

**A Study of Price Instability of Food Crop Onion and the  
Possibility of Planning in Production of Onion  
Ph. D Thesis**

**Mrs. Medha A. Deshmukh**

**Guide: Prof. R. Parchure**

**Officiating Director,**

**Gokhale Institute of Politics and Economics,**

**Pune**

**A STUDY OF PRICE INSTABILITY OF FOOD CROP ONION AND  
THE POSSIBILITY OF PLANNING IN PRODUCTION OF ONION**

A THESIS SUBMITTED IN FULFILLMENT  
OF THE REQUIREMENT OF THE DEGREE OF  
DOCTORATE OF PHILOSOPHY  
IN  
AGRICULTURAL ECONOMICS  
AT  
GOKHALE INSTITUTE OF POLITICS AND ECONOMICS  
UNIVERSITY U/S 3 OF UGC ACT 1956  
PUNE 411004  
BY  
MRS. MEDHA A. DESHMUKH  
UNDER GUIDANCE OF  
PROF. RAJAS K. PARCHURE  
GOKHALE INSTITUTE OF POLITICS AND ECONOMICS,  
PUNE  
February 2015

**A STUDY OF PRICE INSTABILITY OF FOOD CROP ONION AND THE  
POSSIBILITY OF PLANNING IN PRODUCTION IN ONION**

Number of volume : Thesis (one).  
Name of research student : Mrs. Medha A. Deshmukh  
Name of principal supervisor : Prof. Rajas K. Parchure  
Officiating Director,  
Gokhale Institute of Politics and Economics  
Degree : Doctorate of Philosophy in Agricultural  
Economics  
Name of University : Gokhale Institute of Politics and Economics.  
(Deemed University)  
Month and Year of Submission : February 2015.

Prof. Rajas K. Parchure  
Officiating Director,  
Gokhale Institute of Politics and Economics,  
Pune – 411004.

CERTIFICATE (FORM A)

Certified that the work incorporated in this thesis entitled, “ A Study of Price Instability Of Food Crop Onion and The Possibility of Planning in Production of Onion”, submitted by Mrs. Medha A. Deshmukh was carried out by the candidate under my supervision. It is an original contribution and has not been submitted elsewhere for the award of any other degree. Such information as has been obtained from other document has been duly acknowledged in this thesis. I recommend that the thesis should be considered for the award of the degree of ‘Doctorate of Philosophy’.

Prof. Rajas K. Parchure

Date: 6/2/2015

Place: Pune.

### Declaration by Candidate

Mrs. Medha A. Deshmukh hereby declares that this thesis on the topic entitled, "A Study of Price Instability of Food Crop Onion and Possibility of Planning in Production of Onion" is submitted for the award of Degree of Doctorate of Philosophy in Agricultural Economics to the Gokhale Institute of Politics of Economics, Pune -411004.

It is an original contribution and has been completed during my tenure as a research scholar at Gokhale Institute of Politics and Economics, Pune.

This thesis has not been submitted by me elsewhere for the award of any degree or diploma- part or full. The information gathered by me elsewhere for the thesis is original, true and factual. Such information as has been obtained from other document has been duly acknowledged in the thesis. I hereby request, to consider the thesis for the award of the degree of Doctorate of Philosophy to me.

Mrs. Medha A. Deshmukh

Date:6/2/2015

Place: Pune.

## **Acknowledgement**

No research can be completed without a good, senior and a talented Guru, who not only guides the disciple in the study but also, leads him in the right direction. I have no words to express my feelings of gratitude for Prof. R. Parchure. He has been a very patient and understanding guide to me. It is his precision, focused attitude and foresightedness that has helped me a lot in shaping this research work. I know that I have tried his patience especially when he had to explain some basic statistics to me. But he has always been very kind and supportive like a father figure. I salute his thirst for knowledge, his positive approach in bringing himself to the level of the student though he is at the top most height of excellence in knowledge and academics. It is very much certain that his impact will guide my future life also.

I am also indebted to Dr. A. P. Kulkarni for generously sharing his knowledge and guiding me right from the beginning. He has been the pioneer of the onion production and price analysis in Maharashtra. He has a vast experience and knowledge of different agricultural research projects, but he was never hesitant to guide an amateur like me.

I offer my special thanks to Shri Krishna Lavekar, ex commissioner, department of horticulture, Government of Maharashtra. He gave me quick insights of the present agricultural scenario in Maharashtra. This has helped me in understanding the loopholes between the policy and practice.

Dr. K. Lawande, the Director of the National Research Centre for Onion and Garlic, Rajgurunagar, Pune has been very co-operative in giving me the information on the status of research on onion production, storage and price production gaps. The library of the centre was also of great help. I am thankful to Dr. Lawande.

