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Erratic Rise in Tomato Prices, Status, Issues, Government Initiatives and Policy Suggestions to Manage the prices of Tomato and other Vegetables

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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Policy Article

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ABSTRACT

Tomatoes, hold a paramount position in both Indian cuisine and the nation's economy. The status of tomato area and production in India and in states show its importance in Indian economy. India is leading tomato producer in the world. In India, MP and Andhra Pradesh are the largest producer of tomato in India. The erratic weather conditions, pest attack and transport bottlenecks have raised the tomato prices in June to August 2023. In this regard, the paper is to analyze the status and issues in erratic rise in tomato prices, government initiatives and Policy suggestions to manage the prices of tomato and other vegetables. In the study, it is found that the number of reasons that has led to rise in prices starting from poor prices received for tomato for rabi crop, rise in temperature in May – June and to high rainfall in July end. Government has then initiated number of needed measures to support both producers and consumers from creating the awareness, purchase of produce from surplus areas and then distribution of produce in high price areas. To prevent the abnormal price situations in tomatoes or other vegetables, there is need of a multi-pronged approach involving both short-term relief and long-term strategies. As a policy suggestion, to

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combat such crisis in future, a collaborative effort and coordination required among government agencies, weather departments, agricultural experts, extension machinery and farmers themselves is essential.

Keywords: Tomato price; status, issues; government initiatives; policy suggestion; vegetables.

1. INTRODUCTION

"India is the world's second largest producer of fruits and vegetables, including tomatoes. Tomato (Solanum Lycopersicon) is one of the most regularly utilized vegetables and it is also an essential item in raw, cooked, and processed cuisines in the world. After China, India is the world's largest tomato grower followed by Turkey, Italy, Egypt, Spain, Mexico, and Brazil. India produces nearly 22 million tonnes of tomatoes and consumes about 20 million tonnes" [1]. "Its output is significantly higher than domestic demand. With paltry exports, there should be no price shock" [2-4]. "Tomatoes, hold a paramount position in both Indian cuisine and the nation's economy. The vibrant fruit is not only a culinary staple, but it also contributes significantly to India's agricultural and economic landscape. Beyond the gastronomic role, tomatoes play a pivotal role in the livelihoods of millions of farmers and traders across the country. The tomato market's robust presence in the economy generates employment, income, and trade opportunities, thereby impacting rural and urban communities alike. However, in June to August 2023, there has been a steep and concerning rise in tomato prices across the country and created an anxiety in minds of all stakeholders" [5]. "This surge in tomato prices has not only captured public attention but has also raised pressing questions about its causes, effects, potential solutions and future strategies to prevent such erratic price behavior in any vegetable produce" [6]. Thus, it is very necessary to know the reasons to know the sudden price rise and ways adopted to minimize the impact and precautions to be adopted so, such erratic rise should not be found in future.

The objective of the paper is to analyze the status of tomato production, issues in price rise, government initiatives and policy suggestions to manage the prices of tomato and other vegetables.

2. MATERIALS AND METHODS

In order to analyze the status of tomato production, issues in price rise, government initiatives and policy suggestions to manage the prices of tomato and other vegetables, the methodology employed in this research paper involves the collection of secondary data pertaining to the tomato area and production from various sources, including official government websites, reports, research papers, and presentations. The collected data were then analyzed to derive conclusions regarding the important features and performance of the scheme.

I. Data Collection: Secondary data were gathered from the official website/reports of the Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture and Farmers Welfare, Government of India and Department of Consumer affairs, Ministry of consumer affairs, food & public distribution, GoI, State govt. reports. Additionally, important research papers, reports, and presentations related to the tomato and other vegetables were accessed and studied to gather additional insights and perspectives.

II. Data Analysis: The collected data were subjected to thorough analysis to identify, patterns, and key findings related to the tomato and other vegetables. Statistical methods, as well as qualitative analysis techniques, were employed to interpret the data and derive meaningful conclusions regarding tomato area, production and issues related to price rise.

