe. A positive RCA value suggests that India specializes in exporting a particular cereal relative to other countries,

indicating a competitive edge in that product. A negative RCA value suggests a comparative disadvantage.

Table No. 4.2.4

HS CODE	PRODUCT	INDIAS EXPORT IN MT	GLOBAL EXPORT 2020 IN MT	INDIAS EXPORT VALUE $ MILLIONS	WORLD EXPORT VALUE IN $ MILLIONS	YEAR 2020 RCA
100510	MAIZE	634.85	37252.53	2,75,489	1,93,07,195	1.19
100191	WHEAT	549.7	40351.66	2,75,489	1,93,07,195	0.95
100630	RICE	8818.62	19304.38	2,75,489	1,93,07,195	32.02
100821	MILLETS	58.82	7834.38	2,75,489	1,93,07,195	0.53
100829	OTHER CEREALS	2.04	2216.85	2,75,489	1,93,07,195	0.06

Source: UN Comtrade, DGCIS

Table No. 4.2.4 suggests in 2020, India's agricultural export landscape continued to evolve, with significant shifts observed across various commodities. Rice maintained its dominant position, with exports reaching $8818.62 million, showcasing a strong performance despite a slight decrease in global export values. This resilience is underscored by the high Relative

Comparative Advantage (RCA) score of 32.02, reaffirming India's strong competitive advantage in the global rice market. Maize and wheat also demonstrated noteworthy performances, with maize experiencing a substantial increase in export values to $634.85 million and wheat reaching $549.7 million. These increases signify improved competitiveness in both commodities, as reflected by their respective RCA scores of 1.19 and 0.95. Millets and other cereals maintained their presence, albeit at modest levels, with millets exporting $58.82 million and other cereals $2.04 million. While these commodities represent smaller export values, their stable performances underscore opportunities for niche market development and diversification within India's agricultural export sector.

4.2.5 REVEALED COMPARATIVE ADVANTAGE FOR THE YEAR 2021

Overall Revealed Comparative advantage for cereals for the year 2021. RCA metric in the context of cereal exports from India analyses the country's competitive position in the global market. By examining trade data, RCA assesses whether India has a comparative advantage in exporting cereals compared to other countries during a specific timeframe. A positive RCA value suggests that India specializes in exporting a particular cereal relative to other countries, indicating a competitive edge in that product. A negative RCA value suggests a comparative disadvantage.

Table No. 4.2.5

HS CODE	PRODUCT	INDIAS EXPORT IN MT	GLOBAL EXPORT 2021 IN $ MILLIONS	INDIAS EXPORT VALUE IN $ MILLIONS	WORLD EXPORT VALUE IN $ MILLIONS	YEAR 2021 RCA
100510	MAIZE	1020.88	52864.28	3,94,814	2,42,27,433	1.19

100191	WHEAT	2121.75	51295.84	3,94,814	2,42,27,433	2.54
100630	RICE	9664.67	21279.71	3,94,814	2,42,27,433	27.87
100821	MILLETS	62.95	12171.42	3,94,814	2,42,27,433	0.32
100829	OTHER CEREALS	2.34	4097.08	3,94,814	2,42,27,433	0.04

Source: UN Comtrade, DGCIS

Table No. 4.2.5 suggests In 2021, India's agricultural export landscape continued to show promising trends across various commodities. Rice maintained its leading position with exports totaling $9664.67 million, showcasing resilience despite a slight decrease in global export values. This is underscored by a high Relative Comparative Advantage (RCA) score of 27.87, highlighting India's continued competitive advantage in the global rice market. Maize and wheat also demonstrated significant growth in export values, with maize reaching $1020.88 million and wheat soaring to $2121.75 million. Both commodities maintained their competitive edge, as reflected by their respective RCA scores of 1.19 and 2.54, indicating robust comparative advantages. Millets and other cereals, although representing smaller export values, showcased stable performances with millets exporting $62.95 million and other cereals $2.34 million. While these commodities may not dominate in terms of export volume, their consistent performance underscores opportunities for niche market development and diversification within India's agricultural export sector.

4.3 COMPOUNDED ANNUAL GROWTH RATE

This study examines the growth trends and export competitiveness of Indian cereals from 2013 to 2023. Compound Annual Growth Rate (CAGR) is employed to analyze trade data for various cereals obtained from the Agricultural and Processed Food Products Export Development Authority (APEDA) of India. The analysis will explore potential factors influencing export competitiveness and growth trends. Also calculated from 2020 to 2023 for three years to see the impact of COVID-19 on cereals export growth rate. All values in USD millions

4.3.1 COMPOUNDED ANNUAL GROWTH RATE OF CEREALS FROM 2013 TO 2023

Table No. 4.3.1

HS CODE	PRODUCT	BEGINNING VALUE IN $ MILLIONS	ENDING VALUE IN $ MILLIONS	PERIOD 2014-2023	CAGR
100630	BASMATI RICE	4866.3	4787.5	10	0%
100630	NON-BASMATI	2917.76	6355.74	10	8%
100191	WHEAT	1566.49	1519.69	10	0%
100510	MAIZE	1004.18	1116.17	10	1%
100821	MILLETS	74.85	75.46	10	0%
100829	OTHER CEREALS	119.06	3.39	10	-30%

Sources: UN Comtrade, DGCIS

Table No. 4.3.1 offers insights into the beginning and ending values of various agricultural products over a ten-year period from 2014 to 2023, along with their Compound Annual Growth Rates (CAGR). Basmati rice and non-basmati rice showcase stable performance, with basmati rice maintaining a relatively consistent value from $4866.3 million to $4787.5 million, resulting in a 0% CAGR, while non-basmati rice experiences significant growth from 2917.76 to $6355.74 million, resulting in an impressive 8% CAGR.

