DEVELOPMENT OF COTTON IN KUMTA-DHARWAR TRACT

BY
. A. R. RAJAPUROHIT

A THESIS SUBMITTED

TO THE

UNIVERSITY OF POONA

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

ACKNOWLEDGEMENTS

I am grateful to the authorities of the Gokhale
Institute of Politics and Economics, Poona, for giving me
all facilities - including the use of the electronic computer for undertaking this study. I really feel that it was a
great pleasure for me to make this study under the guidance
of Prof. V. M. Dandekar, Director, Gokhale Institute of
Politics and Economics, Poona, and everything good in this
thesis is due to his exacting standard and critical comments.

Collection of the data for this study involved field investigation. I wish to record my gratitudes to all those who helped me in collecting the data, particularly to the Cotton specialist and the Cotton Superintendent at Dharwar, and the Block Development Officer and the Tahsildar at Gadag. I am, however, not finding words to express my gratitude to the selected farmers in the village Hombal, who spared their valuable time and patiently co-operated with me when I interviewed them for several times.

My thanks are also due to all my colleagues and friends in the Gokhale Institute who helped me in many ways. Finally, I wish to thank Mr. V. N. Inamdar for his accurate and fine typing work, and Mr. K. K. Herwadkar who helped me in drawing the graphs and the maps in an excellent way.

CONTENTS

				Page
ACKNOWL	EDGEMEN'	rs		
LIST OF	TABLES			
LIST OF	GRAPHS	AND M	APS	
OUTLINE	OF THE	STUDY		
			PART I	
CHAPTER	I:	SOIL-C	CLIMATE COMPLEX OF THE COTTON GROWING AREA IN MYSORE	1-10
		1.1	Mysore State : Situation	ı
		1.2	Climatia Belta	2
		1.3	Soil Types	4
				7
		1.5 1.6		1 2 4 7 8 9
CHAPTER	II :	EARLI	ER EFFORTS TO INTRODUCE AMERICAN COTTON	11-61
		2.1	Characteristics of the Period	11
		2.2	Cash Rewards for Growing Exotic Cottons	13
		2.3	Dr. Lush's Experience	13
		2.4	Mr. Mercer's Experiments	1 6
		2.5	Experiments with Egyptian Cottons	20
		2.6	Mr. Shearer's Experiments	23
		2.7		30
		2.8	Security Sharp Rise in the Area under	39
		2.0	American Cotton due to Price Effect	27
		2.9	Declining Period	39
		2.10	Cotton Cultivation Practices in	40
			the Earlier Period	
		2.11	Land Improvement in the Earlier Period	43
		2.12		44
		2.13	Transport System	47
		2.14	Mixing of American Cotton with	51
			Local Cotton	

	CHAPTER	II	:	(CONTI	NUED)	Page
				2.15	Dr. Forbes' Commission to Enquire	54
				2.16	into Cotton Adulteration The Bombay Cotton Frauds Act Working of the Frauds Act Concluding Remarks	55 56
				2.18	Concluding Remarks	60
	CHAPTER	III	:	DEVELO	PMENT OF COTTON RESEARCH AND ADMINISTRATION	62-97
				3.1	Characteristics of the Period	62
				3.2	Recommendations of the Indian Cotton Committee	63
				3.3	Cotton Research and the Results	70
				3.4	Improvement of Upland Variety	70
				3.5	Evolving Wilt Resistant Kumta Cotton	72
				3.6	Dry Farming Scheme for Cotton in Bijapur	74
				3.7	Dry Farming Scheme for Cotton in Raichur	77
				3.8	Improvement of Kumta Cotton in Raichur	80
				3.9	Improvement of Kumta Cotton at	81
				3.10		82
				3.11	Cotton Resistant to Blackarm	84
				3.12	Disease Scheme for Cultivation of	85
) • I &	Perennial Cotton at Dharwar	0)
				3.13	Cotton Administration and the Problems	85
				3.14	The Cotton Transport Act	86
				3.15	Cotton Extension	90
í	APPENDIX	;	:	AREA U DISTRI	NDER COTTON IN BELGAUM, BIJAPUR AND CTS (1884-85 TO 1920-21)	97
	CHAPTER	IV:	•	STANDA	RD PRODUCTION TECHNIQUES IN DIFFERENT COTTON ZONES	98-125
				4.1	Classification of Cotton Zones	98
				4.2	The Coastal Long Staple Cotton Zone	99
				4.3	Dharwar-American Kharif Cotton Zone	100
				4.4	The Mysore-American Kharif Cotton Zone	103
				4.5	The Transition Tract Herbaceum Cotton Zone	104