III. Incorporation of Research Findings: The findings of different researchers in the field of tomato prices and reasons and solutions were studied and incorporated into the analysis.

IV. Derivation of Conclusions: Based on the analysis of the collected data and incorporation of research findings, conclusions were derived regarding the progress. These conclusions encompass aspects such as current and future challenges and policy support by government for enhancement of total vegetable supply in India and their prices in markets.

V. Limitations: It is important to acknowledge the limitations of the study, including potential biases in the secondary data sources, constraints in data availability, and challenges in data interpretation. These limitations were taken into consideration while drawing conclusions and making recommendations based on the findings of the research.

Overall, the methodology employed in this research paper aims to provide a rigorous and comprehensive analysis of tomato price trends and status, leveraging secondary data from diverse sources and incorporating insights from existing research in the field.

3. RESULTS AND DISCUSSION

3.1 Status of Production, Prices of Tomato in India

3.1.1 Status of tomato area and production in country

The average state-wise area, production and yield for the quinquennial ending 2016-17 to 2020-21 are given in Table 1.

Table 1. Average state-wise area, production and yield for the quinquennial ending 2016-17 to 2020-21

States	Area (000 ha)	Production (000 MT)
Madhya Pradesh	92.40	3025.00
Odisha	83.20	1313.00
Karnataka	64.20	1956.00
Andhra Pradesh	61.00	2199.00
Chhatisgarh	60.80	1130.00
West Bengal	58.20	1264.00
Bihar	49.00	964.00
Gujrat	48.20	1391.00
Maharastra	46.20	1048.00
Tamil Nadu	43.60	1265.00
Others	203.20	4104.00
India	810.00	20063.00

Source; Agricultural Statistics at Glance, Govt. of India

As per the Ministry of Agriculture, the total area in tomato cultivation in country the major tomato producing states are Madhya Pradesh (11.41%), Odisha (10.27), Karnataka (7.93%) Andhra Pradesh (7.53%), Chhattisgarh (7.51%) West Bengal (7.19%) Bihar (6.05%), Gujarat (5.95%), Maharashtra (5.70%) and Tamil Nadu (5.38%). These states account for 74.01 percent of the total tomato area of the country (Table 1).

3.1.2 Share of tomato production by different states of India

As the production of tomato is concerned, the major tomato producing states are Madhya Pradesh (15.08%), Andhra Pradesh (10.96%), Karnataka (9.75%), Gujarat (6.93%), Odisha (6.54%), Tamil Nadu (6.31%), West Bengal (6.30%), Chhattisgarh (5.63%) Maharashtra (5.22%) and Bihar (4.80%). These states account for 79.54 percent of the total tomato production of the country (Table 1).

3.1.3 Main seasons of tomato in India

In India, tomatoes are mainly grown in three seasons: kharif (June to November), rabi (October to March), and summer (February to May). Harvesting of Rabi Tomato is done in major Rabi growing states i.e. Andhra Pradesh, Telangana, Karnataka, Madhya Pradesh, Gujarat, Chhattisgarh and Maharashtra in December to February. Kharif Tomato is grown in southern States (Karnataka, Andhra Pradesh, Tamil Nadu and Telangana and harvested in August to September. The summer season crop is harvested from March to June. Late Summer harvesting arrives in July Aug months (Table 2).

3.1.4 Status of wholesale and retail prices in famous Azadpur wholesale market, Delhi

It is found that due to weather issue, the supply of tomato in whole sale market is reduced and so, the prices have risen from June to August 2023.

The wholesale arrivals in Delhi Azadpur market is reduced from 437.28 tons per day in June 2023 to 317.16 tons per day in July 2023 and rise to 392.76 tons per day in Aug 2023. The wholesale price in market also increased to Rs 71.15 per kg in July from Rs 17.40 per kg in June 2023. The retail price in Delhi market have increased to Rs 136.29 per kg and reduced further. The national average price for July has remained Rs 109.50 per kg in July and reduced further. The retail prices of tomatoes in many local markets gone beyond Rs 200 per kg (Table 3).