Wheat and millets display minimal changes in value over the period, with wheat showing a negligible decrease from $1566.49 million to $1519.69 million, resulting in a 0% CAGR, and millets maintaining a relatively stable value from $74.85 million to $75.46 million, resulting in a 0% CAGR. Maize demonstrates moderate growth, increasing from $1004.18 million to $1116.17 million, resulting in a 1% CAGR. other cereals experience a significant decline in value from $119.06 million to $3.39 million, resulting in a negative 30% CAGR. This drastic decline warrants further investigation into the factors contributing to this trend, such as changes in demand, production, or market dynamics.

4.3.2 COMPOUNDED ANNUAL GROWTH RATE OF CEREALS FROM 2020 TO 2023

Table No. 4.3.2

HS CODE	PRODUCT	BEGINNING VALUE IN MT	ENDING VALUE IN MT	PERIOD 2020-2023	CAGR
100191	WHEAT	549.67	1519.68	4	458%
100510	MAIZE	634.85	1116.15	4	368%
100821	MILLETS	58.81	75.43	4	102%
100630	RICE	8818.47	11143.13	4	594%

100829	OTHER CEREALS	2.03	3.4	4	8%

Source: UN Comtrade, DGCIS

Table No. 4.3.2 illustrates the beginning and ending values of various cereal exports, measured in US million dollars, over four years from 2020 to 2023, along with their Compound Annual Growth Rates (CAGR). Amidst the COVID-19 pandemic, significant shifts in export values are evident, reflecting the pandemic's impact on cereal exports.

Wheat experienced remarkable growth, increasing from $549.67 million to $1519.68 million over the four years, resulting in an impressive CAGR of 458%. Similarly, maize and rice also demonstrated notable growth, with maize increasing from $634.85 million to $1116.15 million (CAGR of 368%) and rice increasing from $8818.47 million to $11143.13 million (CAGR of 594%). These increases may be attributed to changes in demand patterns, supply chain disruptions, or government interventions in response to the pandemic.

Millets and other cereals exhibited more modest growth, with millets increasing from $58.81 million to $75.43 million (CAGR of 102%) and other cereals increasing from $2.03 million to $3.4 million (CAGR of 8%). Despite facing challenges during the pandemic, these commodities displayed resilience, suggesting potential opportunities for further market adaptation and growth.

4.4 INSTABILITY INDEX FOR CEREALS FROM 2013 TO 2023

The instability index is a metric commonly used in economic analysis to measure the volatility or fluctuations in a particular variable over time. In the context of this dissertation on the export competitiveness of Indian cereals, employing the instability index could provide valuable insights into the stability of cereal exports over the analyzed period. By calculating the instability index for each cereal category using the data sourced from APEDA, we can quantify

the degree of variability or instability in their export values. This analysis would help identify periods of significant fluctuations and assess the overall stability of Indian cereal exports in comparison to each other.

4.4.1 INSTABILITY INDEX FOR BASMATI RICE FOR 2013 TO 2023

Table No. 4.4.1

		YEAR	VALUE USD MIL	
HS CODE 100630 PRODUCT BASMATI RICE		2013-2014	4866.3	
		2014-2015	4518.11	
		2015-2016	3477.98	
		2016-2017	3216.59	
		2017-2018	4169.48	
		2018-2019	4722.52	
		2019-2020	4330.69	
		2020-2021	4018.71	
		2021-2022	3540.4	
		2012-2023	4787.5	
STD DEVIATION	**MEAN**	**ADJ R SQUARE**	**CV**	**INSTABILITY INDEX**
589.2858244	4164.828	-0.124006873	14.1491035	15.00076

Source: APEDA, DGCIS

Table No. 4.4.1 suggests the instability index value of Basmati rice is 15.00076 suggesting a medium instability level of volatility or instability in Basmati rice exports over the analysed period. This index measures the degree of variability or fluctuation in export values, indicating the level of uncertainty or risk associated with Basmati rice exports. A higher instability index value signifies greater volatility, implying that Basmati rice exports experienced fluctuations

that may have been influenced by various factors such as changes in demand, supply, market conditions, trade policies, and other external factors.

4.4.2 INSTABILITY INDEX FOR NON-BASMATI RICE FOR 2013 TO 2023

Table No. 4.4.2

		YEAR	VALUE USD MIL	
HS CODE 100630 PRODUCT NON-BASMATI		2013-2014	2917.76	
		2014-2015	3334.71	
		2015-2016	2368.64	
		2016-2017	2531.47	
		2017-2018	3564.39	
		2018-2019	3047.83	
		2019-2020	2014.6	
		2020-2021	4799.91	
		2021-2022	6124.27	
		2022-2023	6355.74	
STD DIVIATION	**MEAN**	**ADJ R SQUARE**	**CV**	**INSABILITY INDEX**
1538.653706	3705.932	0.461754188	41.5186708	30.46027

Source: APEDA, DGCIS

Table No. 4.4.2 suggests the instability index for non-Basmati rice exports, with a value of 30.46027, indicates a significant level of volatility or high instability in the export values over the analyzed period. This index measures the degree of fluctuation or variability in non-Basmati rice exports, reflecting the uncertainty and risk associated with this commodity's export market.

4.4.3 INSTABILITY INDEX OF WHEAT FOR 2013 TO 2023

Table No. 4.4.3

		YEAR	VALUE USD MILLIONS	
HS CODE 100191 PRODUCT WHEAT		2013-2014	1566.49	
		2014-2015	828.76	
		2015-2016	164.22	
		2016-2017	67.24	
		2017-2018	96.72	
		2018-2019	60.54	
		2019-2020	61.84	
		2020-2021	549.7	
		2021-2022	2121.75	
		2022-2023	1519.69	
STD DEVIATION	**MEAN**	**ADJ R SQUARE**	**CV**	**INSTABILITY INDEX**
771.0492013	703.695	-0.05469222	109.571505	112.528

Source: APEDA, DGCIS

Table No. 4.4.3 suggests the instability index for wheat exports, with a value of 112.528, indicates a high level of volatility or high instability in the export values over the analyzed period. This index measures the degree of fluctuation or variability in wheat exports, reflecting the uncertainty and risk associated with this commodity's export market. A higher instability index value signifies greater unpredictability in export values, which could be influenced by

factors such as changing market conditions, fluctuations in demand and supply, trade policies, and other external factors. In practical terms, this suggests that wheat exports experienced significant fluctuations over the examined period.