				(iv)
		/ cover	· · · · · · · · · · · · · · · · · · ·	Page
CHAPTER :	IV:	(CONTI	NOED)	
		4.7	Dharwar-American Rabi Cotton Zone The Eastern Dry Zone The Irrigated Cotton Zone Concluding Remarks	106 111 115 118
APPENDICES	S TO	СНАРТЕ	CR IV	120
APPENDIX	I:	OF THE	RAINFALL IN INCHES, MONTHLY PERCENTAGE ANNUAL RAINFALL AND THE AVERAGE NUMBER INY DAYS AT GADAG (BASED ON 50 YEARS	121
APPENDIX	IA:	RAINFA 1964-6	ALL AT GADAG FOR THREE YEARS (1962-63 TO 65) (FIGURES IN INCHES)	122
APPENDIX	II:	TEMPE	RATURE AT GADAG (IN OF)	123
APPENDIX :	III:	RELATI	VE HUMIDITY (PERCENTAGE) AT GADAG	124
APPENDIX	IV:		VTAGE DISTRIBUTION OF NUMBER OF DAYS DING TO DIRECTIONS OF WINDS AT GADAG	125
			PART II	
CHAPTER	٧: ٥	HARACI	TERISTICS OF THE SELECTED FARMERS	126-145
		5.2	The Second Objection of the Study The Case Village Selection of the Farmers Particulars about the Selected Farmers and Their Cotton Growing Plots	126 126 128 132
APPENDIX			JLARS ABOUT THE SELECTED FARMERS AND COTTON GROWING PLOTS	139
CHAPTER 1	VI: C	COTTON	CULTIVATION PRACTICES AND PROBLEM OF THEIR MEASUREMENT	146-17]
		6.4	Standard Cotton Cultivation Practices and Methods of Scoring Clearing Operation Ploughing Manuring Harrowing	146 147 149 152 153

			Page
CHAPTER VI	: (CONT	INUED)	
	6.7	Use of Chemical Fertilizers Seeds and Sowing Interculturing, Hand Weeding and Thinning	154 156 158
	6.9 6.10	Crop Protection Measures Measurement of Production	159 161
APPENDIX	PRACT	NG OF EIGHT COTTON CULTIVATION ICES AND PER ACRE VALUE YIELD OF N FOR DIFFERENT COTTON GROWING OF THE SAMPLE FARMERS	163
CHAPTER VII	: RELAT	IONSHIP BETWEEN TECHNIQUE-ADOPTION AND YIELD	172-189
CUADMED WITT	7.3 7.4 7.5 7.6 7.7 7.8 7.9	Individual Practices and Yield Composite-Score and Yield Inter-Correlation of the Independent Variables Multiple Regression Equation Using Eight Independent Variables Conversion of Scores into Rupee Terms Multiple Regression Equation Using Six Independent Variables Measured in Rupee Terms Cobb-Douglas Production Functions Profitability of Different Cultivation Practices	172 173 178 178 178 182 183
OMATIEM VIII		ION OF TECHNOLOGY ON COTTON GROWING PLOTS	190-218
	8.1	Factors Influencing Adoption of Technology	190
	8.2	Location as a Factor Determining Adoption of Technology	190
	8.3	Soil Type as a Factor Determining	192
	8.4	Adoption of Technology Whole-time/Part-time Farming as a Factor Determining Adoption of Technology	193
	8.5	Size of Holding as a Factor	195
	8.6	Determing Adoption of Technology Resource Availability as a Factor Determining Adoption of Technology	196
	8.7	Caste as a Factor Determining Adoption of Technology	198

