AN ANALYSIS OF MARKET SHARE OF RICE PESTICIDES IN NORTHERN TAMIL NADU

Thesis submitted in part fulfillment of the requirements for the degree of

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CERTIFICATE

This is to certify that the thesis entitled **"AN ANALYSIS OF MARKET SHARE OF RICE PESTICIDES IN NORTHERN TAMIL NADU"** submitted in part fulfillment of the requirements for the Degree of **MASTER OF BUSINESS MANAGEMENT** in **Department of Agricultural and Rural Management** to the Tamil Nadu Agricultural University, Coimbatore is a record of bonafide research work carried out by **Mr. C. KANNAN** under my supervision and guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes and that the work had not been published in part or full in any scientific or popular journal or magazine.

Place : Coimbatore
Date: 28.7.2000

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ABSTRACT

AN ANALYSIS OF MARKET SHARE OF RICE PESTICIDES IN NORTHERN TAMIL NADU

STUDENT: C. KANNAN **CHAIRMAN: Dr. M. CHANDRASEKARAN**

Use of agro-chemicals has increased over years to enhance the food production to meet the demand of the growing population. As a result, the ecological system has been adversely affected leading to environmental pollution and health problems. To have a check over this ill effect, concerted efforts are made through the research system and reorienting the policy regimes. One such initiative is the IPM (Integrated Pest Management) which has resulted in declining trend in the usage of pesticides. Keeping this in view, it has become necessary, to study the market share of the important pesticides, share of different companies, to project the market share and to suggest measures for maintaining or enhancing market shares.

In the above context only, the present study has been under taken up in Northern Tamil Nadu for rice crop. The sample for the study covered 120 farmers and 20 dealers from two taluks of Villupuram and Dharmapuri districts. The data were collected using a pre-tested and well structured questionnaire interview schedule developed separately for the farmer survey and dealer survey.

The results of the study indicate that the general characteristics of the selected farmers are given below.

The study revealed that the expenditure on pesticides per acre was Rs. 246.62, Rs.383.75, Rs.218.56 and Rs.233.93 for Pidagam, Madur, Periyamuthur and Panchapalli villages, respectively. The factors that influenced the farmers to choose a brand of pesticide was the "dealers recommendation" followed by the "fellow farmer using", "product efficacy" and "Agriculture officer's recommendation" in that order as revealed by the Garette's Ranking technique. On the other hand, the farmers' preference of dealers was mainly influenced by the "reliability " followed by the "nearness" of the outlets to the farmers, "credit facility" and "loyalty" in that order. As regards, mode of purchase, 74.00 per cent of the sample farmers purchased the chemicals in terms of cash alone and the remaining farmers purchased on cash and credit basis. Furadon and phorate were the

major chemicals used for the paddy cultivation. These two chemicals had a market share of 41.96 per cent and 18.45 per cent, respectively, as observed from the farmers' survey.

The analysis of market share of the companies for paddy pesticides alone, showed that Rallis was the company ranked first with a market share of 42.52 per cent, followed by Cyanamid and Novartis with their share of 15.88 per cent and 13.08 per cent respectively, in the market. "Priority of manufacture and distribution of fertilizers and pesticides", "Product efficacy" and "Product price" were the most important factors which influenced the dealers to prefer a particular company.

Using the Markov chain analysis it was found that the market share of dithane M-45, bavistin and hinosan under fungicides, ekalux, dimecron and nuvacron under insecticides and furadon, thimmet and vijay phorate under soil insecticides are likely to go down in the immediate 3-4 years which will be covered partially by kitazin under fungicides, rogor and monocil under insecticides and Spic phorate under soil insecticides, apart from the fact that the users of these chemical will come down from 74.17 per cent to 63.69 per cent for fungicides and from 88.33 per cent to 82.36 per cent for insecticides. In the case of soil insecticides the percentage of the users is expected to go up from 37.50 per cent to 53.88 per cent, during the same period.

Based on the inference made from the results of the study, the following suggestions are made:

The pesticide companies can organize periodical meetings for the dealers to make them aware of the effectiveness of their brands, conduct demonstrations in the fields of progressive farmers and by enlisting the cooperation of extension personnel.

The number of private dealer outlets should be increased in such a manner that they are within the reach for the farmers and dealer-farmer relationship should be promoted to facilitate farmers loyalty towards dealers.

The technical officers of the organization should conduct the analysis of market share, the rate of brand switching by the farmers to understand the change in the preference of the farmers to win back their loyalty through appropriate marketing strategies and product efficacy.

INTRODUCTION

CHAPTER I

INTRODUCTION

In modern agriculture, the unchecked ravages of insect pests, plant diseases and weeds can have far reaching consequences. Uncontrolled, these can reduce crop yields by as much as half or more. This is important in the context of the fact that the one billion population of this country would be demanding 220 million tonnes of food grains for which the country has to prepare itself. India losses food grains worth of Rs.15,000 crores per annum, due to the pest-disease syndrome alone. If the losses from the pests and diseases are curtailed, it can make an immense difference to our economy through more production, as the cost benefit ratio normally ranges between 1:4 and 1:8[1]. In order to put a check on these losses, of all the measures known to mankind, the use of pesticides comes in handy although it has a long lasting negative effect when it is used indiscriminately.

Pesticide science is hardly 60 years old .The first organic pesticide was developed and marketed in the thirties (dithiocarbamate fungicides). Easily biodegradable organophosphorus compounds and carbamates replaced highly persistent organochlorides discovered after the Second World War. Later, environmental safety linked pesticide usage, led to the development of the non-lethal methods of insect control like, chemosterilants, hormones, etc[2].

Though plant protection is considered to be the key to a prospective crop and sure returns to investment, farmers seldom pay proper attention to it, till their crop suffers from diseases and pests with perceivable losses. On the other hand, the agricultural scientists admit that modern agriculture based on exotic and hybrid varieties of crops is more open to such hazards and hence, greater awareness and adoption of plant protection measures is needed. Though farmers have started assessing the significance of the plant protection in crops, yet their adoption behaviour is far below the desired level in most of the areas of the country[3].

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1. J.S. Varma, "Importance of Pesticides in Indian Agriculture", **Pesticide Information**, July-September, 15(2): 1-5, 1989.
2. D.S. Iyengar, "Market driven pesticides – present trends and future prospects", **Pestology – APCP Conference Issue,** p.258-263, 1999.
3. Nirmal Kumar, P.K. Singh and V.K. Singh, "Constraints to use of plant protection measures", **Pesticide Information,** July-September, 15(2): 15-17, 1989.

Pesticide Use in India

Pesticide usage began to gain popularity from the frontiers and has emerged as one of the essential agro-inputs to raise and sustain the various crop yields. The pesticide use is not evenly spread through out the country and it is high in states like Punjab, Haryana, Andhra Pradesh and Tamil Nadu, where the farmers are progressive and commercial crops are grown, apart from the staple food crops like rice and wheat. The high yielding and hybrid varieties of these crops demand a greater use of different pesticides, to save them from various pests and diseases. There are several factors, which determine the pesticide use by the farmers. The availability of quality and cheaper pesticides and the source which provide information to the farmers about the different pesticide products prevailing in the market, are some of the factors that influence the farmers pesticide use pattern[4].

The use of synthetic pesticides in agriculture has increased rapidly during the last four decades and has overshadowed the traditional plant protection methods used to reduce crop damages due to insect pests, diseases and weeds. Though pesticides use is claimed to have contributed significantly to food security by way of reducing post harvest losses, there is a growing concern about the ill effects of pesticides on human health, natural resources and sustainability of agricultural production.

There had been considerable expansion in the demand for chemical pest control in Indian agriculture in the past. The annual use of pesticides increased from 2,344 tonnes during the triennium ending 1957-58 to 72,653 tonnes during the triennium ending 1992-93 in the country, showing about 30 times increase in a span of three and half decades[5]. However, the current focus of the Central and State Governments on Integrated Pest Management adds an entirely new dimension to pesticide demand in the context of the growing environmental and health consciousness.

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4. A. Rakila and N.R. Padmanabhan, "Farmers brand loyalty to pesticides", **Pestology**, 19(6), p.14, 1995.
5. Ramesh chand and Pratap S. Birthal, "Pesticide use in Indian Agriculture in relation to growth in Area and production and Technological change", **Indian Journal of Agricultural Economics**, 52(3), July-Sep., p.489-498, 1997.

Pesticide Production in India

Production of pesticides technically started in India in the year 1952, with a production capacity of 200 million tonnes of technical grade. The current production is more than 80,000 tonnes of technical grade pesticides. There are 65 technical grade manufacturers who are producing more than 20 ingredients with nearly 400 formulation units. India is second only to China in the number of generic pesticide manufacturing companies[6].

At present pesticide industry in India comprises of basic manufacturers, formulators, importers, distributors and dealers, who are operating within public and private sectors. There are large scale multinationals and indian companies, as well as many medium and small scale units. The total current investment of the pesticide industry is about Rs. 1,500 crores with an annual turnover of around Rs. 4,000 crores[7]. But, the gap between the production capacity of 200 million tonnes created as far back in the early 1950's and the current production at 80,000 tonnes annually, indicate that the picture is not all that rosy for the pesticide companies in the country.

Pesticide Industry in future have to face the increased use of biological pest control measures and consequently a reduction in chemical pesticides use. In Tamil Nadu, the use of pesticides have come down to 1851 tonnes in 1996-97 as against 10,926 tonnes of technical grade pesticides used during 1984-85[8]. However, the facts remain that (i). the economic scenario of India is dominated by agriculture sector in terms of lively hood of 70 per cent of the total population who depend on agriculture and (ii). the two major inputs for increasing the food grain production and to save food grains on storage are fertilizers and pesticides. Therefore, in view of the reality that pesticides cannot be totally dispensed with, the pesticide consumption may settle down at some level and there will be greater competition among manufacturers to maintain or enhance their market shares.

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6. B.N. Dhar, "Pesticides Scenario in India", **The Pesticides World**, 2(1): 2-5, 1996.
7. S.C. Mathur and S.K. Tannan, "The Pesticide Industry in India", **Pesticide Information**, 24(3):12, 1998.
8. Government of Tamil Nadu, **Agrostat**, Department of Agriculture, p.214, 1998.

TABLE 1. WORLD PESTICIDE MARKET (1997-98)

Sl. No.	Pesticides	Quantity in Metric tonnes	Per cent to total value
1.	Fungicides	41,307	49.65
2.	Herbicides	26,098	31.37
3.	Insecticides	12,919	15.53
4.	Others	2,868	3.45
	Total	83,192	100

Source: Agrochemical and Pesticide Safety Hand Book, 1998

TABLE 2. CROP-WISE USE OF PESTICIDES

Sl. No.	Crop	Share of pesticides consumed (per cent)	Share to total cropped area (per cent)
1.	Cotton	52 – 55	5
2.	Rice	17 – 18	24
3.	Chillies / Vegetables / Fruits	13 – 14	3
4.	Plantation crops	7 – 8	2
5.	Other cereals / Millets / Oil seeds / Pulses	6 – 7	58
6.	Sugarcane	2 - 3	2
7.	Others	1 - 2	6

Source: Pestology, 16(10):5, 1999.