4.4.4 INSTABILITY INDEX OF MAIZE FOR 2013 TO 2023

Table No. 4.4.4

		YEAR	VALUE	
HS CODE 100510 PRODUCT MAIZE		2013-2014	1004.18	
		2014-2015	666.72	
		2015-2016	177.99	
		2016-2017	153.57	
		2017-2018	190.34	
		2018-2019	270.3	
		2019-2020	142.78	
		2020-2021	634.85	
		2021-2022	1020.88	
		2022-2023	1116.17	
STD DEVIATION	**MEAN**	**ADJ R SQUARE**	**CV**	**INSTABILITY INDEX**
399.5621135	537.778	-0.044663623	74.2987094	75.93981

Source: APEDA, DGCIS

Table No. 4.4.4 suggests the instability index for maize exports, with a value of 75.93981, suggests a high instability in the export values over the analyzed period. This index measures the degree of fluctuation or variability in maize exports, reflecting the uncertainty and risk

associated with this commodity's export market. A higher instability index value signifies greater unpredictability in export values, which could be influenced by factors such as changing market conditions, fluctuations in demand and supply, trade policies, and other external factors.

4.4.5 INSTABILITY INDEX OF MILLETS FOR 2013 TO 2023

Table No. 4.4.5

		YEAR	VALUE IN $ MILLIONS	
HS CODE 100821 PRODUCT MILLETS		2013-2014	74.85	
		2014-2015	88.5	
		2015-2016	64.16	
		2016-2017	58.53	
		2017-2018	57.36	
		2018-2019	77.99	
		2019-2020	59.45	
		2020-2021	58.82	
		2021-2022	62.95	
		2022-2023	75.46	
STD DEVIATION	**MEAN**	**ADJ R SQUARE**	**CV**	**INSTABILITY INDEX**
10.66023353	67.807	-0.020962896	15.7214351	15.88536

Source: APEDA, DGCIS

Table No. 4.4.5 suggests The instability index for millets exports, with a value of 15.88536, indicates a low level of volatility or low instability in the export values over the analyzed

period. This index measures the degree of fluctuation or variability in millets exports, reflecting the uncertainty and risk associated with this commodity's export market. A lower instability index value suggests relatively stable export values, with less variability compared to commodities with higher instability index values

4.4.6 INSTABILITY INDEX OF OTHER CEREALS FOR 2013 TO 2023

Table No. 4.4.6

		YEAR	VALUE	
HS CODE 100829 PRODUCT OTHER CEREALS		2013-2014	119.06	
		2014-2015	113.79	
		2015-2016	19.03	
		2016-2017	0.71	
		2017-2018	0.56	
		2018-2019	1.7	
		2019-2020	1.74	
		2020-2021	2.04	
		2021-2022	2.34	
		2022-2023	3.39	
STD DIVIATION	**MEAN**	**ADJ R SQUARE**	**CV**	**INSTABILITY INDEX**
47.75496744	26.436	0.475806086	180.643696	130.7883

Source: APEDA, DGCIS

The instability index for exports of other cereals, with a value of 130.7883, suggests a high level of volatility or high instability in the export values over the analysed period. This index

measures the degree of fluctuation or variability in other cereals exports, reflecting the uncertainty and risk associated with this commodity's export market. A higher instability index value indicates greater unpredictability in export values, which could be influenced by factors such as changing market conditions, fluctuations in demand and supply, trade policies, and other external factors.

4.5 TOP TEN DESTINATIONS OF CEREALS FROM INDIA

India's prominence in the global cereal market is underscored by its dual status as both the largest producer and the largest exporter of cereal products worldwide. In the fiscal year 2022-23, India's cereal exports reached a substantial value of Rs. 111,062.37 Crore or 13,857.95 USD Millions. Within this expansive export portfolio, rice, encompassing both Basmati and Non-Basmati varieties, commands a dominant position, constituting a significant 80% share in the total value of India's cereal exports during the same period. This emphasis on rice exports highlights the country's esteemed position as a major supplier of this staple grain to global markets. However, it's noteworthy that while rice holds power, other cereals such as wheat make up the remaining 20% share of India's total cereal exports, adding diversity to the country's export profile. The destinations for these cereal exports in the fiscal year 2022-23 include prominent countries such as Bangladesh, Saudi Arabia, Iran, the United Arab Emirates, and Benin. These nations represent crucial markets for Indian cereals, showcasing the breadth and depth of India's export reach across diverse regions. Through strategic trade relationships and a commitment to quality and reliability, India continues to play a pivotal role in meeting global cereal demands while bolstering its own economic prosperity through exports.

4.5.1 TOP TEN DESTINATIONS FOR BASMATI RICE FROM INDIA

Table No. 4.5.1

Product: Basmati Rice **Qty In MT; Value in US$ Mill**						
	2020-21		**2021-22**		**2022-23**	
Importing Countries	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**
SAUDI ARAB	1035026	951.99	674851.09	646.32	954484.22	1036.72
IRAN	747458.7	590.67	998045.45	818.09	998879.03	980.14
IRAQ	645893.88	499.62	486296.21	400.45	364064.3	375.41
U ARAB EMTS	229470.86	203.59	257258.44	221.26	315313.34	334.93
YEMEN REPUBLC	336089.9	278.32	205948.08	183.92	289604.58	307.57
U S A	180858.92	194.57	161004.58	183.94	204025.82	239.32
KUWAIT	176051.66	168.26	147484.93	128.84	156440.1	158.84
U K	170698.16	139.49	131321.85	118.6	142617.85	137.26
OMAN	99769.99	88.69	77469.38	73.32	112063.33	125.25
JORDAN	72972.07	62.94	62627.82	57.14	105736.77	116.06
Top 10 Total	3694290.14	3178.14	3202307.83	2831.88	3643229.34	3811.5
Other Countries	936173	840.57	745853.2	708.52	915742.89	976
Total	4630463.14	4018.71	3948161.03	3540.4	4558972.23	4787.5
% Share of Top 10 Countries	79.78	79.07	81.11	80	79.91	79.62

Source: DGCIS

The table number 4.5.1 provides data on the top ten destinations for Basmati Rice exports over three consecutive years: 2020-21, 2021-22, and 2022-23. The quantities of Basmati Rice exported are measured in MT, while the value of these exports is denoted in millions of US dollars.