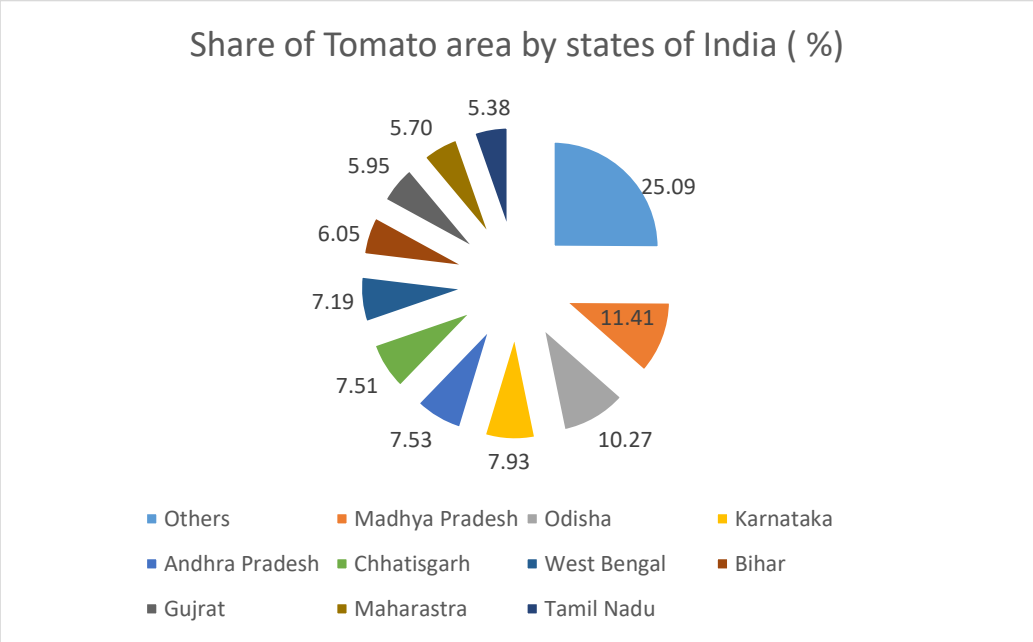


Fig. 1. State-wise average tomato area, 2016-17 to 2020-21 (Area in 000 ha)

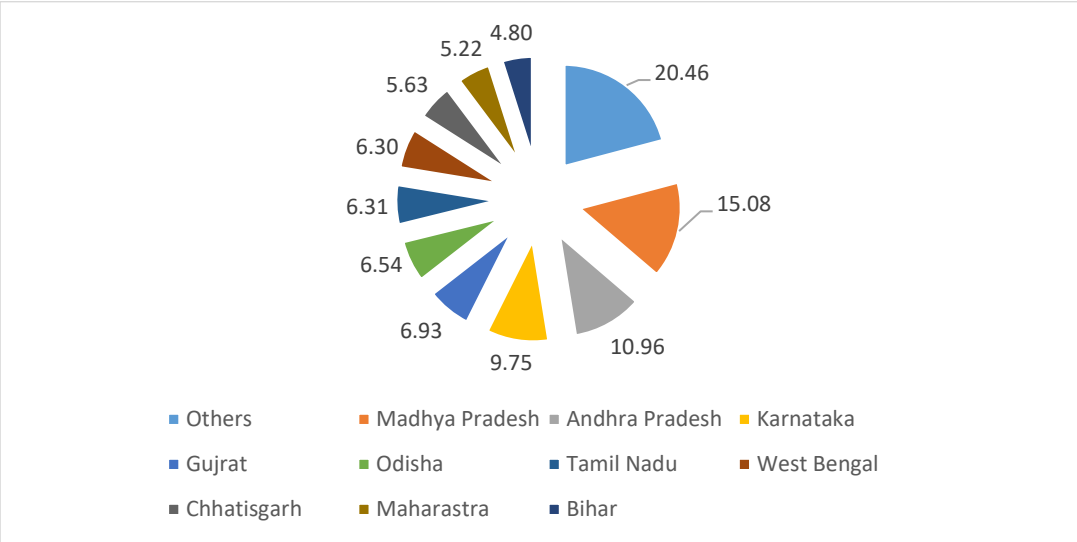


Fig. 2. Share of states in total tomato production in India (%)