Pesticide Marketing

In a dynamic and growing economy, the agricultural marketing system provides important linkages between the farm production sector and the non- farm sector, apart from performing physical and facilitating functions of discovering the prices at different stages of marketing and transmitting the price signal in marketing chain[9].

Table-1 furnishes the details of world pesticides market. It can be observed that fungicides account for 49.65 per cent of the total pesticide market followed by herbicides, which account for 31.37 per cent of the total pesticide market. The share of insecticides in the total pesticides market is 15.53 per cent.

The crop wise usage of pesticide presented in Table 2 shows that 52-55 per cent of pesticides are used for cotton alone, which accounts for only five per cent of total cropped area while the rice crop uses 17-18 per cent of pesticides with 24 per cent of total cropped area. This shows that next to cotton, rice is the single largest crop using more pesticides and being one of the important staple food crops in the world, will continue to patronise the pesticide industry in the years to come, inspite of growing awareness about the deleterious effects of the indiscriminate use of pesticides and the awareness created and skill imparted to follow the integrated pest management methods.

In such a scenario, the performance of a company reflected by the share of its product in the market will always encounter competition by closer substitutes either through the brand loyalty or product efficacy in the long run and factors like advertising or any information source in the short-run.

This indicates that from the companies' point of view, a continuous assessment of their market share, the likely scenario of demand in the immediate future, the factors responsible for preference of a product or a company, by the farmers or dealers and to respond in a strategic manner, will become important to retain or enhance the market share of their product. Companies will also plan their production and marketing strategy based on the stability of crop area and their importance so as to minimise fluctuations in pesticide off-take.

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9. S.S. Acharya, "Agricultural Marketing in India: Some facts and emerging issues", **Indian Journal of Agricultural Economics**, 53(3):311-328, 1998.

It is in this context, the present study is taken up with the overall objective to analyse the market share of the rice pesticides and to understand the likely position of their demand in the immediate future by way of switching brand loyalty by farmers.

The specific objectives of the study are:

- to assess the market share of important pesticides used for rice;
- to assess the market share of companies of these important pesticides;
- to project the market share of different pesticides of different companies; and
- to suggest measures for maintaining or enhancing market shares.

SCOPE OF THE STUDY

The results of the study would help the executives of the pesticide companies in finding out the market share and the market potential of their product in immediate future in Tamil Nadu State, for making right decision in planning their strategy for effective marketing and designing the programme to increase the market share. It will increase the understanding of the executives about the farmers' attitude as pesticide users. The final result will be helpful to the top-level management in framing their appropriate strategies for increasing the market share. Beside, this study will throw light on the opportunities for different products in the target market and will also provide sufficient information on the consumer preference of the pesticides.

LIMITATIONS OF THE STUDY

A study of this nature requires time, which is an obvious limitation. Seasonal fluctuations may pose a challenge in estimating the future market share of pesticides based on the present market share obtained by the data collected. Consideration of only, pesticides which are primarily used for rice, may severely constrain the usefulness of the study results. However, the pesticide companies and dealers can still derive benefits by adopting appropriate marketing strategies by targeting pesticides of a staple food crop which will help them in the long run to tide over the fluctuations in the demand and off-take of pesticides for crops like cotton, whose consumption of pesticides is very high but often suffer from fluctuations in area.

ORGANIZATION OF THE THESIS

The thesis is organised into six chapters as under:

Chapter I: Introduction: It covers the information such as objectives, scope and limitations of the study.

Chapter II: Concepts and Review: It encompasses discussion on concepts used in the present study and the results of the earlier studies by other workers.

Chapter III: Design of the Study: It specifies the sampling design, method of data collection and tools used in the conduct of research and analysis of data.

Chapter IV: Description of Study Area: The general and agricultural characteristic features of the study region are described in this chapter.

Chapter V: Results and Discussion: The results of the analysis are presented and discussed to draw inferences with respect to the objectives of the study.

Chapter VI: Summary and Conclusion: The summary of the results of the study is resented to draw specific conclusions and policy options to help companies to maintain and improve their market share in the near future.

CHAPTER II

CONCEPTS AND REVIEW

A review of concepts, methods and results of past studies is very important to comprehend a problem, decide on methodology, tools of analysis and also to relate and substantiate results. In the following sections, the important concepts and results of related studies are reviewed.

CONCEPTS

Market

According to Jevons market refers to a group of persons who are in intimate business relations and on extensive transaction in any commodity[10].

The American Marketing Association opined market as expression of the aggregate forces of condition within which buyers and sellers make decisions, resulting in the transfer of goods and services, consequent to the aggregate demand of the potential buyers of a commodity or service[11].

Larson delineated market as the entire area within which the forces of demand and supply of given commodity or service interact, in effecting changes and establishing prices. Thus, whenever buyer and seller are brought together, whatever be the means of achieving communication, market exists[12].

Elling defined market as a place (or) area where physical transfer of merchandise takes place[13].

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10. John Freeman Pyle, Quoting Jevons in **Marketing Principles Organisations and Policies**, (New York: McGraw Hill Book Company, Inc., 1931.), p.20.
11. Committee on Definitions, **Marketing Definitions: A Glossary of Marketing Terms** (Chicago: American Marketing Association, 1960.), p.15.
12. A.L. Larson, **Agricultural Marketing**, (New Delhi: Prentice Hall Inc., 1963.), pp.33-34.
13. K.A. Elling, **"Introduction of Modern Marketing - An applied approach"**, (New York: The Macmillan Company, 1969.), p.4.

Acharya and Agarwal referred market as a social institution, which performs activities and provides facilities for exchanging commodities between buyers and sellers[14].

Stanton defined a market as people with heads to be satisfied, money to spend and willingness to spend it[15].

According to Kotler, a market comprised of all the potential customers sharing a particular need or wants who might be willing and able to engage in exchange to satisfy that need or want. Originally, the term market stood for the place where buyers and sellers gathered to engage in exchange[16].

For the present study, the market was considered as a place where exchange of pesticides took place between sellers (dealers) and buyers (farmers).

Marketing

Marketing means the income producing side of business[17].

According to Alexander, marketing is the performance of business activities that direct the flow of goods and services from producer to consumer or user[18].

McCarthy defined marketing as the performance of business activities that direct the flow of goods and services from producer to consumer or user in order to satisfy customers and accomplish the firm's objectives[19].

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14. S.S. Acharya and V.L.Agarwal, **Agricultural Marketing in India** (New Delhi: Oxford and IBH Co, 1987.), p.9.
15. William J. Stanton, "**Fundamentals of Marketing**", (New Delhi: McGraw Hill International Book Company, 1988.), p.14.
16. Philip Kotler, "**Marketing Management**", (New Delhi: Prentice-Hall Publishers, 1998.), p.9.
17. Malcolm P. McNair, Milton P. Brown, David S.R. Leighton and Wilbur B. Englent, "**Problems in Marketing**", (New York: McGraw Hill Book Co., Inc., 1951.), p.2.
18. R.S. Alexander, "**Marketing Definitions - A Glossary of Marketing Terms**" (Chicago: American Marketing Association, 1960.), p.15.
19. E.J. McCarthy, "**Basic Marketing**", (Homewood: Richard D Irusn, Inc., 1964.), p.16.

According to Stanton, marketing is a total system of interacting business activities designed, to plan, price, promote and distribute, want-satisfying products and services to present and potential customers[20].

Cox *et al.* defined marketing as the set of activities that make possible the intricate division of labour that characterizes our economy; its central responsibilities are to guide the choices economic specialists make among alternative uses of their resources and to exchange among them the goods and services they produce[21].

Cundiff and Still defined marketing as the business processes by which products are matched with markets and through which transfer of ownership is effected[22].

Westing and Album considered marketing as identification and creation of customer needs and it is a coordinated use of all functions within a business that can fulfill the needs of buyer and seller[23].

The American Marketing Association viewed marketing as the performance of all business activities that directed the flow of goods and services from producer to the ultimate consumer or user[24].

According to Philip Kotler, Marketing is a social and managerial process by which individuals and groups obtain what they need and want, through creating, offering and exchanging products of value with others[25].

For the present study, Marketing was considered as the process, which initiates from the point of production till it reaches the ultimate user.

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20. W.J. Stanton, **Op. Cit.,** p.5.
21. R. Cox, C. Goodman and Richandler, "**Distribution in a High level Economy**" (Englewood Cliffs: Prentice-Hall, Inc., 1965.), p.14.
22. Edward W. Cundiff and Richard R. Still, "**Basic Marketing concepts, Environments and Decisions**", (New Delhi: Prentice Hall of India Ltd., 1968.), p.2.
23. Howard Westing and Gerald Album, "**Modern Marketing Thought**", (London: The Macmillan company Collier - Macmillan Ltd., 1969.), p.13.
24. R.D. Buzzel and J.B. Mathews Jr., "**Quoting American Marketing Association in Marketing - An introductory Analysis**", (New York: Mc Graw-Hill Book Company, 1974.), p.13.
25. Philip Kotler, **Op. Cit.,** p.14.

Market Share

Davar defined market share as the ratio of the company sales to the total industry sales on either actual or potential basis[26].

Boone defined market share as the percentage of the market controlled by a certain company, product or service[27].

Thiruneelakandan estimated the market share for pesticides of different companies in Periyar and Salem districts using the total quantity of pesticides sold by sample dealers and average quantity sold per dealer and expressed in percentage[28].

Kalugasalamurthy analysed the market share using compound growth rate and chain ratio method for fungicides in Tamil Nadu. At retailer level, the quantity sold in different brands / chemicals fungicides, what the dealer dealt during the reference year (1990-91) were collected and worked out. At farm level the use of particular brand of fungicide during the same period for different crops in the study region were obtained[29].

Geetha estimated the most likely share for gypsum using chain ratio method[30].

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26. Davar, "**Modern Marketing Management**", (Bombay: Progressive Corporation Pvt. Ltd., 1975.), p.273.
27. Louis E. Boone and David L. Kurthy, "**Contemporary Business**", (New York: Dryden press, 1982.), p.13-14.
28. R. Thiruneelakandan, "Study on Market Potential for pesticides in Salem and Periyar District" (Unpublished MBM Thesis, Dept. of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1991.), p.28-29.
29. S. Kalugasalamurthy, "Fungicides Marketing in Tamil Nadu" (Unpublished MBM Thesis, Tamil Nadu Agricultural University, Coimbatore, 1991.), p.35.
30. R. Geetha, "Market potential for Gypsum in Trichirapalli District", (Unpublished MBM thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1991.), pp.65-67.

Murali estimated market share for biozyme for cotton crop in Tamil Nadu. The area under irrigated and rainfed cotton was forecasted to assess the market share for biozyme and plant growth promoters in general[31].

Ravichandran estimated the market share of leading vegetable seed firms in Karnataka using percentage analysis[32].

Ramanan estimated the market share for neem based pesticides in Tamil Nadu using Chain ratio method and market build up method[33].

According to Kotler the company's overall market share is its sales expressed as a percentage of the total sales to its served market. Served market is all the buyers who are able and willing to buy its product. The company's relative market share to its top competitor express its sales as a percentage of the three largest competitor's combined sales[34].

For the present study, market share was defined for the chemicals and for the companies separately, by working out the percentage share to the total quantity used by all the sample farmers.