I am grateful to the Director of the Maharashtra State Agricultural Marketing Board, Pune and the staff of National Horticultural Board, Shivaji nagar, Pune for the data support from time to time.

The National Horticultural Research and Development Federation, Nashik has been helpful in providing all the required data. I offer my sincere thank to the federation.

I am grateful to all the faculty members of Gokhale Institute of Politics and Economics for their valuable suggestions and encouragement through the six monthly presentations and personal meetings.

I am proud to be a member of Dhananjay Gadgil Library which has countless books and a perfect atmosphere for research. The library staff deserves a part of credit for this research work.

The biggest support for this research has been my parents. My father Shri Vijaykumar Muley, ex- senior executive of a nationalized bank, is my source of energy. It is because of his confidence in me that I was able to complete this research. I pray that I always get their blessings and support and thank the Almighty for such wonderful parents.

I thank my husband Shri Anand Deshmukh and my two daughters for their wholehearted support.

I dedicate this thesis to my beloved late brother Shri Umesh Vijaykumar Muley. Though I lost him, I cherish his memories. He was my mentor and a true friend. He would have been the happiest person to see this thesis complete.

## Abstract

The different price stabilization measures adopted by the government for controlling the vacillation of onion prices were largely unsuccessful. At present, onion price instability is very high for the reason of production instability and price seasonality. Onion producers are not able to get more than 45 percent share of the retail prices due to faulty marketing and trading practices. Even in severe price crisis of December 2010, July 2013, farmers have not earned a penny. As a result, the income from onion cultivation has become unstable and unsustainable. Considering the suitable weather conditions for onion growth in the state, the export potential, the huge production levels and most importantly the engagement of nearly 4 to 5 million small and medium farmers in onion cultivation, income stabilization of the onion producers is the main objective of this thesis. In order to achieve the objective, the thesis recommends a combination of three instruments: production planning; adoption of storage policy by the farmers themselves; and establishment of price stabilization fund. The three measures are suggested after examining the factors leading to onion price instability. The recognized factors: the production instability of the main Kharif season, lack of storages by the farmers for the summer season and lack of any income stabilization instruments, the faulty trading and marketing practices. These factors pose a big challenge for income stabilization measures. Price stabilization measures and production controls should be simultaneously implemented to achieve the two fold objectives of income stabilization along with increase in production. It is hypothesized in the study that the adoption of these measures, with supported suitable marketing changes will reduce the income instability.

The possibility of production planning is evaluated with onion price production relationship. The quantity of onion required for direct and indirect consumption is predicted and accordingly the required area to be brought under cultivation is also predicted. The forecast of state level production will help in planning for production. Market study is carried out to bring forth the monopolistic, exploitative and speculative trading practices of commission agents and traders. Price and arrival seasonality analysis provide the scope for development of a storage policy for the summer season crop. The possibility of storing the summer crop and releasing the stocks in non harvesting season is examined for improving the incomes from the summer crop. The costs, benefits and risks in storage policy are examined with the help of Lasalgaon market price and arrival data. The impact of storage on market prices is examined. To reduce the impact of fluctuating prices on producer's income, concept of price stabilization fund is developed, where price fluctuations will be kept within limits of a predetermined price band with low, normal and supernormal price levels. It is a corpus to be set up for providing financial assistance to farmers when market price is lower than the fixed low price of the fund and it is expected that farmers will pay the money back when they get super normal prices. The required size of the fund is established with the help of available Lasalgaon



market price and arrival data. Possible misuse, suggestions to overcome the misuse and the impact of fund operation on reducing income instability is assessed.

The price instability at 68 percent is found to be the highest in onion compared to wheat, rice, potato and garlic. Price instability is also higher than production instability, which is 45 percent. The price growth rate at 2.4 per annum is the lowest as compared to growth rate of prices of other crops. The production, area growth statistics of onion in the state are higher than onion price growth statistics. The onion prices are marked with high price seasonality within months, making the season wise income unstable and non remunerative. The onion price production relationship is negative, prices fall by Rs. 0.50 to 0.60 per 100 tons of additions of arrivals. State level production is strongly influenced by previous year's onion national price index (up to 85 percent variation explained).

On the basis of price production relationship equation and production forecast equation estimated in the study, the study has developed two methods of production planning for the state. First method is to plan for the level of onion output required for state consumption and second method is to predict the state onion production. It is observed that the present production level is just sufficient to fulfill the state's onion demand in normal harvesting conditions. But in any abnormal situations of crop losses, there occurs acute shortage of onion supply. Further, the production level should increase as per the rate of increase of population and exports. In both the planning methods the production levels as well as area required can be estimated. Production planning methodology provides an idea of the price levels and production levels that may get established in near future. Accordingly, horticulture department or the policy makers can think of suitable changes (if required), either in area under onion or the output levels. Production planning in a staggered or phased manner is suggested in the study to avoid the surplus or gluts of crop in the market.