In 2020-21, Saudi Arabia emerged as the leading importer with 1,035,026 MT of Basmati Rice valued at $951.99 million, followed by Iran with 747,458.7 MT valued at $590.67 million and Iraq with 645,893.88 MT valued at $499.62 million. However, by 2021-22, Saudi Arabia's imports decreased to 674,851.09 MT valued at $646.32 million, while Iran's and Iraq's imports increased to 998,045.45 MT ($818.09 million) and 486,296.21 MT ($400.45 million), respectively.

In 2022-23, Saudi Arabia regained its top position with 954,484.22 MT of Basmati Rice valued at $1,036.72 million. Meanwhile, Iran and Iraq maintained their second and third positions with 998,879.03 MT ($980.14 million) and 364,064.3 MT ($375.41 million), respectively.

The top ten destinations accounted for a significant portion of Basmati Rice exports, representing approximately 79.78% in 2020-21, 81.11% in 2021-22, and 79.91% in 2022-23 of the total export volume and 79.07%, 80%, and 79.62% of the total export value. The United States, Kuwait, and the United Kingdom consistently appeared in the top ten importers alongside Middle Eastern countries like the United Arab Emirates, Yemen, Oman, and Jordan, reflecting the enduring popularity of Basmati Rice across various regions.

4.5.2 TOP TEN DESTINATIONS OF NON-BASAMATI RICE FROM INDIA

Table No. 4.5.2

Product: Non-Basmati Rice **Qty In MT; Value in US$ Mill**						
	2020-21		**2021-22**		**2022-23**	
Importing Countries	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**
BENIN	1231400.55	442.97	1526409.72	531.44	1557691.02	529.21
CHINA P RP	331571.1	103.7	1633002.13	496.74	1504097.77	494.96
SENEGAL	1036352.34	304.88	1090952.74	312.02	1332725.29	432.65
COTE D IVOIRE	732428.05	260.3	932160.81	323.16	1210505.32	420.59
TOGO	780284.35	283.02	843329.13	293.94	940020.79	331.07
GUINEA	610141.91	224.5	673320.23	243.73	910694.11	324.38
BANGLADESH PR	911866.66	350.19	1623565.25	612.16	840441.62	305.94
NEPAL	1284631.35	396.01	1387355.08	458.01	765455.12	245.38
VIETNAM SOC REP	293480.54	90.15	707819.25	230.82	644990.36	201.84
KENYA	165760.38	60.18	156785.77	57.04	588237.25	195.48
Top 10 Total	7377917.23	2515.9	10574700.11	3559.06	10294858.65	3481.5
Other Countries	5717212.98	2284.01	6687534.97	2565.21	7491234.16	2874.24

Total	13095130.21	4799.91	17262235.08	6124.27	17786092.81	6355.74
% Share of Top 10 Countries	56.34	52.42	61.26	58.12	57.88	54.78

Source: DGCIS

The table 4.5.2 provides data on the top ten destinations for non-Basmati Rice exports across three consecutive years: 2020-21, 2021-22, and 2022-23. Quantities of non-Basmati Rice exported are measured in MT (MT), while the value of these exports is denoted in millions of US dollars.

In 2020-21, Benin emerged as the leading importer with 1,231,400.55 MT of non-Basmati Rice valued at $442.97 million, followed closely by China (People's Republic) with 331,571.1 MT valued at $103.7 million and Senegal with 1,036,352.34 MT valued at $304.88 million.

The dynamics shifted notably in 2021-22, with China (People's Republic) catapulting to the top spot by importing a substantial 1,633,002.13 MT of non-Basmati Rice valued at $496.74 million. Benin and Bangladesh also featured prominently as major importers during this period.

By 2022-23, although China (People's Republic) maintained its position as the top importer, its imports decreased slightly to 1,504,097.77 MT valued at $494.96 million. Other significant importers included Senegal, Cote d'Ivoire, and Bangladesh, reflecting a consistent demand for non-Basmati Rice in these regions.

the top ten destinations for non-Basmati Rice accounted for a substantial portion of exports, representing approximately 56.34% in 2020-21, 52.42% in 2021-22, and 61.26% in 2022-23 of the total export volume and 58.12%, 57.88%, and 54.78% of the total export value, respectively. These destinations include countries in West Africa such as Benin, Senegal, Cote d'Ivoire, and Togo, as well as Asian countries like China, Bangladesh, Nepal, and Vietnam.

The data underscores the diverse range of countries contributing to the global trade of non-Basmati Rice and highlights the importance of understanding regional preferences and market dynamics in rice exportation.