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31. R. Murali, "A study on market potential for plant growth regulators in Tamil Nadu on Cotton", (Unpublished MBM thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1992.), p.29.
32. A. Ravichandran, "Study on market potential for hybrid tomato and hybrid bhendi seeds in Karnataka", (Unpublished MBM thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural Univeristy, Coimbatore, 1995.), p.72.
33. S. Ramanan, "An analysis of market potential for neem based pesticides in Tamil Nadu", (Unpublished MBM thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1997.), p.24.
34. Philip Kotler, **Op. Cit.**, p.767.

Markov Analysis

Dent applied Markov technique to study international wool flows and used the data on market shares.

If m_{jt} is the market share of "brand" j at time t, (j = 1,2,...r and t = 1,2,....T), and p_{ij} is the probability that any consumer will switch from brand i to j in the next period, then the expected market share of brand i at time t will be equal to its share at t-1 multiplied by the probability of a repeat purchase, plus any change due to switching from other brands, i.e.,

$$m_{jt} = \sum_{i=1}^{r} m_{it-1} p_{ij} + v_{jt} \ (j = 1,....r) \ .....(1)$$

where v_{jt} is a random variable, uncorrelated with m_{it-1} for all i, and $\Sigma(v_{jt}) = 0$, for all j, t. The set of states of brands was considered exhaustive, so that,

$\sum_{j=1}^{t} p_{ij} = 1$, for all i, for all periods .....(2)

The transition probabilities ($0 \leq p_{ij} \leq 1$) were estimated employing a quadratic programming approach. In this, the values of $p_{ij} \leq 0$ were chosen to minimise,

$\sum_{t=1}^{T} \sum_{j=1}^{r} v^2_{jt}$ subject to the constraints.

As the expected market share of any country A in time t is equal to its share in time t-1, multiplied by the probability of that country's sincerity in buying from country B, plus the share of country C in time t-1 multiplied by the probability of A's switching over from D to B and so on. Thus the system of regression equation (1) was represented as

$M_t = m_{t-1} p + v_t$

Where m_t was a row vector of market shares of the six exporters at time t and v_t was a row vector of disturbances.

He observed that while transition probabilities were of interest in themselves, giving some idea of the extent of substitution between exporters, a more important question was their implication with respect to future buying patterns.

Assuming these probabilities to be constant over time, he predicted for each importer, the market shares of exporting countries in future years using the following model,

$M_{t+1} = m_t + vt+1$ all t .....(4)

In that $E(m_{tm}) = m_t p^n$ all t .....(5)

He observed that the probability of improving the predicted future share patterns for any exporter existed simply by altering the appropriate transition probabilities. He concluded that the ability of the model to explain the buying patterns rested heavily on the assumption that the transition probabilities were constant over time and that the quadratic equation frequency technique used yielded accurate estimate of the probabilities[35].

Gupta defined Markov chain as an ordered series of states connected by an appropriate transition matrix, a rectangular array in which the elements are transition probabilities which are such that the probabilities of an event in time period 'n+1' depends only on the state of the system in time period 'n'. Markov analysis is a way of analysing the current movement of some variable in an effort to forecast its future and predicting the behaviour of the customers from the standpoint of the loyalty to one brand and their switching pattern to other brands[36].

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35. W.T. Dent, "Application of Markov analysis to international wool flows", **Review of Economics and Statistics**, 49(2): 613-616, 1967.
36. P.K. Gupta, "**Operations research and Statistical Analysis**, (New Delhi: Sultan chand and sons, 1984.), p.431.

Veena *et al.* studied the changing direction of Indian coffee exports using Markov chain analysis[37].

Vaseeharan applied Markov analysis to study the changing direction of Senna exports[38].

Jacob used Markov analysis to study the performance and scope of Neem gold on vegetables in Tamil Nadu[39].

Rangaraj while projecting the demand for 'Karate' used Markov analysis to estimate the market share[40].

For the present study, Markov analysis was used to project the market share of various insecticides, fungicides and soil insecticides used for paddy for future years.

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37. V.M. Veena, Surya Prakash and Lalit Achoth, "Changing direction of Indian Coffee Export", **Indian Journal of Agricultural Economics**, 49(3): 425-431, 1994.
38. S.S. Vaseeharan, "An Economic analysis of production and marketing of medicinal plants in Tamil Nadu", Unpublished M.Sc.(Ag.) thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1997.), p. 78.
39. Lovely Jacob, "Performance and scope of Neem gold on vegetables in Tamil Nadu", (Unpublished M.Sc. (Ag.) thesis submitted to Department of Agricultural. Economics, Tamil Nadu Agricultural University, Coimbatore, 1999.), p.65.
40. K.B. Rangaraj, "An analysis of market demand of Karate for rice in Erode district of Tamil Nadu", (Unpublished MBM Thesis submitted Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1999.), p. 34.

REVIEW OF PAST STUDIES

Market Share

Kalugasalamurthy analysed the market share at the national level in which Mancozeb was found to have highest market share followed by Edifenphos, Carbendazim, copper-oxy chloride and sulphur[41].

Geetha estimated the most likely share for gypsum using chain ratio method and concluded that market would be increasing, due to increase in trend in groundnut area.[42].

Ravichandran estimated the market share of leading vegetable seed firms in Karnataka. In respect of tomato hybrid, Indo American hybrid seeds had a larger market share (37.13 per cent) followed by Mahyco seeds (20.26 per cent). In case of bhendi also, Indo American hybrid seeds had a major share (36.3 per cent) followed by Anker seeds (28.42 per cent). Higher yield and more profit were the major reasons for using Indo American hybrid seeds[43].

Ramanan estimated the market share for neem based pesticides in Tamil Nadu using Chain ratio method and market build up method and he concluded that the willingness of the farmers were more and hence neem based products were having better scope[44].

Saravanan concluded that Stanes micronutrient ranked first with the share of 42.3 per cent among the fourteen micronutrient brands analysed in Salem and Erode districts. The results had shown that Stanes products had a higher penetration percentage of 83.3 per cent followed by Karnataka Agro and Rallis, among the respondent dealers surveyed[45].

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41. S. Kalugasalamurthy, **Op. Cit.,** p.87.
42. R. Geetha, **Op. Cit.,** p.92.
43. A. Ravichandran, **Op. Cit.,** p.76.
44. S. Ramanan, **Op. Cit.,** p.102.
45. L. Saravanan, "Market potential, Market share and farmers awareness of stanes micronutrient - in Salem and Erode District", (Unpublished MBM thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1998), p.34.

Veena *et al.* studied the changing direction of Indian coffee exports using Markov chain analysis. Six major countries namely USA, West Germany, USSR, Italy, Netherlands, Yugoslavia and others, importing coffee were considered. They concluded that India's previous market shares to USSR, West Germany and Italy were retained[46].

Vaseeharan applied Markov analysis to study the changing direction of Senna exports and reported that Germany would be the major buyer of Indian Senna and USA would loose its share in future years[47].

Jacob used Markov analysis to study the performance and scope of Neem gold on vegetables in Tamil Nadu. He used period I (1996-97) and period II (1997-98) as base years to estimate the market share for future years and concluded that Neem gold will have 30.70 per cent market share during 1998-99 that would be 7.40 per cent higher than the previous year[48].

Rangaraj while projecting the demand for 'Karate', used Markov analysis to estimate the market share. In this, Karate's market share was estimated to be 72.6 per cent for the year 1998-99 with period I (1996-97) and period II (1997-98) as base years[49].

Brand Preference

Hundal and Sandhu reported that reasonable price was a major basic factor that influenced the brand preference for television sets[50].

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46. V.M. Veena, Surya Prakash and Lalit Achoth, **Op. Cit.,** p.430.
47. S.S. Vaseeharan, **Op. Cit.,** p.86.
48. Lovely Jacob, **Op. Cit.,** p.78.
49. K.B. Rangaraj, **Op. Cit.,** p.87
50. T.S. Hundal and H.S. Sandhu, "Buying behaviour of TV buyers in Punjab", **Indian Journal of Marketing,** 18(2-4): 23, 1987.

Sivakumar stated that farmers used pesticides due to their effective control (78 per cent) and cost effectiveness (53 per cent). Also he stated that farmers did not use pesticides due to lack of awareness, higher price and low level of brand loyalty, which were ranked in order[51].

Ramalingam in his study on brand preference regarding fertilizers among farmers and dealers in Pollachi Taluk, used Garett's scoring technique to rank the brands. He found that SPIC was the most preferred industry by both farmers and dealers[52].

Senthilvelan ranked better results followed by quality and credit availability as the factors that influenced farmers in pesticide purchase[53].

Saravanan reported that 79 per cent of farmers were influenced by dealers and 21 per cent used pesticides following the advice of other farmers[54].

Ramesh concluded that 67 per cent of the farmers used stomp (herbicide) for its effective control, 50 per cent used due to labour problem, and 33 per cent used due to dealer persuasion. The study also revealed that 55 per cent of farmers did not use stomp due to lack of awareness about the product[55].

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51. S.D. Sivakumar, "A study on the market structure and buying behaviour of the farmers with reference to pesticides" (Unpublished M.Sc. (Ag.) Thesis, Dept. of Agricultural Economics, submitted to Tamil Nadu Agricultural University, 1987.), p.40.
52. K. Ramalingam, "Fertilizer brand preference of farmers and dealers in Pollachi Taluk - An Analysis" (Unpublished M.Sc.(Ag.) Thesis, Dept. of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1991.), p.82.
53. T.G. Senthilvelan, "An analysis into the market potential for Acephate", (Unpublished MBM thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1995.), p.96.
54. M. Saravanan, "Study on market potential for pesticides in Adilabad and Karimnagar districts of Andhra Pradesh", (Unpublished MBM Thesis submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1995.), p.90.
55. S. Ramesh, "A study on feasibility of establishing stomp on cotton, groundnut, tapioca in Tamil Nadu (Unpublished MBM Thesis submitted to Dept. of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1998.), p.64.

Source of Purchase

Singh *et al.* reported that private dealers were the major distributors as they handled about 80 per cent of the total supply of pesticides in Punjab[56].

Ramanan found out that 98 per cent of the farmers purchased pesticides from private dealers, 15 per cent from Agricultural Department Depots and 29 per cent from Co-operatives[57].

Sujatha stated that farmers purchased hybrid seeds from private dealers' only[58].

Mode of Purchase

Senthilvelan reported that 41 per cent of farmers purchased pesticides in terms of cash whereas 59 per cent of farmers purchased on credit[59].

Ravichandran concluded that most of the farmers (98 per cent) purchased hybrid tomato and bhendi seeds for cash and 2 per cent of farmers purchased on credit[60].

Farmers' Dealer Loyalty

Study by Singh and Singh revealed that the farmers chose private dealers as their choice of agency, based on the provision of incentives in the form of credit and exhibited loyalty to the dealers because of the same reason[61].

56.Balvinder Singh, S.S Grewal and M.S. Sandhu, "A study on price spread and quality of pesticides in Punjab", **Indian Journal of Agricultural Marketing**, 6(2): 60, 1992, p.42.

57. S. Ramanan, **Op. Cit.**, p.78.

58. Sujatha, "Market potential for tomato and bhendi hybrid seeds in Salem and Dharmapuri districts", Unpublished MBM thesis submitted to the Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1998.), p.24.