Adoption of storage policy by the farmers for the non harvesting season will increase farmer's incomes by 36 percent and the risk in storages is very low at 10 percent. The establishment of price stabilization fund will reduce the instability in income by 18 percent. The marketing and institutional reforms such as increasing the number of traders in market, system of 'reserve price' at the time of auction to secure farmer's interests, coverage of transport and other costs of the farmers etc. are suggested which complement for smooth functioning of income stabilization instruments.

A theoretical analysis backed by statistical analysis of onion prices and production, indicates that the income from onion cultivation can be stabilized with the help of production and marketing planning, adoption of storage policy by the farmers and the establishment of price stabilization fund.

## Table of Contents

---

Acknowledgement	vi	
Abstract	viii	
Table of Contents	x	
List of Tables	xii	
List of Figures	xiv	
List of Abbreviations	xiv	
<b>Chapter 1 Income Instability of Onion Growing Farmers</b>		
1.1	The History of Income Stabilization through Price Stabilization and Production Controls	15
1.1.1	Onion Income Stabilization Programs	16
1.1.2	Success of Onion Price Stabilization Programs	17
1.2	Maharashtra - A Major Onion Supplier, But with Marked Price Instability	18
1.3	Income Instability of Onion Producers	19
1.3.1	The December-2010 Price Rise	20
1.3.2	The July-2013 Price Rise	21
1.3.3	Factors Leading to Income Instability	22
1.4	Statement of the Study	23
1.5	Objectives of the Study	23
1.6	Details on Objectives of Study	23
1.6.1	Concept of Onion Production Planning	24
1.6.2	Concept of Onion Storage Policy	25
1.6.3	Concept of Price Stabilization Fund	27
1.7	Methodology	28
1.7.1	Methodology to Examine the Possibility of Planning in Production	28
1.7.2	Methodology for analyzing Storage Policy and its impact on Income stabilization	28
1.7.3	Methodology for Establishment of Price Stabilization Fund	29
1.8	Data Collection	29
1.9	Markets Selected and Period of Analysis	30
<b>Chapter 2 Onion Price-Production Research Review</b>		
2.1	Categories of Literature	31
2.1.1	Studies on Fruits and Vegetables Price Instability	32
2.1.2	Studies on Onion Crop	34
2.1.3	Studies on Onion Storages	38
2.1.4	The International History of Price Stabilization Fund	39
2.1.5	Price Stabilization Fund in India	42
2.1.6	State Government Price Stabilization Fund in India	44
2.2	Summary of Important Findings of Research Projects on Onion	44
2.3	Policy Implications	45

### **Chapter 3 Onion Price- Arrival Statistical Behavior, Explanatory Analysis**

3.1	Price Integration	46
3.2	Month Wise Arrival and Price Behavior	47
3.2.1	Season Wise Producer's Returns and Income Instability	49
3.3	Onion Price Instability Derived from Production Instability	50
3.3.1	Onion Price Variation Compared with Production Instability	52
3.4	Onion Price, Arrival Seasonality and Farmer's Income Instability	53
3.5	Lasalgaon Market Price Time Trend	56
3.6	Onion National Price Index Time Trend	57
3.7	Chapter Conclusions	58

### **Chapter 4 Onion Price-Production Relationship**

4.1	Concept of Price Production Relationship Model	60
4.2	Model for Establishing Market Price-Arrival Relationship	60
4.2.1	Influence of Onion National Price Index on Onion Prices	61
4.2.2	Influence of Market Arrivals on Market Prices	61
4.3	Influence of National Price Index, Market Arrivals on Market Prices	63
4.4	Model for Establishing Current Year State Production-Lagged Onion National Price Index Relationship	64
4.5	Results	65

### **Chapter 5 Onion Production Planning to Control Production Fluctuation and Increase Producer's Revenue**

5.1	Production Planning Methods	67
5.1.1	Methodology for Estimation of Direct and Indirect Onion Consumption of the Maharashtra State	67
5.1.2	Forecast of Maharashtra State Onion Production and Prices	69
5.2	Staggered Production Planning of Onion-Concept	70
5.2.1	Production in Phased Manner	70
5.3	Present Marketing and Trading Practices	72
5.4	Suggestions for Marketing Reforms	74
5.4.1	Suggestions for Institutional Reforms	76
5.5	Conclusions	76