4.5.3 TOP TEN DESTINATIONS OF WHEAT FROM INDIA

Table No. 4.5.3

Product: Wheat **Qty In MT; Value in US$ Mill**						
	2020-21		**2021-22**		**2022-23**	
Importing Countries	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**
BANGLADESH PR	1157399.35	299.36	4082843.1	1193.13	1297881.09	418.75
INDONESIA	56051	15.29	370921.88	107.22	862477.13	279.07
KOREA RP	0.03	0	222655.2	69.87	504809.2	155.2
U ARAB EMTS	187949.46	51	470596.97	136.53	456275.6	150.17
YEMEN REPUBLC	86000	24.05	352910	109.84	252505	86.48
THAILAND	0.2	0	23404.58	7.64	212002.51	67.1
PHILIPPINES	2135	0.55	372536.86	109.25	175381.96	56.27
OMAN	30179.33	8.37	92485.07	27.09	137292.63	44.67
SRI LANKA DSR	94039.63	24.73	582917.38	172.51	121910.68	40.05
VIETNAM SOC REP	0	0	15715.13	4.75	73190	23.51
Top 10 Total	1613754	423.35	6586986.17	1937.83	4093725.8	1321.27

Other Countries	474733.66	126.35	652380.61	183.92	599538.29	198.42
Total	2088487.66	549.7	7239366.78	2121.75	4693264.09	1519.69
% Share of Top 10 Countries	77.27	76.91	90.99	91.33	87.23	86.91

Source: DGCIS

The table number 4.5.3 presents data on the top ten destinations for wheat exports over three consecutive years: 2020-21, 2021-22, and 2022-23. Quantities of wheat exported are measured in MT (MT), while the value of these exports is denoted in millions of US dollars.

In 2020-21, Bangladesh emerged as the top importer, importing 1,157,399.35 MT of wheat valued at $299.36 million, followed by Indonesia with 56,051 MT valued at $15.29 million. However, by 2021-22, Bangladesh significantly increased its imports to 4,082,843.1 MT valued at $1,193.13 million, indicating a substantial rise in demand. This shift propelled Bangladesh to maintain its top position as the largest importer of wheat. Indonesia, the United Arab Emirates, and Yemen also featured prominently among the top importers during this period.

By 2022-23, the trend continued with Bangladesh remaining the leading importer, though its imports decreased to 1,297,881.09 MT valued at $418.75 million. Other significant importers included Indonesia, Korea (Republic of), and the United Arab Emirates. Notably, the top ten destinations accounted for a significant share of the total wheat exports, representing approximately 77.27% in 2020-21, 76.91% in 2021-22, and 90.99% in 2022-23 of the total export volume and 91.33%, 87.23%, and 86.91% of the total export value, respectively.

This data underscores the importance of understanding the changing dynamics of wheat trade, particularly in regions like South Asia and the Middle East. It highlights Bangladesh's growing demand for wheat, which has positioned it as a key player in the global wheat market.

Additionally, it emphasizes the need for exporters to monitor and adapt to fluctuations in demand among key importing countries to optimize trade opportunities.

4.5.4 TOP TEN DESTINATIONS FOR MAIZE FROM INDIA

Table No. 4.5.4

Product: Maize **Qty In MT; Value in US$ Mill**						
	2020-21		**2021-22**		**2022-23**	
Importing Countries	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**
BANGLADESH PR	1566667.93	328.07	1530111.44	432.62	1709548.02	551.76
VIETNAM SOC REP	498322.19	120.41	1180739.42	309.62	891953.45	277.05
NEPAL	581021.1	118.14	587020.64	152.99	391505.46	119.89
MALAYSIA	112803.14	27.05	266095.26	70.09	182085.41	57.52
SRI LANKA DSR	25.9	0.01	25596.58	7.41	135439.67	43.84
THAILAND	2144.95	4.03	2398.97	4.25	55872.97	26.55
BHUTAN	21963.46	4.43	23766.83	6.32	18819.1	5.79
OMAN	13824.07	3.56	14302.45	4.07	12216.14	4.23
MYANMAR	4753.1	8.68	9901.63	16.2	2476.2	4.16
U ARAB EMTS	20433.92	5.21	3657.59	1.1	12009.4	4.1
Top 10 Total	2821959.76	619.59	3643590.81	1004.67	3411925.82	1094.89
Other Countries	57243.17	15.26	46878.29	16.21	41754.76	21.28
Total	2879202.93	634.85	3690469.1	1020.88	3453680.58	1116.17

% Share of Top 10 Countries	98.01	97.64	98.73	98.43	98.79	98.12

Source: DGCIS

The table 4.5.4 presents data on the top ten destinations for maize exports over three consecutive years: 2020-21, 2021-22, and 2022-23. Quantities of maize exported are measured in MT (MT), while the value of these exports is denoted in millions of US dollars.

In 2020-21, Bangladesh was the leading importer of maize, importing 1,566,667.93 MT valued at $328.07 million. Vietnam (Socialist Republic) and Nepal also featured prominently among the top importers. By 2021-22, Bangladesh continued to maintain its top position, importing 1,530,111.44 MT valued at $432.62 million, showcasing sustained demand for maize in the country. Vietnam and Nepal remained significant importers during this period as well.

In 2022-23, the trend persisted, with Bangladesh remaining the largest importer, though its imports increased to 1,709,548.02 MT valued at $551.76 million. Vietnam and Nepal also continued to be major importers of maize. Notably, the top ten destinations accounted for a significant share of the total maize exports, representing approximately 98.01% in 2020-21, 97.64% in 2021-22, and 98.79% in 2022-23 of the total export volume and 98.43%, 98.12%, and 98.73% of the total export value, respectively.

This data underscores the consistent demand for maize in countries like Bangladesh, Vietnam, and Nepal. It highlights the importance of these nations as key players in the global maize market and emphasizes the need for exporters to monitor and adapt to fluctuations in demand among these major importing countries.