Table 2. Major transplanting time and harvesting periods in India for tomato

Season	Transplanting	Harvesting period
Southern and Western states	A-June- July	A- August - September
	B-October - November	B- December - February
	C-January- February	C-March - June
Northern and eastern states	A- October- November	A- January - March
	B- January - February	B- March - June
Hilly states	A- May- June	A- July - September
	B-October - November	B-December - March

Source: Monthly report, Horticulture Statistics Division, Govt of India, 2019

Table 3. Market arrivals and wholesale and retail prices in Delhi and national level in 2023

Particulars	June 2023, average	July, 2023 average	Aug 2023 average
Average Arrivals In Azadpur Mandi, Delhi (tonnes/day)	437.28	317.16	392.76
Average Model wholesale price, Azadpur Mandi, Delhi (Rs/kg)	17.40	71.15	45.23
Retail prices in Delhi, (Rs/kg)	32.90	136.29	111.29
Retail prices, all India, (Rs/kg)	32.58	109.50	102.02

Source: Department of consumer affairs, ministry of commerce, GOI

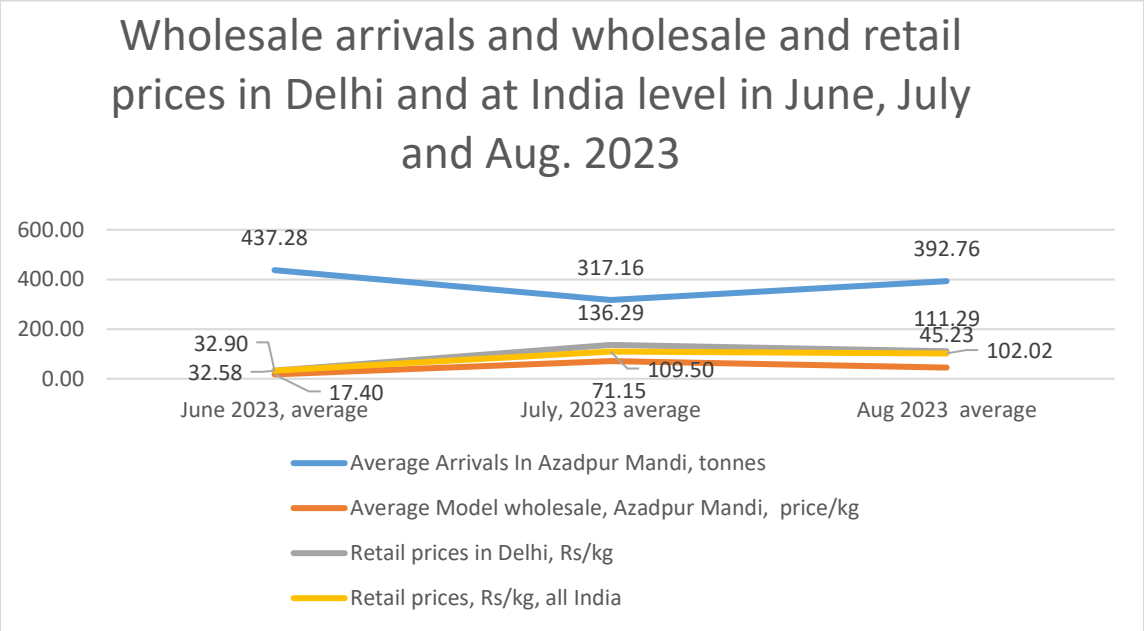


Fig. 3. Wholesale arrivals and wholesale and retail prices in Delhi and national level

3.2 Reasons for High Price Rise

There are number of reasons that led to higher increase in price of tomatoes. The important reasons for rise in tomato prices are given here.