59. T.G. Senthilvelan, **Op. Cit.**, p.96.

60. A. Ravichandran, **Op. Cit.**, p.90.

61.S.K. Singh and. Y.P Singh, "Distributing factors in selection of Plant Protection Equipment User's Survey" **Pestology**, 10(2), p.25-30, 1986.

Dealers' Preference of Companies

Velappan identified five factors out of 15 factors, which were influential in motivating the fertilizer dealers. The important among these were consumer preference, credit facility, dealer margin, easy availability and dealer facility[62].

Menon mentioned that motivation of dealers could be achieved through offering incentives - financial and non-financial. The financial incentives happened to be discounts and rebates, cash awards and price protection. The non-financial aids were company association, recognition, fair play and prompt handling of complaints[63].

Ramesh Babu identified that the major factors influencing dealers purchase decision were; consumer preference, quality, availability of the product, special rebates and credit facility. The other factors were delivery facilities of the manufacturers, volume rebates, packing, service to dealers, promotional activities, recognition by the manufacturers, prompt handling of complaints and product linking, in that order[64].

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62. S. Velappan, "Fertilizer Dealer Motivation A research", **Fertilizer Marketing News**, 13(2): 1-3, 1982.
63. K.N. Menon, "Dealer Development and Motivation", **Fertilizer News**, 33(8): 33-35, 1988.
64. K. Ramesh Babu, "Factors influencing Dealers Purchase Decision Making Regarding Fertilizers in Tamil Nadu", (Unpublished MBM Thesis, Department of Agricultural. Economics, Tamil Nadu Agricultural University, Coimbatore, 1988.), p.78.

DESIGN OF THE STUDY

CHAPTER III

DESIGN OF THE STUDY

A reliable methodology is necessary to draw meaningful inferences from the study. This chapter deals with the sampling design, methods of data collection, study period and the analytical framework.

Sampling Framework

Based on rainfall distribution, irrigation pattern, soil characteristics, cropping pattern and other physical, ecological and social characteristics, Tamil Nadu State is classified into seven distinct Agro–Climatic Zones. North Tamil Nadu comprising of NorthEastern Zone and North Western Zone was selected for this study. Based on the highest area under paddy, Villupuram district in North Eastern Zone (178161 ha.) and Dharmapuri district in North Western Zone (64393 ha.) were selected for the study and the details are given in Table 3. The taluk wise area under paddy for the selected districts is given in Table 4.

Based on the same criteria of highest area under paddy, two taluks were selected from each district and from each taluk one village was selected. Thus, a total of four villages were selected from these two districts. The taluks and villages selected from these districts are given in Table 5. Thirty farmers were selected from each village randomly. Thus, a total of 120 farmers from these four villages were interviewed using a pre-tested comprehensive interview schedule.

TABLE 3. AREA UNDER PADDY IN SELECTED DISTRICTS

Sl. No.	Zone	Name of Districts	Area under paddy (in ha.)	Selected districts
1.	North Eastern Zone	1. Kancheepuram	1,54,694	
		2. Thiruvallore	1,11,895	
		3.Vellore	90,679	Villupuram
		4. Thiruvannamalai	1,42,223	
		5. Villupuram	**1,78,161**	
		6. Cuddalore	1,16,625	
2.	North Western Zone	1. Salem	46,481	
		2. Namakkal	23,983	Dharmapuri
		3. Dharmapuri	**64,393**	

Source: Agrostat, Department of Agriculture, Government of Tamil Nadu, 1997-98.

TABLE 4. TALUK WISE AREA UNDER PADDY IN SELECTED DISTRICTS

Sl. No.	Villupuram District	
	Taluks	**Area under paddy (in ha.)**
1.	Villupuram	36,000
2.	Vanur	19,500
3.	Tindivanam	23,379
4.	Gingee	13,500
5.	Thirukoyilur	21,060
6.	Ulundurpaettai	19,622
7.	Kallakurichi	26,600
8.	Sankarapuram	18,500
Sl. No.	**Dharmapuri District**	
	Taluks	**Area under paddy (in ha.)**
1.	Dharmapuri	6,060
2.	Pennagaram	3,688
3.	Palacode	8,271
4.	Denkanikottai	5,905
5.	Hosur	5,100
6.	Krishnagiri	17,680
7.	Uthangarai	3,434
8.	Harur	7,672
9.	Pappireddipatti	4,682
10.	Pochampalli	1,901

Source: Offices of the Joint Director of Agriculture, Villupuram and Dharmapuri (1997-98).

TABLE 5. LIST OF SELECTED VILLAGES

S. No.	District	Taluk	Village
1.	Villupuram (North Eastern Zone)	1. Villupuram 2. Kallakurichi	1. Pidagam 2. Madur
2.	Dharmapuri (North Western Zone)	1. Krishnagiri 2. Palacode	1. Periyamuthur 2. Panchapalli

The selection of dealers was based on the farmers' response. Accordingly, dealers from whom the sample farmers purchased their pesticides were selected and interviewed using a separate interview schedule prepared for dealers. A total of 20 dealers were chosen for the study

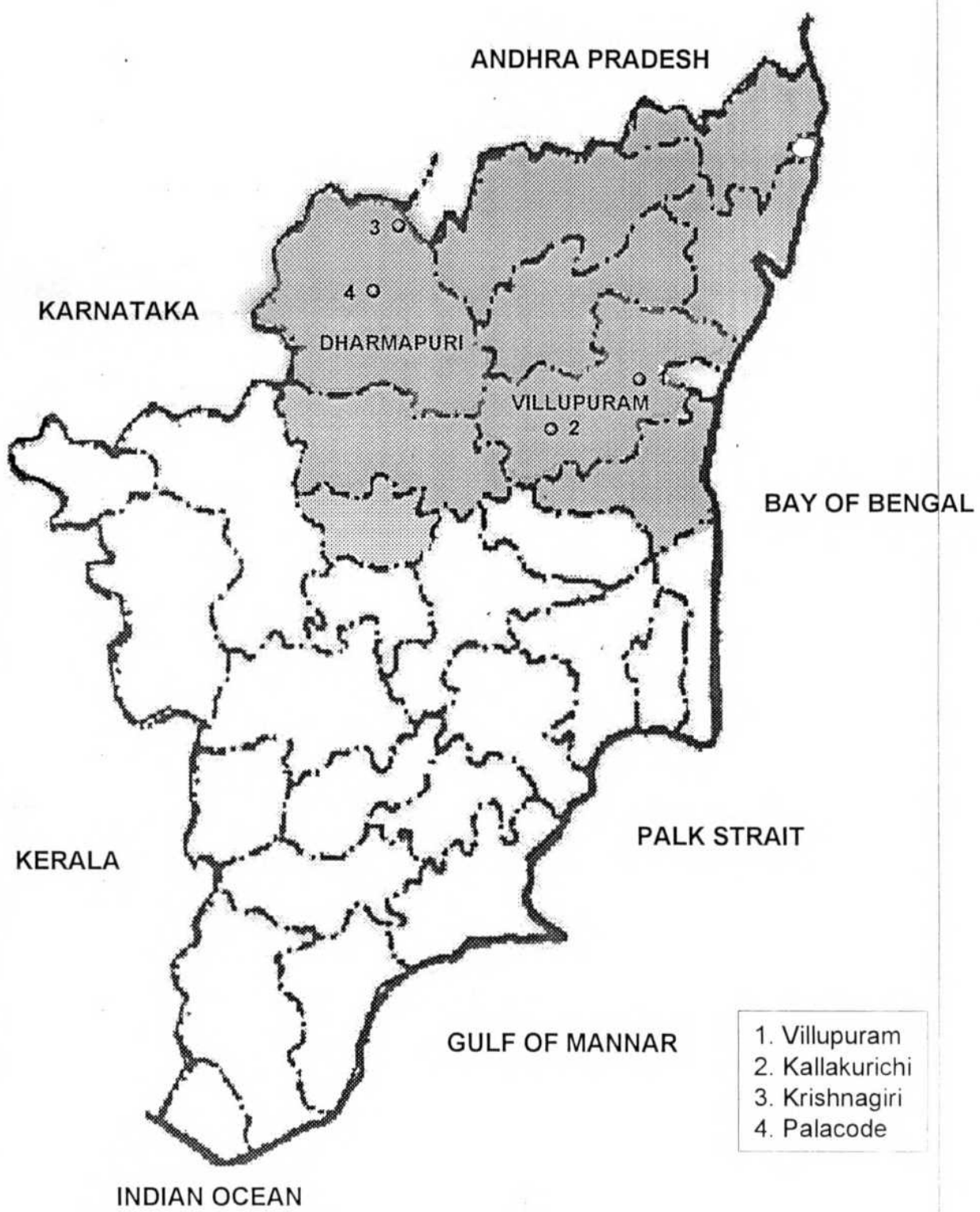
Collection of Data

Primary Data were collected from farmers and dealers using pretested questionnaires. Personal interview method was followed to obtain information from the respondents. The two different questionnaires used for the study are given in Appendix-I and Appendix II.

Secondary Data relating to the study area regarding agriculture and general information were collected from the offices of the Joint Directors of Agriculture, Assistant Directors of Agriculture, Agricultural Development officers, Assistant Directors of Statistics and Village Administrative Officers.

Fig. 1. TAMIL NADU STATE MAP (SHOWING NORTHERN TAMIL NADU)

Fig. 2. TAMIL NADU STATE MAP (SHOWING STUDY TALUKS)



Study Period

The reference year for the study was 1999-2000 and the collection of data was taken up during the month of February 2000. To facilitate the analysis on market potential through switching of brand loyalty by farmers, the data on use of pesticides by farmers during the years 1998, 1999 and 2000 were also gathered.

Selection and Measurement of Variables

At the farmers level, apart from the general information, the following details were collected which would help to analyse the market share of paddy pesticides used and there by the market share of companies.

1. Brands of the pesticides used by the farmers for the previous three years i.e., 1998, 1999 and 2000 and the quantity used in 2000 for the control of paddy pests.
2. Source of purchase of these pesticides by them.
3. The factors influencing the brand preference.
4. The reasons for preferring particular dealer from whom they purchased the pesticides.

At the dealers level, along with the general information, the details on product line dealt, dealership possessed and the brands available for paddy pests, sales turnover for the past three years i.e., 1996-97, 1997-98 and 1998-99, sales turnover of different brands of pesticides used for paddy and factors influencing paddy pesticides brand preference by dealers, were collected to analyse the market share of paddy pesticides by different companies.

Tools of Analysis

Conventional Analysis

The Simple percentages and averages were worked out to study the general characteristics of sample farm households like age, education, size of operational area, acreage under paddy, experience in paddy cultivation, annual income, expenses on chemicals, terms, mode and source of purchase of chemicals and trend in usage of pesticides.

Similar analyses were carried out to study the experience in dealing with pesticides, number of companies and products they are dealing, sales turnover, chemical wise and company wise market share for the dealers.

Garrett's Ranking Technique

This technique was used to rank the factors influencing brand preference of farmers, factors influencing the preference of dealers and factors influencing the dealers' preference of companies.

According to this technique, the order assigned to the different factors by the respondents were converted into ranks by using the formula.