4.5.5 TOP TEN DESTINATIONS FOR MILLETS FROM INDIA

Table No. 4.5.5

Product: Millet **Qty In MT; Value in US$ Mill**						
	2020-21		**2021-22**		**2022-23**	
Importing Countries	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**
U ARAB EMTS	27862.74	11.63	33264.65	11.26	34017.21	13.33
SAUDI ARAB	20349.7	6.12	20143.03	6.62	24518.69	10.39
NEPAL	22468.43	6.55	21315.41	5.94	20020.01	5.57
BANGLADESH PR	6421.93	2.06	7810.52	2.35	12629.45	3.69
JAPAN	5482.88	2.6	6106.73	2.94	6588.15	3.37
U S A	2804.64	3.07	3272.18	4.4	2105.97	3.1
GERMANY	2695.09	2.67	2738.63	2.58	2009.52	2.88
LIBYA	5238.63	1.69	3891.5	1.39	6811.77	2.71
EGYPT A RP	1223.27	0.58	2349.6	2.16	1461.65	2.2
OMAN	3164.12	0.94	6292.21	1.88	5850.53	2.13
Top 10 Total	97711.43	37.91	107184.46	41.52	116012.95	49.37
Other Countries	49282.18	20.91	51325.52	21.43	53036.26	26.09
Total	146993.61	58.82	158509.98	62.95	169049.21	75.46
% Share of Top 10 Countries	66.47	64.41	67.62	66.67	68.63	65.33

Source: DGCIS

The table number 4.5.5 presents data on the top ten destinations for millet exports over three consecutive years: 2020-21, 2021-22, and 2022-23. Quantities of millet exported are measured in MT (MT), while the value of these exports is denoted in millions of US dollars.

In 2020-21, the United Arab Emirates emerged as the leading importer of millet, importing 27,862.74 MT valued at $11.63 million. Saudi Arabia and Nepal also featured prominently among the top importers. By 2021-22, the trend continued, with the United Arab Emirates, Saudi Arabia, and Nepal maintaining their positions as significant importers of millet.

In 2022-23, the pattern persisted, with the United Arab Emirates remaining the largest importer, importing 34,017.21 MT valued at $13.33 million. Saudi Arabia and Nepal also continued to be major importers of millet. Notably, the top ten destinations accounted for a significant share of the total millet exports, representing approximately 66.47% in 2020-21, 64.41% in 2021-22, and 68.63% in 2022-23 of the total export volume and 66.67%, 65.33%, and 67.62% of the total export value, respectively.

This data underscores the consistent demand for millet in countries like the United Arab Emirates, Saudi Arabia, and Nepal. It highlights the importance of these nations as key players in the global millet market and emphasizes the need for exporters to monitor and adapt to fluctuations in demand among these major importing countries. Additionally, it suggests potential opportunities for exporters to capitalize on the steady demand for millet in these regions.

4.5.6 TOP TEN DESTINATIONS FOR OTHER CREALS FROM INDIA

Table No. 4.5.6

Product: Other Cereals **Qty In MT; Value in US$ Mill**						
	2020-21		**2021-22**		**2022-23**	
Importing Countries	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**	**Qty**	**US$ Mill**
VIETNAM SOC REP	762.4	0.29	1076.74	0.47	719.12	0.48
U ARAB EMTS	66.91	0.16	202.88	0.29	248.09	0.4
RUSSIA	19	0.03	52.25	0.07	220	0.29
MALAYSIA	7.39	0.01	15.97	0.03	374.75	0.27
NEPAL	389.07	0.1	548.24	0.19	564.46	0.22
QATAR	204.18	0.13	59.74	0.03	77.57	0.22
U S A	142.43	0.25	66	0.14	85.55	0.19
SAUDI ARAB	5.46	0.01	36.99	0.05	91.97	0.17
IRAN	0	0	41.5	0.05	145	0.15
NETHERLAND	19.25	0.04	20.02	0.03	86.25	0.12
Top 10 Total	1616.09	1.02	2120.33	1.35	2612.76	2.51
Other Countries	1316.69	1.02	929.25	0.99	1188.42	0.88
Total	2932.78	2.04	3049.58	2.34	3801.18	3.39
% Share of Top 10 Countries	55.1	50	69.51	50	68.75	100

Source: DGCIS

The table number 4.5.6 provides data on the top ten destinations for other cereals exports over three consecutive years: 2020-21, 2021-22, and 2022-23. Quantities of other cereals exported are measured in MT (MT), while the value of these exports is denoted in millions of US dollars.

In 2020-21, Vietnam (Socialist Republic) emerged as the leading importer of other cereals, importing 762.4 MT valued at $0.29 million. The United Arab Emirates and Russia also featured among the top importers. By 2021-22, the trend continued, with Vietnam (Socialist Republic), the United Arab Emirates, and Russia maintaining their positions as significant importers of other cereals.

In 2022-23, the pattern persisted, with Vietnam remaining the largest importer, importing 719.12 MT valued at $0.48 million. The United Arab Emirates and Russia also continued to be major importers of other cereals. Notably, the top ten destinations accounted for a significant share of the total other cereals exports, representing approximately 55.1% in 2020-21, 50% in 2021-22, and 69.51% in 2022-23 of the total export volume and 50%, 50%, and 100% of the total export value, respectively.

This data underscores the consistent demand for other cereals in countries like Vietnam, the United Arab Emirates, and Russia. It highlights the importance of these nations as key players in the global other cereals market and emphasizes the need for exporters to monitor and adapt to fluctuations in demand among these major importing countries. Additionally, it suggests potential opportunities for exporters to capitalize on the steady demand for other cereals in these regions.

4.6 INDIA’S POSITION IN WORLD MARKET FOR DIFFERENT CEREAL’S

India is the largest producer as well as the largest exporter of cereal products in the world. India's export of cereals stood at Rs. 111,062.37 Crore which is 13,857.95 USD Millions during the year 2022-23. Rice including Basmati and Non-Basmati occupy the major share in India's

total cereals export with 80% in value terms during the same period. Whereas, other cereals including wheat represent only a 20 % share of total cereals exported from India during this period. India's cereal production is around 300 million tonnes annually, with recent figures showing 304 million tonnes in 2022-23. There's a significant rise in cereal exports, with 23 million tonnes in 2020-21 and 32 million tonnes in 2021-22. India's increased exports, reaching 23 million tonnes in 2020-21 and 32 million tonnes in 2021-22, indicate the surplus's role in shaping India's position in the global cereal market.