1	wi	١
١	AT	

		Page
CHAPTER VIII:	(CONTINUED)	
	8.8 Need for Case Analysis 8.9 Method of Case Analysis 8.10 Tracing a Predominant Factor Determining the Adoption of Technology	200 200 201
	8.11 Concluding Remarks	206
APPENDIX I:	CHARACTERISTICS OF HIGH-ADOPTERS OF BOTH TRADITIONAL TECHNOLOGY AND NEW TECHNOLOGY ON ALL PLOTS	207
APPENDIX II:	CHARACTERISTICS OF HIGH-ADOPTERS OF BOTH TRADITIONAL TECHNOLOGY AND NEW TECHNOLOGY ON SOME PLOTS ONLY	208
APPENDIX III :	CHARACTERISTICS OF HIGH-ADOPTERS OF NEW TECHNOLOGY ONLY ON ALL PLOTS	209
APPENDIX IV:	CHARACTERISTICS OF HIGH-ADOPTERS OF NEW TECHNOLOGY ONLY ON SOME PLOTS	210
APPENDIX V:	CHARACTERISTICS OF HIGH-ADOPTERS OF TRADITIONAL TECHNOLOGY ONLY ON ALL PLOTS	211
APPENDIX VI:	CHARACTERISTICS OF HIGH-ADOPTERS OF TRADITIONAL TECHNOLOGY ONLY ON SOME PLOTS	213
APPENDIX VII:	CHARACTERISTICS OF LOW-ADOPTERS OF BOTH TRADITIONAL TECHNOLOGY AND NEW TECHNOLOGY	214
APPENDIX VIII:	CHARACTERISTICS OF LOW-ADOPTERS OF TRADITIONAL TECHNOLOGY BUT NON-ADOPTERS OF NEW TECHNOLOGY	215
CHAPTER IX:	CONCLUSION	219-231
BIBLIOGRAPHY		232-235

LIST OF TABLES

Table No.	Title	Page
5.1	Total Number of Farmers and the Area Operated in the Village (1963-64)	128
5.2	Farmers Using Chemical Fertilizers During the Period 1961-62 to 1963-64	129
5.3	Selection of the Farmers Presumed to be Not Progressive	131
5•4	Size of Sample Farmers Before Investigation and After Investigation	132
6.1	Cotton Cultivation Practices and Scores Allotted	147
6.2	Frequency Distribution of the Scores of the Clearing Operation	149
6.3	Frequency Distribution of the Scores of the Ploughing Practice	151
6.4	Frequency Distribution of the Scores of the Manuring Practice	152
6.5	Frequency Distribution of the Scores of the Harrowing Practice	154
6 .6	Frequency Distribution of the Scores of the Fertilizing Practice	155
6.7	Frequency Distribution of the Scores of the Seeds and Sowing Practice	158
6.8	Frequency Distribution of the Scores of the Interculturing Practice	159
6.9	Frequency Distribution of the Scores of the Crop Protection Practice	161
7.1	Simple Correlation Coefficients of Different Independent Variables with Yield	173
7.2	Correlation Coefficients for Composite Scores and Yield	178

Table No.	Title	Page
7•3	Simple Correlation Coefficients between Different Variables for Cotton, Deep Black Soil	179
7.4	Simple Correlation Coefficients between Different Variables for Cotton, Karl Soil	180
7.5	Coefficient of Multiple Determination and Regression Coefficients Using Eight Independent Variables	181
7.6	Coefficient of Multiple Determination and Regression Coefficients Using Six Independent Variables (Expressed in Rs.)	183
7.7	Partial Elasticities of Output	186
8.1	Adoption of Different Cultivation Practices according to Location (Arithmetic Means of the Scores)	191
8.2	Adoption of Different Cultivation Practices according to Soil Type (Arithmetic Means of the Scores)	192
8.3	Distribution of the Plots according to Location and Soil Type	193
8.4	Adoption of Different Cultivation Practices according to Whole-time or Part-time Farming (Arithmetic Means of the Scores)	195
8.5	Adoption of Different Cultivation Practices according to Size of Holding Groups (Arithmetic Means of the Scores)	196
8.6	Distribution of the Plots according to Size of Holding and Whole-time/Part-time Farming	197
8.7	Adoption of Different Cultivation Practices according to Resource Availability Groups (Arithmetic Means of the Scores)	198
8.8	Adoption of Different Cultivation Practices according to Caste Groups of the Farmers (Arithmetic Means of the Scores)	199
8.9	Percentages of Farmers Favoured by Different Factors Influencing Adoption of Technology according to Categories of Farmers	204