3.2.1 Discouraged to grow vegetables due to price crash in March- April 2023

"Farmers were discouraged to grow vegetables due to price crash in in March-April in both north India and Maharashtra. In north India, in April when the prices went to Rs 1-2/kg, farmers had no motivation to pay attention to their crop. They were not even getting 30% of their production cost as income. They forced to uproot their tomato plants and tried to grow something else" [7].

a. **Heat wave in May and June 2023 in South India:** Extreme heat in May and June start and then unseasonal rainfall and hailstorms in June especially in Maharashtra. As is Karnataka is concerned, monsoon sets in the first week of June. But it started about one month late, in June end or July first week. That delayed the sowing in Karnataka. During pre-monsoon season (1st March to 31st May) also, the Coastal region comprising of Uttara Kannada, Udupi and Dakshina Districts recorded - 60% (large deficit) and Malnad districts comprising of Shivamogga, Hassan, Chikkamgaluru and Kodagu recorded -21% (Deficit) rainfall. In June 2023, Karnataka as a whole recorded -57% deficit rainfall in June, which is the third lowest in ii the last 122 years for the State (Memorandum, Govt. of Karnataka, [8], ToI, 2023 and [9].

b. **Virus attack in June 2023:** Tomato is a short duration crop which is very sensitive to heat and extremely susceptible to viruses [10]. Two different viruses also hit yields in Maharashtra and Karnataka earlier this year. The Tomato Mosaic Virus (ToMV) and the Cucumber Mosaic Virus

(CMV) led to such havoc in Karnataka and Maharashtra and southern states that the local Agriculture produce market Committee which received nearly 5.50 lakh quintals of tomatoes in June 2022 has got just 3.2 lakh quintals in June 2023. This sudden heat, attack of viruses has resulted in fall of yield of tomatoes.

c. **Heavy spells in July 2023 in Karnataka:** There were spells of heavy rains during the 3rd and 4th week of July 2023, which was only confined to 10 days, and the State as a whole recorded +29% for the month of July [8].

d. **Heavy spells in July-August 2023 in North India and hilly states:** After late arrival of monsoon, there was the sudden spurt of rain in all parts of nation. That blocked the transportation of tomatoes. "With the onset of monsoon, the tomato crop is currently going through a seasonal transition. Rainfall in areas such as Himachal Pradesh, Uttarakhand and Haryana have impacted the crop and also restricted its supply, resulting in a demand-supply gap,"

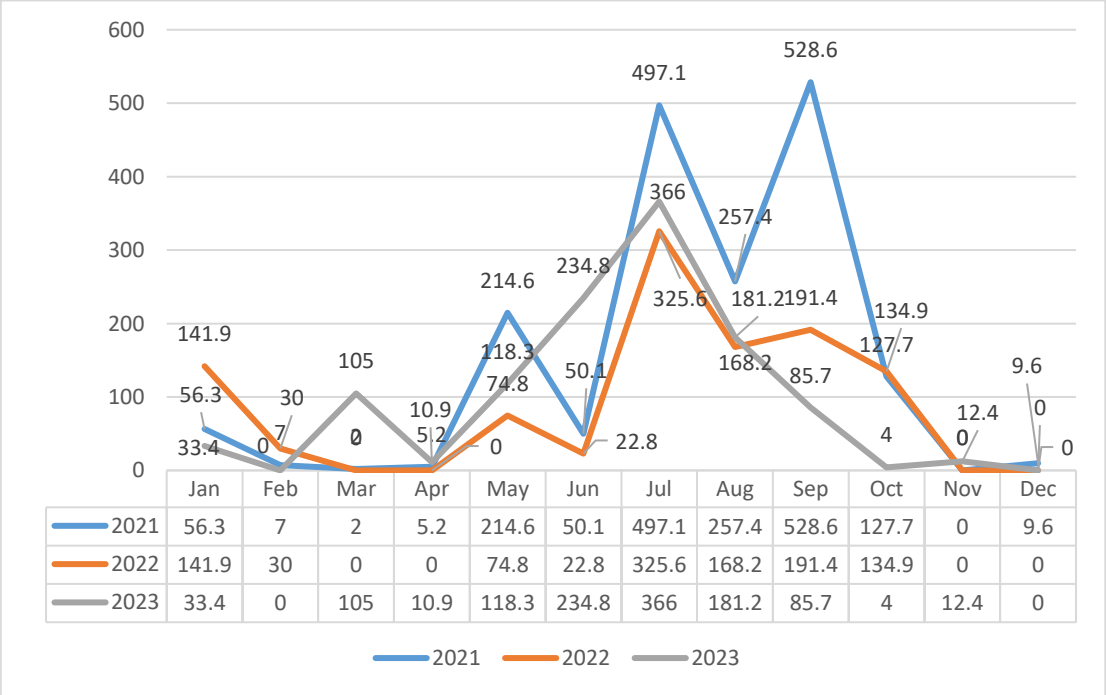
e. **High monthly rainfall in Delhi:** The rainfall in North India was high in July month of 2023. It was 325.6 mm in July 2022 and increased to 366 mm in July 2023. It created transport bottlenecks and pest and diseases in north Indian tomato crops.