Per cent Position = $100 (R_{ij} - 0.5) / N_j$

Where, R_{ij} = Rank given to the i^{th} attribute by the j^{th} individual

N_j = Number of attributes ranked by the j^{th} individual

By referring to the Garett's table, the per cent position estimated were converted into scores. Thus for each factor, the scores of the various respondents were added and the mean value was estimated. The means thus obtained for each of the attributes were arranged in a descending order. The attributes with the highest mean value was considered as the most important one and followed by others in that order[65].

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65. Henry E. Garrett and R.S. Woodsworth, **Statistics in Psychology and Education**, (Bombay: Vakils, Fetter and Simmons Pvt..Ltd., 1969.), p.239.

Markov Analysis

Markov analysis is a way of analysing the current movement of some variables in an effort to forecast its future movement. It is a marketing aid for examining and predicting the behavior of customers from the standpoint of loyalty to one brand and their switching to other brands. The analysis is made normally in four steps as described below.

Step 1. Construction of State - Transition Matrix: A state-transition matrix is a rectangular array which summarizes the transition probabilities for a given markov process. In such a matrix, the rows identify the current state of the systems being studied and the columns identify the alternative states to which the system could move.

An "m x n" matrix, where P_{ij} denotes the probability of moving from state S_i to State S_j, represents the generalized state-transition matrix.

To / From	S_1	S_2	S_3	....	S_j
S_1	P_{11}	P_{12}	P_{13}	....	P_{1j}
S_2	P_{21}	P_{22}	P_{23}	....	P_{2j}
S_3	P_{31}	P_{32}	P_{33}	....	P_{3j}
.	.	.	.	.	.
.	.	.	.	.	.
S_i	P_{i1}	P_{i2}	P_{i3}	....	P_{ij}

The interpretation of a given state - transition matrix depends on the problem itself. However, in general, the row probabilities are those associated with customer retention and loss, while the column probabilities are those associated with customers retention and gain. The sum of the probabilities in each row must equal one. In the case

of brand switching, P_{ij} denotes the probabilities that a customer's preference would switch from brand S_i to brand S_j, during the current period to the next period.

The above condition, say on the i^{th} row

$P_{i1} + P_{i2} + P_{i3} + \ldots\ldots + P_{in} = 1$ $(i = 0, 1,2...n)$,

could be interpreted as 'a customer is bound to have some preference'.

Step 2. Calculation of Retention Probabilities

Retention probabilities were estimated by dividing the number of customers retained by the number of customers originally served.

Step 3. Estimation of Gain or Loss Probabilities

The rules followed were:

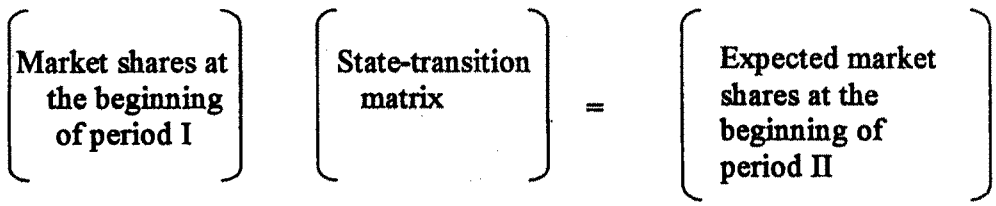
For gain probabilities, the number of customers each entity had gained should be divided by the number of customers served by the source of the gain. For loss probabilities, the number of customer each entity had lost should be divided by the original number of customers it served.

Using the results of step 2 & 3, the state - transition matrix will be constructed. The retention probabilities were listed along the main diagonal. If loss probabilities were used, they were inserted in the appropriate row cells of the matrix. If gain probabilities were used, they were inserted in the column cells of the matrix. In either case, the resulting matrix would be the same.

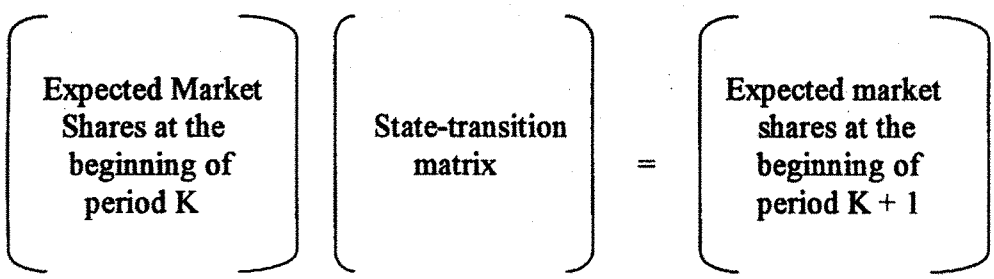
Step 4. Steady State Condition

If no attempt (like sales promotion, advertisement) was made to alter the transition probabilities, the system will eventually reach a point of equilibrium. When a point of equilibrium was reached, the market shares owned or controlled by the competitive firms would stabilize. From the management point of view, the steady state would identify the potential market structure in the long run.

Using the state - transition matrix, the expected future market share for the next period would be determined as



if more than one expected shares calculation are required, then



where K = number of time periods under consideration.

Using the state transition matrix, the equilibrium condition of the current problem would then be determined.

DESCRIPTION OF THE STUDY AREA

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

A proper perspective of the study region covering a brief description of geographical features such as location, climate, rainfall, soil type and agro-socio-economic features such as agriculture, population, literacy and labour are absolutely essential to have a better understanding of the problem studied. These are presented in the following sections.

Location

The total geographical area of Villupuram district is 7.22 lakh hectares. It is located between 11^0 10' and 12^0 35' North latitude and between 78^0 35' and 50^0 0' East longitude. Dharmapuri surrounds Villupuram district on North-western side, Chengelpet on North-eastern side, Salem on Western side, Thiruvannamalai on Northern side and Cuddalore on the Southern side. It comes under North-eastern agro-climatic zone of Tamil Nadu.

Dharmapuri district was formed by bifurcating Salem district. It is bound on the East by Thiruvannamalai district, on the west by Erode district and Bangalore district of Karnataka, on the North by Chitoor district of Andhra Pradesh and Lathipalli taluk of Bangalore and on the South by Salem district. It lies between 11^0 47' and 13^0 01' of North latitude and 77^0 13' and 78^0 46' of the East longitude with an average altitude of 1300 ft above MSL. It comes under North-western agro-climatic zone of Tamil Nadu.

Dharmapuri district has extensive hilly and rocky areas with undulating plains. It is one of the districts having the more forest area in Tamil Nadu. The Western side of the district is fully covered with hilly as well as forest areas and the land is highly undulated. In the North Eastern side of the district, Elagiri hill is present. It has an altitude of 600 - 1000 meters above MSL and it is in Bargur block. Hoeganakkal waterfall is located in the Southern part of the district, in Pennagaram block.

The plains of the Dharmapuri district can be divided into 3 elevating stages. The lower elevation, below 150m is seen in the southern part of district (Thoppur and Nallampalli areas). The mid elevation of 150 to 300m occupies the major area of the district. It covers Harur, Morappur, Pappireddipatti and Mathur blocks. The highly elevated plain in the district lying between 300 to 600 m above MSL covers Pennagaram, Palacode and Hosur blocks. The district is mainly an undulating rugged terrain in the middle, surrounded by hill ranges on the Northern and North Western sides by the Mysore plateau, on the East by Javvadi hill range and on the South by Chitteri and Shevaroy hill ranges. The district is cut by a net work of streams mainly flowing toward Southeast, mostly controlled by prominent shear zones.

The main rivers of Dharmapuri district are Pambar, Ponniyar and Chinnar rivers. The Cauvery flows along the South-western boundary of the district. The altitude ranges from 380 to 1396 m above the mean sea level.

Demography

The demographic details of Villupuram and Dharmapuri districts are given in Table 6. According to 1991 census, the total population of the Villupuram district is 25.49 lakhs. Out of this, 50.76 per cent (12.94 lakhs) are male. Among the population, 38.50 per cent are literates. Majority of the population in this district are involved in agriculture, either working as cultivator or as agricultural labourers, constituting about 45.63 per cent of the total population in this district.

The Population of the Dharmapuri district is 24.28 lakhs. The sex ratio is 942 females per 1000 males. The urban population is 2.30 lakhs with a share of 9.50 per cent. The literate population of Dharmapuri is 9.41 lakhs which constituted 39.76 per cent of the total population. The male and female literacy levels of the district are 48.02 per cent and 28.94 per cent, respectively. The density of the population is 252 persons per square km.

TABLE 6. DEMOGRAPHIC DETAILS

(in numbers)

Sl. No	Particulars	Villupuram			Dharmapuri		
		Persons	Male	Female	Persons	Male	Female
1.	Total Population	2549211 (100)	1294009 (50.76)	1255202 (49.24)	2428586 (100)	1250596 (51.50)	1177925 (48.50)
2.	Rural Population	2290562 (89.85)	1165902 (90.10)	1124660 (89.60)	2197921 (90.50)	1132281 (90.54)	1065640 (90.47)
3.	Urban Population	258649 (10.15)	128107 (9.90)	130542 (10.40)	230675 (9.50)	118390 (9.47)	112640 (9.56)
4.	Literate Population	980621 (38.50)	638047 (49.30)	342574 (27.29)	941444 (39.76)	600518 (48.02)	340926 (28.94)
5.	Density of population per square km.	350	-	-	252	-	-
6.	Sex ratio (Females per 1000 males)	970	-	-	942	-	-

(Numbers in the parentheses indicate percentages to the total population)

Source: Offices of the Assistant Director of Statistics, Villupuram and Dharmapuri (1998-99).

Administrative Set–Up

The details of administrative taluks and blocks in Villupuram and Dharmapuri districts are given in table 7. For administrative purpose, Villupuram district has been divided into eight taluks and twenty-two blocks. Dharmapuri district has been divided into ten taluks and eighteen blocks. There are a total of 1514 villages spread over these blocks.

Soil Type

Soil types of a particular area play a crucial role in determining the cropping pattern.

Majority of the soils in Villupuram district come under the following types;

a) Red soil – shallow, drained, gravelly soil,
b) Clay-loam - with deep soil and rarely mixed with black soil
c) Saline alkaline – coastal soil with barren rock

The different types of soils such as black or mixed loam, red ferrugeneous and gravel are found in Dharmapuri district. The black or red loam is very fertile due to its moisture absorbing character. The occurrence of red loamy soils is more pronounced and found throughout Hosur taluk. Considerable stretches of red loam and black soils are found both in Dharmapuri and Krishnagiri taluks. In general, soil of this district is quite deep, loose with colours varying from red to dark reddish brown. The soil has low nitrogen and phosphate content with no marked variations between different taluks.

Land Use Pattern

The land use details of Villupuram and Dharmapuri districts are given in Table 8. The net sown area in Villupuram district accounted for 49.1 per cent of the total geographical area. The area under forest accounted for 9.93 per cent of the total geographical area, which is far less than the requirement of 33 per cent. The extent of grazing lands is also very less (0.61 per cent of the total geographical area).