### **Chapter 6 Onion Storage Policy and Its Impact on Income Stabilization**

6.1	Concept of Storage Policy	77
6.2	The Main Assumption of Storage Policy	77
6.3	The Central Methodology	77
6.4	Results of Analysis of Lasalgaon Market Price Data for Storage Policy, (1990-2011)	78

6.5	The Risks in Storages	81
6.6	The Problems in Storages	81
6.7	Suggestions to Overcome the Limitations	82
6.8	Policy Implications	83

### **Chapter 7 Onion Price Stabilization Fund**

7.1	Concept and definition of Fund	85
7.2	Methodology for Estimating the Size of the Fund	86
7.3	Size of the Fund	87
7.4	Impact of the Fund on Income Stabilization	89
7.5	Merits of Fund	91
7.6	Possible Misuse of Fund	92
7.7	Suggested Measures to Curb Misuse	92
7.8	Conclusions	93
	Thesis Conclusion	94
	Bibliography	97
	Appendix	102
	Appendix 1 Lasalgaon market price, arrival data	102
	Appendix 2 Pimpalgaon market price, arrival data	104
	Appendix 3 Nashik market price, arrival data.	106
	Appendix 4 Maharashtra Onion Area, Production, Yield Data.	108

---

List of Tables		
Table No.	Title	Page No.
1.1	Onion Arrival and Price Percent Changes of December 2010 Over December 2009	21
1.2	Onion Month Wise Changes in Arrivals and Prices of 2013 over 2011	22
3.1	Onion Price Correlation Matrix	47
3.2	Onion Cost of Production	51
3.3	Price Coefficient of Variation (Std. Dev./Mean) of Selected Crops, 1999-2011	52
3.4	Coefficient of Variation= Mean/Std. Dev., Lasalgaon-2000 to 2011	53
3.5	Seasonal Price and Arrival Coefficient of Variation derived from Std. Dev./Mean (1990-2010, Lasalgaon)	54
3.6	Onion Seasonality Index of Arrivals and Prices, Lasalgaon (1990-2011)	55
3.7	Regression Results of Price Time Trend, Lasalgaon-1990-2011	58
3.8	Regression Results of Onion National Price Index Time Trend, 1994-2011	58
4.1	Regression Results showing the Influence of National Onion Price Index on Local Onion Prices during 2000 to 2009.	62
4.2	Regression Results showing the Influence of Arrivals on the Price Residuals of Model no. 2 during 2000-2009.	63
4.3	Effect of Onion Arrivals on Onion Prices	64
4.4	Regression Results showing the Influence of Onion National Price Index and Onion Arrivals on Onion Prices during 2005 to 2009	65
4.5	Influence of National Onion Price Index and Arrivals on Onion Prices	65
4.6	Regression Results Showing the Influence of Lag of National Onion Price Index on Current Year State Production	66
5.1	Onion Direct, Indirect Consumption (MT)	69
5.2	Maharashtra Onion Average Statistics, 2005-2013	69
5.3	Expected Percent Increase in Onion Production, Maharashtra, 2013-14	70
5.4	Expected Increase in Area under Onion, Maharashtra, 2013-14	70
5.5	Staggered Onion Production Planning	72

Table No.	Title	Page No.
6.1	April Month Arrival Scenario	61
6.2	April Revenue Increase	80
6.3	Storage Wastage	80
6.4	July Month Arrival Scenario	80
6.5	July Revenue Increase	80
6.6	Percent Increase in July Revenue over April Revenue	81
6.7	Cost of Storage of the Rabbi Onion	81
6.8	Estimation of Storage Profit	81
6.9	National Onion Price Index Prediction	82
7.1	Production Quantity of Two Seasons	86
7.2	Production and Marketing Costs of Onion	87
7.3	PSF Money Management	88
7.4	Impact of Different Price Bands on Mean and Standard Deviation of Revenue, Compared with Mean & Standard Deviation of Revenue without Price Band	90

List of Figures		
Figure No.	Title	Page No.
3.1	Onion Monthly Prices and Arrivals, Lasalgaon Average-1990-2011	48
3.2	Seasonal Prices, Lasalgaon Average, 1990-2011	50
4.1	Onion Yearly Arrivals in Selected Markets, 1997-2011	64
7.1	Old (Market) Price and New (Fund) Price Line	91

### List of abbreviations

UNCTAD: United Nations Conference on Trade and Development

NAFED: National Agricultural Cooperative Marketing Federation of India Limited

MSAMB: Maharashtra State Agricultural Marketing Board

NHRDF: National Horticultural Research Development Federation

SFAC: Small Farmers' Agri- Business Consortium

Qtl: Quintals

MT: Metric Ton

ONPI: Onion National Price Index.