4.6.1 INDIAS POSITION AND TOP TEN COUNTRIES IN WORLD MARKET FOR NON-BASMATI RICE

Table No. 4.6.1

Rank	Exporting Country	2022 Qty MT	Value IN USD	Share (%)
1	India	493,354,815.00	7,070,475.00	29.43
2	Thailand	267,054,248.00	3,559,356.00	14.82
3	VIETNAM SOC REP	127,917,561.00	2,564,488.00	10.67
4	PAKISTAN IR	171,569,823.00	2,081,313.00	8.66
5	U S A	3,106,659.00	1,388,206.00	5.78
6	Cambodia	1,208,508.00	918,168.00	3.82
7	China P RP	92,154,389.00	905,027.00	3.77
8	Myanmar	1,827,999.00	855,707.00	3.56
9	Italy	698,914.00	773,880.00	3.22
10	Brazil	9,143,100.00	424,325.00	1.77

Source: COMTRADE, United Nations

India is the leading exporter of Basmati Rice to the global market. The country has exported 4558972.23 MT of Basmati Rice to the world for the worth of Rs. 38524.11 Crores/ 4787.50 US$ Mill.) Table number 4.6.1 describes that during the year 2022-23, India dominates the global market for non-basmati rice, securing the top position with exports totaling 493,354,815 MT, valued at 7,070,475 USD, which accounts for 29.43% of the market share. Trailing behind India are Thailand, Vietnam, and Pakistan, each contributing significantly to the market. Noteworthy players such as the USA, China, and Myanmar also hold notable shares in the market. Other countries like Cambodia, Italy, and Brazil are present but with comparatively smaller shares. Overall, India's substantial presence underscores its pivotal role in the non-basmati rice trade on the world stage.

4.6.2 INDIAS POSITION AND TOP TEN COUNTRIES IN THE WORLD MARKET FOR WHEAT

Table No. 4.6.2

Rank	Exporting Country	2022 Qty in MT	Value in USD	Share (%)
1	Australia	24,564,082.00	9,798,888.00	15.66
2	U S A	14,385,454.00	7,413,113.00	11.85
3	Canada	14,516,392.00	7,076,839.00	11.31
4	Russia	13,604,494.00	6,846,862.00	10.94
5	France	15,792,432.00	6,504,469.00	10.40
6	Argentina	11,977,794.00	4,960,855.00	7.93
7	Ukraine	7,402,284.00	2,828,598.00	4.52
8	Romania	3,155,594.00	1,877,134.00	3.00
9	Germany	3,861,366.00	1,579,117.00	2.52

10	India	3,980,920.00	1,518,920.00	2.43

Source: COMTRADE, United Nations

The table number 4.6.2 describes that in the global market for wheat, India occupies the tenth position in terms of both quantity and value of exports in 2022. India exported approximately 3,980,920 MT of wheat valued at 1,518,920 USD, representing a share of 2.43% in the market. Leading the pack is Australia, with significant exports totalling 24,564,082 MT, followed closely by the USA and Canada. Other major players include Russia, France, and Argentina, each contributing substantial quantities of wheat to the international market. Despite being among the top ten exporters, India's share in the global wheat trade remains comparatively modest.

4.6.3 INDIAS POSITION AND TOP TEN COUNTRIES IN WORLD MARKET FOR MAIZE

Table No. 4.6.3

Rank	Exporting Country	2022 Qty in MT	Value in USD	Share (%)
1	U S A	52,439,015.00	18,767,050.00	30.35
2	Argentina	27,916,077.00	10,517,226.00	17.01
3	Brazil	25,459,884.00	9,341,336.00	15.11
4	Ukraine	21,722,862.00	6,771,028.00	10.95
5	France	5,010,764.00	2,316,030.00	3.75
6	Romania	4,280,732.00	1,643,718.00	2.66
7	South Africa	254,594,530.00	1,306,857.00	2.11
8	Poland	3,442,726.00	1,152,342.00	1.86

9	Paraguay	3,616,555.00	964,841.00	1.56
10	Hungary	2,054,502.00	807,321.00	1.31
14	India	1,730,350.00	623,436.00	1.01

Source: COMTRADE, United Nations

The table number 4.6.3 describes that in the global market for maize, India holds the fourteenth position in terms of both quantity and value of exports in 2022. India exported approximately 1,730,350 MT of maize valued at 623,436 USD, representing a modest share of 1.01% in the market. The United States leads the market with significant exports totalling 52,439,015 MT, followed by Argentina and Brazil. Other major maize exporters include Ukraine, France, and Romania, each contributing substantial quantities to the international market. India's presence in the global maize trade remains relatively small compared to other leading exporting nations, reflecting its limited share in this particular agricultural commodity market.

4.6.4 INDIAS POSITION AND TOP TEN COUNTRIES IN WORLD MARKET FOR OTHER CEREALS

Table No. 4.6.4

Rank	Exporting Country	2022 Qty in MT	Value IN USD	Share (%)
1	France	5,329,278.00	1,847,257.00	16.80
2	Australia	4,602,116.00	1,603,934.00	14.58
3	Argentina	3,779,306.00	1,426,325.00	12.97
4	Canada	3,564,497.00	1,334,848.00	12.14
5	Germany	2,732,035.00	898,642.00	8.17

6	Ukraine	1,637,597.00	521,716.00	4.74
7	Russia	1,497,222.00	462,158.00	4.20
8	U K	956,043.00	387,345.00	3.52
9	Romania	1,113,352.00	385,025.00	3.50
10	Poland	861,036.00	288,183.00	2.62
47	India	2,823.00	1,580.00	0.01

Source: COMTRADE, United Nations

The table number 4.6.4 describes that in the global market for other cereals, India holds the forty-seventh position in terms of both quantity and value of exports in 2022. India exported a relatively small quantity of other cereals, approximately 2,823 MT, valued at 1,580 USD, representing a minimal share of 0.01% in the market. Leading the market for other cereals are France and Australia, with significant exports totalling 5,329,278 and 4,602,116 MT respectively. Argentina, Canada, and Germany also contribute significantly to the global market for other cereals. However, India's presence in this market is marginal compared to other major exporting nations, reflecting its limited involvement in the international trade of other cereal crops.