TABLE 7. ADMINISTRATIVE TALUKS AND BLOCKS IN VILLUPURAM AND DHARMAPURI DISTRICTS

Sl. No	Villupuram	
	Taluks	**Blocks**
1.	Villupuram	Kandamangalam, Vikravandi, Kalai, Koliyanur
2.	Vanur	Vanur
3.	Tindivanam	Olakkur, Mylam, Marakkanam
4.	Gingee	Gingee, Vallam, Melmangalam
5.	Thirukoyilur	Thirukoyilur, Thiruvennainallur, Mugaiyur
6.	Ulundurpaettai	Ulundurpaettai, Thirunavalur
7.	Kallakurichi	Kallakurichi, Chinnasalem, Thiyagadurgam
8.	Sankarapuram	Sankarapuram, Rishivandiyam, Kalvarayan hills
Sl. No	**Dharmapuri**	
	Taluks	**Blocks**
1.	Dharmapuri	Dharmapuri and Nallampalli
2.	Pennagaram	Pennagaram
3.	Palacode	Karimangalam and Palacode
4.	Denkanikottai	Keelamangalam and Thally
5.	Hosur	Hosur and Shoolagiri
6.	Krishnagiri	Krishnagiri and Veppanapalli
7.	Uthangarai	Mathur and Uthangarai
8.	Harur	Harur
9.	Pappireddipatti	Pappireddipatti and Morappur
10.	Pochampalli	Kaveripattinam and Bargur

Source: Offices of the Assistant Director of Statistics, Villupuram and Dharmapuri (1998-99).

TABLE 8. LAND UTILIZATION PATTERN OF VILLUPURAM AND DHARMAPURI DISTRICTS

(Area in ha.)

Sl. No	Particulars	Villupuram		Dharmapuri	
		Area	Per cent to Total Area	Area	Per cent to Total Area
1.	Forests	71,697	9.9	3,66,226	38.0
2.	Barren and uncultivable lands	60,918	8.4	43,846	4.6
3.	Cultivable waste	1,16,208	1.7	49,655	1.5
4.	Land put to non-agricultural use	12,067	16.1	14,424	5.1
5.	Permanent pastures and grazing lands	4,195	0.6	13,929	1.4
6.	Land under Miscellaneous crops	11,844	1.6	8,608	0.9
7.	Current Fallow	75,867	10.5	57,583	6.0
8.	Other Fallow lands	14,784	2.1	10,535	1.1
9.	Net Area sown	3,54,623	49.1	3,99,297	41.4
10.	Area sown more than once	68,073	-	57,240	-
11.	Total cultivated Area	4,22,696	-	4,56,537	-
12.	Total Geographical Area	7,22,203	100.0	9,64,103	100.0

Source: Offices of the Joint Director of Agriculture, Villupuram and Dharmapuri (1997-98).

The total geographical area of Dharmapuri district is 9.64 lakh ha. The net sown area accounts for 41.4 per cent of the total geographical area. The area under forests accounts for 38.0 percent, which meets the stipulated requirement of one-third area under forest cover. The area under current fallow accounts for 6.0 per cent of the total geographical area.

Rainfall Distribution

The season wise rainfall in the two districts are presented in Table 9. In Villupuram district, the normal annual rainfall is 947.50 mm. The maximum rainfall is usually received during northeast monsoon followed by southwest monsoon. Rainfall data in this district were collected in 19 weather stations.

The average rainfall of Dharmapuri district is 854.2 mm. The major portion of rainfall is received in the months of July, August and September.. The rainfall is minimum in the months of January, February, March and April.

In both the districts, the actual rainfall during 1997-98 was higher than the normal rainfall.

Irrigation Sources and Pattern

The source wise irrigation details in the two districts are presented in Table 10. In Villupuram district, the major irrigation sources are tanks and wells. There are 2085 tanks, 1,55,493 open wells and 22,331 tube wells in Villupuram district. There are 196 canals that run for 884-km length in this district, covering Kallakurichi and Ulundurpet region with feeder lines from the river. River irrigation is available in Rishivandiyam, Sankarapuram, Mailam and Gingee taluks, where 7409 hectares of land is irrigated. From canal irrigation, 4033 hectares of land is benefited in this district. The net irrigated area with the available water resources in this district is 2.5 lakh hectares. The gross area irrigated is 2.72 lakh hectares. Out of this, 1.68 lakh hectares are irrigated by wells and tanks irrigate 70766 hectares.

TABLE 9. SEASON WISE RAINFALL DISTRIBUTION IN VILLUPURAM AND DHARMAPURI DISTRICTS

(in mm.)

Sl. No	Season	Villupuram		Dharmapuri	
		Normal	Actual	Normal	Actual
1.	Southwest Monsoon (June – September)	364.1 (38.43)	410.9 (31.42)	369.10 (43.09)	406.00 (39.26)
2.	Northeast Monsoon (October – November)	474.5 (50.08)	667.0 (51.02)	303.30 (35.48)	549.30 (53.12)
3.	Winter (January, February)	24.5 (2.69)	58.0 (4.43)	21.20 (2.45)	0.0 (0.0)
4.	Hot weather (March – May)	84.1 (8.80)	76.1 (5.82)	161.60 (18.98)	78.70 (7.62)
	Total	947.5 (100.0)	1212.0 (100.0)	854.20 (100.0)	1034.00 (100.0)

(Numbers in the parentheses indicate percentage to the total rainfall)

Source: Offices of the Joint Director of Agriculture, Villupuram and Dharmapuri (1997-98).

TABLE 10. SOURCE-WISE IRRIGATION IN VILLUPURAM AND DHARMAPURI DISTRICTS (1996-97)

(in ha.)

Sl. No.	Source	Villupuram		Dharmapuri	
		No.	Net Area Irrigated	No.	Net Area Irrigated
1.	Canal	196	5,449	181	6,563
2.	Tanks	2,085	49,920	2,347	18,071
3.	Tube wells	22,331	40,990	26	95
4.	Open wells	1,55,493	1,03,073	1,38,418	1,08,433
	Total		1,96,432		1,33,162

Source: Offices of the Joint Director of Agriculture, Villupuram and Dharmapuri (1997-98).

Cauvery and Southpennar are the two major rivers flowing through Dharmapuri district. Another source of irrigation is Southpennar starting from chennakeshava hills. It is the most useful irrigation source to Dharmapuri district. The Mathur dam was constructed across South pennar for canal irrigation and it covers southern parts of Krishnagiri, Kaveripatanam and Eachampadi taluks. In other parts of Dharmapuri district mostly open wells numbering 1,38,418 irrigate an area of 1,08,433 ha. Tanks numbering 2,347 account for the irrigation of 18,071 ha.

Area under Irrigation

The data pertaining to the irrigated area under different crops in the selected districts are presented in Table 11. It could be seen from the table that the irrigated area under rice (1,75,055) is maximum followed by sugarcane in Villupuram district. In Dharmapuri district area irrigated under paddy is followed by oil seeds and cotton.

Cropping Pattern

The cropping pattern in the two districts surveyed are presented in table 12. In Villupuram district, paddy was cultivated as the major crop in an area of 1.75 lakh ha. followed by cumbu with 0.69 lakh ha. and with ragi 0.12 lakh ha. Pulses were grown in an area of 0.53 lakh ha. Oil seed crops were cultivated in an area of 1.68 lakh ha., of which groundnut alone occupied an area of 1.46 lakh ha. Cash crops like sugarcane and cotton were cultivated in an area of 0.39 lakh hectares and 0.14 lakhhectares, respectively.

In Dharmapuri district groundnut was the single largest crop with 0.89 lakh hectares followed by ragi with 0.77 lakh hectares, horsegram with 0.66 lakh hectares and paddy with 0.64 lakh hectares. Area under all pulses accounted for 1.32 lakh hectares. Cash crops like sugarcane and cotton were raised in an area of 0.27 lakh hectares and 0.23 lakh hectares, respectively.

TABLE 11. AREA OF MAJOR CROPS IRRIGATED (1997 -98)

(in ha.)

Sl. No	Crop	Villupuram	Dharmapuri
		Irrigated Area	Irrigated Area
Food crops			
1.	Paddy	1,75,055	64,284
2.	Sorghum	164	32
3.	Cumbu	821	1,011
4.	Total Cereals	1,77,050	71,050
5.	Total Pulses	448	187
6.	Total Food grains	1,77,498	71,237
7.	Total Condiments and Spices	1,433	3,475
8.	Sugarcane	33,175	18,938
9.	Total Fruits and Vegetables	6,221	13,702
10.	Total Food crops	2,18,327	1,07,352
Non food crops			
11.	Oil seeds	26,468	24,279
12.	Cotton	3,470	11,563
13.	Tobacco	0	19
14.	Fodder crops	14	105
15.	Miscellaneous Non-food crops	6,106	7,666

Source: Season and Crop Report, 1997-98.

TABLE 12. CROPPING PATTERN IN VILLUPURAM AND DHARMAPURI DISTRICTS

Sl. No.	Villupuram				Dharmapuri		
	Crop	Area (in Lakh Ha.)	Production (in Lakh metric tonnes)	Productivity (in kgs/Ha)	Area (in Lakh Ha.)	Production (in Lakh metric tonnes)	Productivity (in kgs/Ha)
.1.	Paddy	1.75	5.21	3065	0.64	2.54	3629
2.	Sorghum	0.05	0.04	814	0.25	0.30	1196
3.	Cumbu	0.69	0.78	1135	0.07	0.18	2491
4.	Ragi	0.12	0.26	2178	0.77	1.26	1631
5.	Maize	-	-	-	0.01	0.01	1095
6.	Tenai	0.02					
7.	Varagu	0.03	0.03	873	0.02	0.02	981
8.	Samai	0.01	0.01	801	0.41	0.34	842
9.	Redgram	0.08	0.07	864	0.25	0.28	648
10.	Blackgram	0.35	0.14	390	0.08	0.04	538
11.	Greengram	0.04	0.02	478	0.07	0.03	554
12.	Horsegram	0.03	0.01	333	0.66	0.30	455
13.	Total Pulses	0.53	0.24	453	1.32	0.67	508
14.	Total food Grains	3.16	6.57	2079	3.52	4.87	1384
15.	Groundnut	1.46	2.38	1631	0.89	1.37	1546
16.	Gingelly	0.20	0.09	468	0.05	0.02	438
17.	Sunflower	0.01	0.01	1040	0.10	0.10	1013
18.	Total Oilseeds	1.68	2.48	1476	1.15	1.53	1332
19.	Cotton	0.14	0.25	301	0.23	0.39	20598
20.	Sugarcane	0.39	2.76	9486	0.27	1.36	8019

Source: Agrostat, Department of Agriculture, Government of Tamil Nadu, 1997-98.

Marketing Facilities

The details pertaining to the marketing institutional facilities available are presented in Table 13. The three types of marketing facilities available are the market committees, Regulated markets and farmers markets.

Retail Outlets for Plant Protection Chemicals

The details pertaining to the retail outlets for the plant protection chemicals are given in Table 14. The total number of retail outlets in Villupuram district for plant protection chemicals is 670, which accounts for four per cent of total retail outlets in the State. In the case of Dharmapuri district six per cent of the retail outlets of the State are present in the form of private dealers, Co-operatives, Agro-service centres and Agriculture extension centres. Among the four types of outlets, the private dealers are the major source for plant protection chemicals followed by the Co-operatives, Agro-service centres and Agriculture extension centres. The proportion of each category of outlets in each district are shown in parentheses.

Infrastructures Related to Agriculture

The infrastructure facilities available under the Department of Agriculture in the two districts are presented in table 15. A total number of 913 fertilizer sale points are present in Villupuram district whereas Dharmapuri district has 752 fertilizer sale points. The unique features of Dharmapuri among the two districts are the presence of State oil seed farm, Parasite breeding centre for coconut, Biocontrol agent production centre and Soil testing lab. Both the districts have farmers training centres, fertilizer testing laboratories and coconut crossing centres. There are four seed processing units and four state seed farms present in Villupuram district and there are two seed processing units and one state seed farm in Dharmapuri district.