3.3 Movement of Prices of Tomato and Other Seasonal Vegetables

While the rise in tomato prices has been the talk of town, other vegetables, including cabbage, Chilies, Potato, Brinjal and ridge guard were also seen a slight rise in prices in Delhi market from June to August 2023 [5]. More the perishability of vegetable, higher the rise in prices. After the tomato, the prices of chilli increased more than that of other vegetables. The higher prices of all vegetables has affected the household budget expenditure.

3.4 Government Initiatives

The Department of Consumer Affairs monitors the prices of 22 essential food commodities, including tomato and onion, through 536 price reporting centers across the country [11]. Government of India and state governments have started number of measures to control the price rise. Some important of them are given below.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	56.3	7	2	5.2	214.6	50.1	497.1	257.4	528.6	127.7	0	9.6
2022	141.9	30	0	0	74.8	22.8	325.6	168.2	191.4	134.9	0	0
2023	33.4	0	105	10.9	118.3	234.8	366	181.2	85.7	4	12.4	0

Fig. 4. Monthly rainfall in Delhi, from 2021 to 2023 (mm)
Source: IMD, GoI

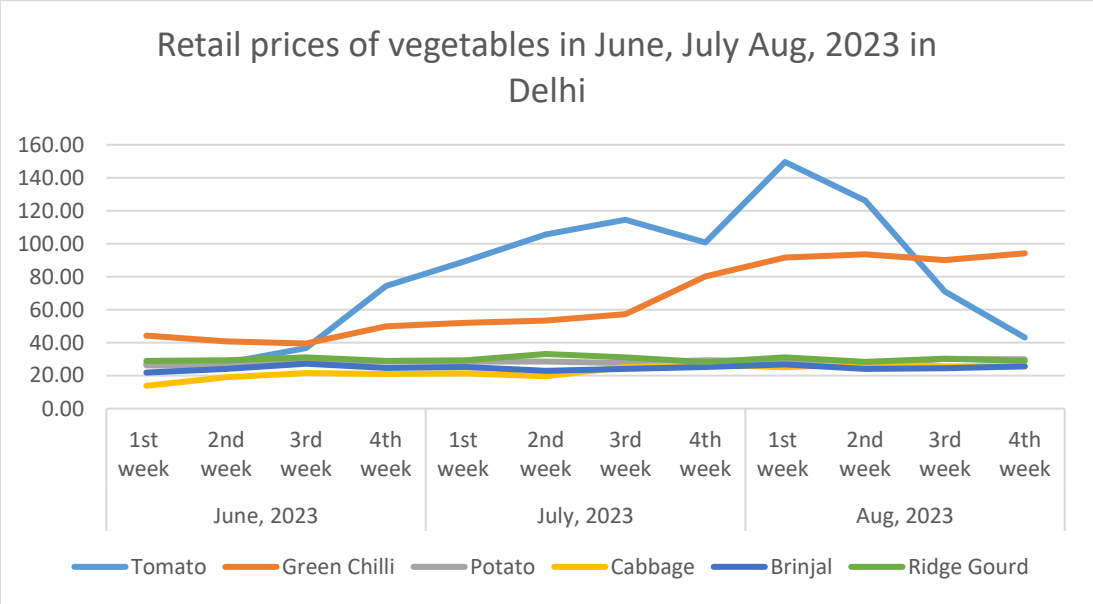


Fig. 5. Delhi retail prices for vegetables in 2023
(Source: https://vegetablemarketprice.com)