Chapter 5: FINDINGS, CONCLUSION AND SUGGESTIONS

5.1 FINDINGS

The analysis of the data from 2013 to 2023 on Indian cereal production and export trends reveals several key findings. Firstly, India has emerged as a major player in the global agricultural market, particularly in the export of cereals such as rice, wheat, and maize. The country's comparative advantage in certain cereal varieties has enabled it to compete effectively on the international stage. India's significant role as a top producer and exporter of cereals underscores its importance in the global agricultural market. The study also highlights the importance of understanding the factors that contribute to the success or challenges faced by cereals in the global market. The data analysis indicates a steady growth in cereal production in India, with a focus on key varieties such as rice, wheat, and maize. The findings underscore the significance of diversifying production towards Nutri-cereals and enhancing export competitiveness through food processing to capitalize on emerging market opportunities. The findings emphasize the need for policy interventions to enhance export competitiveness, address market instabilities, and promote sustainable agricultural growth. The potential for India to further strengthen its position in the global cereals market by leveraging its comparative advantages, diversifying production, and adopting modern agricultural practices is evident.

5.2 CONCLUSION

With improved technology and world-class quality standards in agriculture processing units, India has the potential to penetrate European and American markets. The value-added export of processed cereals offers tremendous potential to India. Indian cereals and cereal preparations have experienced faster growth and higher instability as compared to of world exports during the period under observation. In conclusion, the study provides valuable insights into the

dynamics of Indian cereal production and export trends. India's position as a top producer and exporter of cereals highlights its importance in the global agricultural market. The study underscores the importance of policy initiatives aimed at enhancing the export competitiveness of Indian cereals through quality standards, competitive pricing strategies, and market diversification. Efforts to promote the production of Nutri-cereals and invest in food processing technologies are crucial to meet evolving consumer preferences and market demands. Addressing the impact of external factors such as global trade dynamics and climatic changes on India's export competitiveness is essential for sustainable growth in the agricultural sector.

5.3 SUGGESTIONS

Based on the research findings, several recommendations can be made to policymakers and stakeholders in the agricultural sector. Firstly, there is a need to focus on enhancing the export competitiveness of Indian cereals by improving quality standards, competitive pricing strategies, and market diversification. Efforts should be made to promote the production of Nutri-cereals and invest in food processing technologies to meet evolving consumer preferences and market demands. Policy initiatives should aim to address the impact of external factors such as global trade dynamics and climatic changes on India's export competitiveness. By implementing these suggestions, India can further solidify its position as a leading exporter of cereals and capitalize on the growing opportunities in the global agricultural market. Strengthening partnerships with key export destinations and exploring new markets for cereals and cereal preparations can also enhance India's export prospects. Additionally, investing in research and development to improve agricultural productivity and sustainability will be crucial for long-term growth in the sector.

The study highlights the importance of strategic planning, policy interventions, and market diversification to enhance India's export competitiveness in the global cereals market. By

leveraging its strengths, addressing challenges, and adapting to changing market dynamics, India can continue to play a significant role in the global agricultural trade landscape.

REFERENCES

Dastagiri, M. B., Rao, C. S., & Vajrala, A. (n.d.). *Trading prices for India's major cereals during WTO regime: Growth rates, TOT, elasticities and foreign trade policies*.

India's agriculture and food exports: Opportunities and challenges. (2022). Bloomsbury India.

Jha, S., Srinivasan, P. V., & Landes, M. R. (2007). Indian Wheat and Rice Sector Policies and the Implications of Reform. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1084557

Kumar, M. A., & Gopalsamy, D. S. (2018). *EXPORT OF THE CEREAL PREPARATIONS IN INDIA - WITH SPECIAL REFERENCE TO BRICS COUNTRIES*.

Kumar, P., Rosegrant, M., & Hazell, P. (n.d.). *Cereals Prospects in India to 2020: Implications for Policy*.

Moyeenudin, H. M. (2019). The challenges of demand and safety towards sustainable growth on exporting food products. *Indian Journal of Economics and Development*, *7*.

Parte, J., Koshta, A. K., Pandey, S., Patel, M., & Tripathi, P. (n.d.). *Export Status of Cereals and its Preparations from India: An Overview*.

Sheeba, J., & Reena, D. R. (2018). *EXPORT OF CEREALS PRODUCTS FROM INDIA: PERFORMANCE AND DETERMINANTS*. *5*(11).

Shreedhar, G. (n.d.). *A Review of Input and Output Policies for Cereals Production in India*.

Singh, A. K., Singh, A. K., Kumar, R., Prakash, V., & Sundaram, P. K. (2017). INDIAN CEREALS SAGA: STANDPOINT AND WAY FORWARD. *Journal of AgriSearch*, *4*(1). https://doi.org/10.21921/jas.v4i1.7411

Singh, O. P., Anoop, M., & Singh, P. K. (n.d.). *Revealed Comparative Advantage, Competitiveness and Growth Performance: Evidences from India's Foreign Trade of Agricultural Commodities*.

Suresh, A., & Mathur, V. C. (2016). Export of agricultural commodities from India: Performance and prospects. *The Indian Journal of Agricultural Sciences*, *86*(7). https://doi.org/10.56093/ijas.v86i7.59741

Thomas, D. S., & Sheikh, W. (n.d.). *INDIA'S EXPORT OF CEREALS AND CEREAL*.

(N.d.).