Road Facilities

The road facilities available in the two districts are presented in table 16. It could be seen that various parts of the two districts are well connected by roads.

TABLE 13. INSTITUTIONALISED MARKETING FACILITIES AVAILABLE IN VILLUPURAM AND DHARMAPURI DISTRICTS

(in numbers)

Sl. No.	Retail outlets	Villupuram	Dharmapuri
1	Market Committee	11	15
2	Farmers market	2	2
3	Regulated market	1	1

Source: Agrostat, Department of Agriculture, Government of Tamil Nadu, 1997-98.

TABLE 14. NUMBER OF RETAIL OUTLETS FOR PLANT PROTECTION CHEMICALS AVAILABLE IN VILLUPURAM AND DHARMAPURI DISTRICTS

(in numbers)

Sl. No.	Retail outlets	Villupuram	Dharmapuri	Tamil Nadu
1	Agril.Extn.Centres	40 (5.97)	33 (2.98)	880 (5.14)
2	Co-operatives	240 (35.82)	423 (38.21)	4613 (26.97)
3	Private Outlets	300 (44.78)	482 (43.54)	8810 (51.50)
4	Agro Service Centres	90 (13.43)	169 (15.27)	2803 (16.39)
	Total	670 (100.00)	1107 (100.00)	17107 (100.00)

(Numbers in the parentheses indicate percentage to the total number of retail outlets)
Source: Agrostat, Department of Agriculture, Government of Tamil Nadu, 1997-98.

TABLE 15. INFRASTRUCTURES CATERING TO THE NEEDS OF AGRICULTURE IN VILLUPURAM AND DHARMAPURI DISTRICTS

(in numbers)

Sl. No.	Infrastructures	Villupuram	Dharmapuri
1.	Seed processing unit	4	2
2.	State seed farms	4	1
3.	State oil seed farms	0	1
4.	Agricultural Extension centres	48	33
5.	Coconut Nurseries	0	2
6.	Coconut crossing centres	1	1
7.	Parasite breeding centre for sugarcane	2	1
8.	Parasite breeding centre for coconut	0	1
9.	Bio control agents production centres	0	1
10.	Soil testing laboratories	0	1
11.	Fertilizer analysing laboratories	1	1
12.	Farmers training centres	1	1
13.	Fertilizer sale points	913	752

Source: Agrostat, Department of Agriculture, Government of Tamil Nadu, 1997-98.

TABLE 16. ROAD FACILITIES

(in km.)

Sl. No.	Roads	Villupuram	Dharmapuri
1	National highway	70.55	92.50
2	State highway	64.08	78.52
3	Municipality roads	23.00	43.00
4.	Panchayat union roads	5340.00	5850.00
5.	Town panchayat roads	168.24	182.64

Source: Agrostat, Department of Agriculture, Government of Tamil Nadu, 1997-98.

RESULTS AND DISCUSSION

CHAPTER V

RESULTS AND DISCUSSION

In this chapter, the results of various analyses carried out are presented and discussed under the following sections.

I. Farmer survey

II. Dealer survey

III. Market share analysis

IV. Markov analysis

I. FARMER SURVEY

General Details of Sample Farm Households

1. Family Details

The details on composition of the sample farm families are presented in the Table-17. An analysis of the results showed that out of the total number of family members, 25.00 per cent were adults and 75.00 per cent were children. Pidagam village of Villupuram district had maximum child population while Periyamuthur village of Dharmapuri district had the maximum adult population. The average size of the sample farm households was 4.82 persons.

2. Educational Status of Farm Families

The results presented in the Table-18 would reveal that among the farm families, 62.00 per cent of them had their education upto school level, 13.00 per cent had education upto the College level and the remaining 25.00 per cent were illiterates. Among the villages, maximum illiterates accounting for 34.00 per cent were observed in Panchapalli village of Dharmapuri district.

Pidagam village of Villupuram district had the maximum number of the farm family members who had education upto college level. School level of education was maximum in Madur village. The literacy level in the four villages surveyed were in the range of 66.00 to 79.00 per cent.

TABLE 17. FAMILY DETAILS OF THE SAMPLE FARM FAMILIES

(numbers)

Districts	Villages	Family composition		
		Adult	Children	Total
Villupuram	Pidagam	23 (16.00)	120 (84.00)	143 (100.00)
	Madur	36 (24.00)	112 (76.00)	148 (100.00)
Dharmapuri	Periyamuthur	51 (31.00)	113 (69.00)	164 (100.00)
	Panchapalli	32 (26.00)	92 (76.00)	124 (100.00)
	Total	142 (25.00)	437 (75.00)	579 (100.00)

(Numbers in parentheses indicate percentage to total number of sample farm families)

TABLE 18. EDUCATIONAL STATUS OF THE SAMPLE FARM FAMILIES

(numbers)

Districts	Villages	Literacy level			
		Illiterate	School	College	Total
Villupuram	Pidagam	29 (21.00)	75 (54.00)	36 (25.00)	143 (100.00)
	Madur	34 (23.00)	101 (68.00)	13 (9.00)	148 (100.00)
Dharmapuri	Periyamuthur	40 (25.00)	109 (66.00)	15 (9.00)	164 (100.00)
	Panchapalli	42 (34.00)	21 (57.00)	11 (9.00)	124 (100.00)
	Total	145 (25.00)	356 (62.00)	78 (13.00)	579 (100.00)

(Numbers in parentheses indicate percentage to total number of sample farm families)

3. Operational Holding Area of the Sample Farms

An examination of results presented in Table-19 would indicate that 41.66 per cent of the sample farmers had an operational holding area of less than 2.5 acres. Farmers with an operational holding area ranging from 2.50 acres to 5.00 acres accounted for 35.83 per cent and farmers with more than 5.00 acres of operational holding area accounted for only 22.40 per cent. It could be inferred from the above analysis that the marginal and small farmers dominate agriculture in northern Tamil Nadu both together accounting for 77.49 per cent.

The results would also indicate that the average size of the operational holdings of the sample farms was only 4.8 acres. It ranged between 1.8 acres in Periyamuthur village of Dharmapuri district to 6.8 acres in Pidagam village in Villupuram district.

4. Cropping Pattern

The results of the analysis of the cropping pattern in the sample farms during the year 1999–2000 are presented in the Table–20. The total cropped area in the four villages together accounted for 577.83 ha. The results revealed that paddy occupied a total area of 191.83 ha. in the four villages together with 34.39 per cent. The next important crop cultivated in these four villages was groundnut with 20.29 per cent, which occupied a total area of 112.80 ha. The other important crops cultivated in the sample villages were Sugarcane with 15.63 per cent, sesamum with 5.74 per cent and ragi with 4.02 per cent. It could be inferred from the table that while paddy and sugarcane were the dominant crops in Villupuram district, groundnut and paddy were the dominanat crops in Dharmapuri district.

TABLE 19. OPERATIONAL HOLDING AREA OF THE SAMPLE FARMS

Districts	Villages	Operational holding (in acres)					Total
		< 2.5	2.5 – 5.0	5.0 – 7.5	7.5 – 10.0	> 10	
Villupuram	**Pidagam**	5	14	4	3	4	30
	Madur	3	16	4	4	3	30
Dharmapuri	**Periyamuthur**	28	2	0	0	0	30
	Panchapalli	14	11	2	2	1	30
	Total	50 (41.66)	43 (35.83)	10 (8.30)	9 (7.50)	8 (6.60)	120 (100.00)

(Numbers in parentheses indicate percentage to total number of farmers)

TABLE 20. CROPPING PATTERN IN THE SAMPLE FARMS

(in ha.)

Sl. No.	Crops	Villupuram		Dharmapuri		Total
		Pidagam	Madur	Periyamuthur	Panchapalli	
1.	Paddy	71.80	70.50	20.33	29.20	191.83 (34.39)
2.	Groundnut	30.00	10.80	33.60	38.40	112.80 (20.22)
3.	Tapioca	4.40	-	-	-	4.40 (0.79)
4.	Ladies finger	1.20	-	-	-	1.20 (0.22)
5.	Cotton	0.80	0.80	-	-	1.60 (0.29)
6.	Sugarcane	44.40	42.80	-	-	87.20 (15.63)
7.	Castor	0.40	-	-	-	0.40 (0.07)
8.	Brinjal	8.00	-	3.60	-	11.60 (2.08)
9.	Sunflower	1.60	-	-	-	1.60 (0.29)
10.	Soybean	1.20	-	0.40	-	1.60 (0.29)
11.	Banana	0.40	-	-	1.60	2.00 (0.36)
12.	Black gram	2.00	-	-	-	2.00 (0.36)
13.	Ragi	1.20	3.20	4.80	13.20	22.40 (4.02)
14.	Sesamum	1.20	30.80	-	-	32.00 (5.74)
15.	Turmeric	-	2.00	-	-	2.00 (0.36)
16.	Cumbu	-	6.00	-	-	6.00 (1.08)
17.	Jasmine	-	-	5.20	-	5.20 (0.93)
18.	Betelvine	-	-	10.40	-	10.40 (1.86)
19.	Mango	-	-	-	12.00	12.00 (2.15)
20.	Coconut	-	-	-	25.60	25.60 (4.59)
21.	Tomato	-	-	1.20	22.80	24.00 (4.30)
	Total	168.60	166.90	79.53	142.80	557.83 (100.00)

(Numbers in parentheses indicate percentage to total area)

The results presented in table-21 would show that total area under paddy in sample farms did not vary much during three years from 1998 to 2000. The difference between the minimum and maximum area ranged between only 3.80 per cent in Madur of Villupuram district and 4.66 per cent in Panchapalli of Dharmapuri district.

6. Farmers Experience in Paddy Cultivation

The results of the experience of farmers in paddy cultivation analysed and presented in table-22 would show that farmers with experience in cultivating paddy for more than 20 years accounted for 60.82 per cent, followed by farmers with experience of cultivating paddy for more than ten years with 31.66 per cent. Only, 7.5 per cent of farmers had experience of less than ten years in cultivating paddy. The pattern was more or less similar in both the districts.

7. Farmers Annual Income

It could be seen from table-23 that 55.00 per cent of sample farmers had an annual income ranging from Rs. 25,000.00 to Rs. 50,000.00 followed by 26.68 per cent of farmers with annual income less than Rs. 25,000.00, 14.16 per cent with an annual income ranging from Rs.50,000.00 to Rs.1,00,000.00. Farmers with an annual income of more than Rs. 1,00,000.00 accounted for only 4.16 per cent. The analysis would indicate that the annual income of majority of farmers (81.60 per cent) was only less than Rs.50,000/-.

8. Expenses on Chemicals by Farmers in the Four Villages

The results presented in table-24 would indicate the total expenses on chemicals by the farmers in the four villages surveyed. The average expense by a farmer per acre was the highest for Madur village (Rs. 383.75) followed by Pidagam village (Rs. 246.61), Panchapalli village (Rs. 233.93) and Periyamuthur village (Rs. 218.56), in that order.