a. **Price Stabilization Fund (PSF):** In order to check the current increase in prices of tomato and make it available to the consumers at affordable prices, the Government has started the procurement of tomatoes under Price Stabilization Fund (PSF) and is making it available at a highly subsidized rate to consumers. The National Cooperative Consumers Federation (NCCF) and National Agricultural Cooperative Marketing Federation (NAFED) procured in mid-July, the tomato from mandis in Andhra Pradesh, Karnataka and Maharashtra and made it available at affordable prices in major consuming centers in Delhi-NCR, Bihar, Rajasthan, etc. after subsidizing the price to the consumers. The tomatoes have been disposed initially at retail price of Rs.90/kg which has been reduced to Rs.80/kg from 16.07.2023 and further reduced to Rs.70/kg from 20.07.2023.

b. **Tomato Grand Challenge:** A "Tomato Grand Challenge Hackathon" was launched 30.06.2023, to invite ideas on comprehensive and focused area interventions in tomato value chain, from cropping and market insights for the farmers to improved packaging, transportation and storage. The Tomato Grand Challenge was open to students, research scholars, faculty members, industry individuals, Indian start-ups, professionals etc.

c. **State govt interventions:** "Concurrently, the endeavors by state governments in Tamil Nadu, West Bengal, Andhra Pradesh, Karnataka exemplified the potential of localized interventions to alleviate the impact of price surges. The Varuna Mitra Model as 24x7 Interactive Help Desk guided the farmers on different meteorological parameters" [9]. The prevailing tomato price surge served as a compelling reminder of the necessity for a comprehensive approach that involved strategic government intervention, technological innovation, and community involvement.

3.5 Policy Suggestions for Management of Tomato and other Vegetable Prices and Supply in Future

The important policy suggestions for management of prices of tomato and other vegetables are provided here. By taking into considerations, the prices and supply of vegetables may be controlled in future.

a. **Improved high yielding and resist varieties:** "In the realm of agricultural research and development, innovations play a pivotal role in cultivating resilient tomato varieties. Research efforts are

directed towards creating tomato strains that exhibit traits, such as drought tolerance, high rain tolerant, disease resistance, and prolonged shelf life" [6].

b. **Weather-Resilient Farming Practices:** "As climate change disrupts traditional farming practices, the need for adaptive solutions has intensified. Initiatives like the National Innovations on Climate Resilient Agriculture (NICRA) project, spearheaded by the Indian Council of Agricultural Research (ICAR), are aimed at enhancing agricultural resilience to changing climatic conditions. Innovation takes center stage in the pursuit of developing tomato varieties that can withstand the challenges posed by erratic weather patterns, increased pest infestations, and fluctuating market demands" [12,13].

c. **Information to farmers on erratic weather and pest attack and control measures:** By utilizing data analytics and predictive tools, farmers can anticipate optimal cultivation times, manage weather-related challenges, and stabilize yields. The scope includes advancements in tomato varieties, distribution of crop planning information, improved post-harvest techniques, and novel storage technologies. designing and disseminating information systems pertaining to crop planning, market intelligence for farmers, interface platforms for farmers/nurseries/ traders/customer interface, production practices, protected cultivation as poly and net houses etc.

d. **Improve Value and Supply Chains:** Enhance value and supply chains to address perishability and transportation issues. Processing is must for smoothing of prices and supply in all seasons. Convert tomatoes into paste and puree during peak seasons to ensure adequate supply during lean periods. Subsidized post harvesting machines should be provided at block or panchayat level, may be through custom hiring basis. innovative storage technologies and solutions for longer preservation and so on to reduce panic selling due to perishability. innovative post-harvest treatments and packaging solutions to minimize post-harvest losses during harvesting, handling, and transportation.