LIST OF GRAPHS AND MAPS

		After page
	GR A PHS	
2.1	AREA UNDER AMERICAN AND LOCAL VARIETIES OF COTTON IN DHARWAR	30
2.2	AREA UNDER AMERICAN AND LOCAL VARIETIES OF COTTON IN BELGAUM	30
3.1	GRAPH SHOWING THE EXTENSION OF THE AREA UNDER SEEDS OF KNOWN PURITY IN THE KUMTA-DHARWAR TRACT PROPER (CONSISTING OF DHARWAR, BIJAPUR AND BELGAUM DISTRICTS)	95
·		
	MAPS	
1.1	MYSORE STATE : COTTON (1953-54 TO 1955-56)	8
5.1	MAP OF SELECTED VILLAGE	138

AN OUTLINE OF THE STUDY

The plains of North Mysore, stretching into the central and north-eastern parts of Dharwar, south-eastern part of Belgaum, and central and south-eastern parts of Bijapur districts, have deep black soil and congenial climatic conditions for growing quality cotton. The tract grows both Deshi and American varieties of cotton. The Deshi cotton grown in this tract is known as Kumta (G.herbaceum) cotton. It has probably derived its name from the Kumta port in North Kanara district from which it was shipped to Bombay until the railway line, linking the cotton growing areas of the tract with Bombay was established at the end of the nineteenth century. As traditionally Kumta variety of cotton was grown in this area, it was known as Kumta-Dharwar tract and it is still recognized by the same name. The name of Dharwar is probably associated with it because the plains of the district are well known for growing the best cotton in the whole of the tract.

Motivated by the trade interest in growing long-staple cotton within the Empire, the East India Company Government introduced in 1842 two American varieties of G.hirsutum type, namely, Upland Georgian and New Orleans in this tract. The experiments were highly successful on the plains of Dharwar. It is significant to note that, among the several efforts made by the Government in different parts of the country to

grow American cottons during the last century, it was only in Dharwar that the experiments were successful at the field level.

The development of a crop in a region may be conceived in respect of increase in the total area under the crop, increase in the area under improved variety vis-a-vis the total area, improvement in technology of production resulting in increase in the productivity and change in the production organization so that the new technology is adopted on a mass scale. This study has two objectives which can be best stated in the form of two direct questions such as "What were the general conditions under which the area under improved variety of cotton in the Kumta-Dharwar tract developed during different periods and what were the growth-promoting agents?" and, "What is the functional relationship between the improved production techniques and per acre yield; and what is the type of farm organization which adopts better techniques and why?" The study is divided into two parts accordingly and Part I contains the first four chapters and Part II contains the rest five chapters. An outline of the contents of different chapters is given below.

Chapter I presents a descriptive picture of the soilclimate complex of the cotton growing area in Mysore. The data are drawn partly from a brochure prepared by the Cotton Specialist at Dharwar, and partly from the district gazetteers. How the American variety of cotton was introduced

in the tract and how it developed during the period from 1829 to 1882 is described in Chapter II, for which the district gazetteers mainly provided the data. The other sources of information for this chapter are the papers in the possession of the East India Company, showing what measures have been taken since 1836 to promote the cultivation of cotton in India and the works on cotton in India by Royle, Leacock and Mandelbaum, Tata and Cassels. Development of cotton research and administration during the period from 1918 to 1962 are traced in Chapter III, depending upon the information gathered from the Annual Reports of the Indian Central Cotton Committee. Chapter IV presents the standard production techniques, based on the results of the agricultural experiment stations and evolved for different cotton zones having different soil-climate complexes. In this case, again, the Cotton Specialist at Dharwar provided the data.

Chapters V to VIII deal with the organizational problems of cotton cultivation, based on the data collected through making case studies of 67 farmers in a cotton growing village in Dharwar. The characteristics of the selected farmers and their farms are described in Chapter V. In Chapter VI, a systematic technique-adoption index is developed for the cotton growing plots in the sample. It is done in the way the American rural sociologists have done it but is confined to only some major improvements to suit the purpose of the study. In Chapter VII, the relationship between rate of

(xiii)

technique-adoption and productivity of cotton is established by employing multiple regression analysis and Gobb-Douglas production function. Chapter VIII attempts to bring to light the most ideal and feasible characteristics of the farm organization adopting the standard cotton production techniques. The concluding chapter synthesizes the results of Part I and Part II and adds that the mass-acceptance of the standard techniques is a new condition of growth. It advocates for introducing necessary institutional arrangement to promote that condition.