e. **Farmers groups and tomato cluster making:** "The government should identify pre-existing tomato clusters and invest in infrastructure development in those regions. Infrastructure includes decentralized cold storages at the block or village levels, supported by solar dryers and cottage-level processing plants. Farmers should have the option to store fresh tomatoes or engage in value-addition activities" [1]. Collaborative efforts, including farmers' collectives, are essential to drive this change and enhance food security. Promote direct sales by Farmer Producers Organizations to provide farmers with a larger share of consumer prices.

f. **Provide regular information support to Farmers:** The escalating prices of tomatoes, a kitchen staple in India, highlight the need for solutions to ensure their affordability and availability. Unpredictable weather patterns and pricing uncertainties often lead to supply shortages and price hikes. Leveraging technology presents a promising solution.

g. **Custom hiring Sun drier and processing plants at panchayats:** "Sun-dried tomatoes present a viable and low-cost alternative to fresh tomatoes during periods of hyperinflation. There is also a healthy demand for dried tomatoes in the processing industry and potential for exports. Farmers should be encouraged to utilize drying facilities to extend the shelf life of their harvests. Reviving the tradition of using dried vegetables in off-season months can benefit farmers, consumers, and reduce the energy footprint of tomato crops" [6].

h. **Market Linkages:** Strengthening market linkages between farmers and consumers through farmers' markets, cooperatives, and direct-to-consumer initiatives can reduce the role of intermediaries, ensuring that farmers receive a fair share of the consumer price [14-18].

i. **Exports or Imports:** In case of glut or shortage, to manage the prices, the export/import may be an important option.

j. **Connectivity with all-weather roads:** The next crucial step is to improve connectivity in hilly areas such as Himachal Pradesh, Uttarakhand, Kashmir, and parts of the Northeast. Train connectivity to these regions can facilitate major off-season production. 'Kisan Rail' scheme like scheme is needed that hoped to connect producers and consumers through

subsidized freight rates and dedicated carriages.

k. **Special minimum support price (MSP) for TOP:** The government should consider establishing a special minimum support price (MSP) for TOP (Tomato, Onion and Potato) crops, supported by government-led procurement. Tomatoes, onions, and potatoes are essential staples in the Indian diet. Anticipating extreme weather events and potential supply chain disruptions, the National Agricultural Cooperative Marketing Federation of India (NAFED) or another government agency should procure TOP crops. Many times, government resort to procurement for smoothing the prices.

l. **Contract farming:** At the micro-level, the government should encourage direct market links between farmers and consumers. Residential welfare associations (RWAs), housing societies, clubs, and other organizations can partner with farmers to supply their yearly quotas of tomatoes, onions, and potatoes. This arrangement would benefit farmers by providing them with stable incomes while offering consumers healthier and more affordable food options. Direct markets combined with decentralized vegetable storage facilities can help combat hyperinflation and food insecurity in India.

4. SUMMARY AND CONCLUSION

The rise in tomato prices in India is symptomatic of the larger challenges faced by the agricultural sector. The erratic weather conditions, pest attack and transport bottlenecks has raised the prices of tomatoes in June to Aug. 2023 [5]. Government has then initiated number of needed measures from creating the awareness, purchase of produce and distribution of produce in high price areas to support both producers and consumers. To combat such crisis in future, a collaborative effort between government agencies, agricultural experts, and farmers themselves is essential by keeping an eye on production, supply, price variations in different commodities through innovative information technology. The support should be provided instantly through local extension network. The storage, processing and regular motivation is required to farmers, in case of lower prices, so the efforts of should be high in maintaining crops. To prevent the abnormal price situations in tomatoes or other vegetables, there is need of a multi-pronged approach involving both short-term relief and long-term strategies. By implementing weather-resilient practices, pest management strategies, and supporting farmers with timely information, credit and subsidies, India can not only stabilize tomato and other vegetable prices but also build a more resilient and sustainable agricultural system for the future.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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