TABLE 21. AREA UNDER PADDY OVER YEARS IN THE SAMPLE FARMS

Districts	Villages	Area over years (in acres)			Difference between maximum and minimum area (%)
		1998	1999	2000	
Villupuram	Pidagam	513.68	494.01	507.51	4.00
	Madur	194.50	191.25	187.25	3.80
Dharmapuri	Periyamuthur	67.60	66.80	69.80	4.44
	Panchapalli	146.00	139.50	143.50	4.66

TABLE 22. FARMERS EXPERIENCE IN PADDY CULTIVATION

Districts	Villages	Experience in paddy cultivation (in years)			
		< 10	10 – 19	20 – 29	≥ 30
Villupuram	Pidagam	2	6	13	9
	Madur	3	14	5	8
Dharmapuri	Periyamuthur	4	3	7	16
	Panchapalli	0	15	10	5
	Total	9 (7.52)	38 (31.66)	35 (29.16)	38 (31.66)

(Numbers in parentheses indicate percentage to total number of farmers)

TABLE 23. ANNUAL INCOME OF SAMPLE FARMERS

Districts	Villages	Annual Income (in Rs.)			
		< 25,000	25,000 – 50,000	50,000 – 1,00,000	> 1,00,000
Villupuram	Pidagam	6	11	8	5
	Madur	7	15	8	0
Dharmapuri	Periyamuthur	13	16	1	0
	Panchapalli	6	24	0	0
	Total	32 (26.68)	66 (55.00)	17 (14.16)	5 (4.16)

(Numbers in parentheses indicate percentage to total number of farmers)

TABLE 24. TOTAL EXPENSES ON CHEMICALS BY SAMPLE FARMERS IN THE FOUR VILLAGES

Districts	Villages	Total expenses (Rs.)	Average expenses by a farmer per acre (Rs.)
Villupuram	Pidagam	7398.50	246.62
	Madur	11512.5	383.75
Dharmapuri	Periyamuthur	6757.00	218.56
	Panchapalli	7018.00	233.93

9. Source of Purchase

The results presented in the table-25 indicated that 95.83 per cent of the sample farmers were dependent on private dealers for the purchase of chemicals, while only 4.17 per cent of the sample farmers were dependent on both the Private dealers and Co-operative societies. None of the sample farmers were solely dependent on the Co-operative societies for the purchase of chemicals.

10. Terms of Purchase

The results presented in table-26 indicated that 61.66 per cent of the farmers in all the four villages purchased the chemicals on payment of cash and the remaining 38.39 per cent of the farmers purchased the chemicals both on cash and credit. Among the villages, 93.34 per cent of farmers in Panchapalli village and 80 per cent of farmers in Madur village purchased the chemicals on cash basis alone, whereas 63.40 per cent of the farmers in both Pidagam and Periyamuthur villages purchased the chemicals on both cash and credit.

11. Trend in Usage of Pesticides Over Years

The results presented in table-27 would show that 52.50 per cent of the farmers reported use of same quantity of pesticide during the period of study as compared to the previous year. While 11.67 per cent of the farmers reported relatively higher use, 35.00 per cent of the farmers reported low usage during the period of study as compared to previous years. The results would mean the attempt of farmers to adopt alternate methods of plant protection. However, such inferences are to be supported by data recorded during a continuous period of time.

TABLE 25. SOURCE OF PURCHASE OF PLANT PROTECTION CHEMICALS IN SAMPLE FARMS

(in numbers)

Districts	Village	Number of farmers purchasing from			Total
		Private Dealers	Co-operative Societies	Both	
Villupuram	**Pidagam**	30 (100.00)	0	0	30 (100.00)
	Madur	30 (100.00)	0	0	30 (100.00)
Dharmapuri	**Periyamuthur**	29 (96.67)	0	1 (3.33)	30 (100.00)
	Panchapalli	26 (86.67)	0	4 (13.33)	30 (100.00)
	Total	115 (95.83)	0	5 (4.17)	120 (100.00)

(Numbers in parentheses indicate percentage to total number of farmers)

TABLE 26. TERMS OF PURCHASE OF PLANT PROTECTION CHEMICALS BY SAMPLE FARMS

(in numbers)

Districts.	Villages	Cash	Both cash and credit	Total
Villupuram	**Pidagam**	11(36.60)	19 (63.40)	30 (100)
	Madur	24 (80.00)	6 (20.00)	30 (100)
Dharmapuri	**Periyamuthur**	11(36.60)	19 (63.40)	30 (100)
	Panchapalli	28 (93.34)	2 (6.66)	30 (100)
	Total	74 (61.67)	46 (38.33)	120 (100)

(Numbers in parentheses indicate percentage to total number of farmers)

TABLE 27. TREND IN USAGE OF PESTICIDES OVER YEARS IN SAMPLE FARMS

(in numbers)

Sl. No	Villages	Low	High	Equal	No usage	Total
Villupuram	**Pidagam**	25	0	5	0	30
	Madur	2	8	20	0	30
.Dharmapuri	**Periyamuthur**	4	5	20	1	30
	Panchapalli	11	1	18	0	30
	Total	42	14	63	1	120
		(35.00)	(11.67)	(52.50)	(0.83)	(100)

(Numbers in parentheses indicate percentage to total number of farmers)

TABLE 28. FACTORS INFLUENCING FARMERS CHOICE OF A BRAND

S. No	Attributes	Total Score	Mean score	Rank
1.	Product efficacy	6661	68.09	3
2.	Credit facilities	2192	63.32	6
3.	Product cost	1500	54.74	9
4.	Dealer's recommendation	5976	70.99	1
5.	Fellow farmer using	6640	68.12	2
6.	Advertisement	1015	59.96	7
7.	Sales Rep.'s recommendation	1637	64.60	5
8.	Easy availability	2873	58.02	8
9.	Agriculture Officer's recommendation	1987	64.66	4

12. Factors Influencing Farmers Choice of a Product or a Brand

The factors influencing the choice of a product or brand by the farmers are analysed and the results are presented in Table-28. The results would indicate that out of the nine attributes specified, the dealers' recommendation had been ranked as first to influence the farmers to prefer a particular brand with a mean score of 70.99, followed by fellow farmer using the pesticide with a mean score of 68.12 and product efficacy with a mean score of 68.09. Product cost has the least influence on the farmers brand preference with a mean score of only 54.74. The recommendation by the Agricultural Officer was ranked fourth with a mean score of 64.66. The analysis would show the dominance of the dealers and fellow farmers influencing the brand preference, closely followed by product efficacy and the recommendation of the Agricultural Officer. Price was not a factor to reckon with.

13. Factors Influencing Farmers Choice of Dealers

The details presented in table-29 showed that reliability followed by location (nearness), credit facility and loyalty, influenced largely the choice of the dealers. The mean score ranged from 66.05 to 59.36 for these attributes.

TABLE 29. FACTORS INFLUENCING FARMERS CHOICE OF DEALERS

S. No.	Attributes	Total Score	Mean score	Rank
1.	Easy availability	3735	55.81	V
2.	Credit facility	2694	59.89	III
3.	Nearness	5354	63.75	II
4.	Loyalty	4457	59.36	IV
5.	Fellow farmer's influence	2129	52.708	VI
6.	Reliability	6534	66.053	I

1. Experience in Dealing Pesticides

A perusal of results presented in table-30 would reveal that out of the total of 20 dealers, ten were having more than 15 years experience in dealing with pesticides and 10 had less than 15 years of experience and among them, four had less than five years of experience.

2. Number of Companies Dealt

The results presented in table-31 showed that the dealers preferred to sell products of only few companies, as indicated by the fact that 12 dealers dealt with products of only five companies and six dealt with the product of upto 10 companies. Dealers selling products of more than 10 companies were only two.

3. Product Line Dealt

The results of the analysis on the product line dealt with presented in table-32 would reveal that eight out of 20 dealers (40.00 per cent) were trading with pesticides and fertilizers. Thirty five per cent of the dealers were dealing with pesticides, fertilizers, seeds and cement. Only one dealer in Pidagam village was dealing with Pesticides, Fertilizers, Seeds and farm equipments. Four dealers were found to deal with pesticides, fertilizers and seeds together.

4. Sales Turnover of Paddy Pesticides.

The results presented in table-33 would indicate the sales turnover of paddy pesticides. These results on the sales turnover of the pesticide dealers would reveal that 60.00 per cent were small dealers with a total turnover of less than five lakhs annually.

TABLE 30. EXPERIENCE OF DEALERS IN DEALING WITH PESTICIDES

Sl. No.	Villages	Experience (in years)				Total
		< 5 Years	6 – 15 Years	16 – 25 Years	> 25 Years	
Villupuram	Pidagam	0	1	2	1	4 (20.00)
	Madur	0	1	1	2	4 (20.00)
Dharmapuri	Periyamuthur	2	2	1	1	6 (30.00)
	Panchapalli	2	2	2	0	6 (30.00)
	Total	4 (20.00)	6 (30.00)	6 (30.00)	4 (20.00)	20 (100.00)

(Numbers in parentheses indicate percentage to total number of dealers)

TABLE 31. NUMBER OF COMPANIES - PRODUCTS DEALT WITH BY DEALERS

Sl. No.	Villages	Companies dealt (in numbers)				Total
		< 5	6 –10	11 – 15	> 15	
1.	Pidagam	2	1	0	1	4 (20.00)
2.	Madur	3	1	0	0	4 (20.00)
3.	Periyamuthur	2	3	1	0	6 (30.00)
4.	Panchapalli	5	1	0	0	6 (30.00)
	Total	12 (60.00)	6 (30.00)	1 (5.00)	1 (5.00)	20 (100.00)

(Numbers in parentheses indicate percentage to total number of dealers)

TABLE 32. PRODUCT LINE DEALT BY THE DEALERS

Sl. No.	Villages	Pesticides & Fertilizers	Pesticides, Fertilizers, Seeds and Cement	Pesticides, Fertilizers & Seeds	Pesticides, Fertilizers, Seeds & Farm Equipment	Total
1.	**Pidagam**	2	0	1	1	4 (20.00)
2.	**Madur**	1	3	0	0	4 (20.00)
3.	**Periyamuthur**	4	2	0	0	6 (30.00)
4.	**Panchapalli**	1	2	3	0	6 (30.00)
	Total	8 (40.00)	7 (35.00)	4(20.00)	1 (5.00)	20 (100.00)

(Numbers in parentheses indicate percentage to total number of dealers)

TABLE 33. SALES TURNOVER OF PADDY PESTICIDES

Sl. No	Year	Turnover (Rs. in lakhs)				
		≤ 5	5 – 10	10 - 15	15 –20	≥ 20
1.	1996	12	4	1	2	1
2.	1997	12	4	1	2	1
3.	1998	12	4	1	2	1
	Average	12 (60.00)	4 (20.00)	1 (5.00)	2 (5.00)	1 (5.00)

(Numbers in parentheses indicate percentage to total number of dealers)

5. Dealers Preference of Companies

The results presented in table-34 would show that the dealers preferred companies, which are manufacturing fertilizers and pesticides with a mean score of 82.00. This was followed by product efficacy with a mean score of 73.24, product price with the mean score of 73.00, good brand image with a mean score of 72.46 and credit availability with a mean score of 71.25. Attributes like timely supply, promotional support and incentives did not seem to have much influence in the dealer preference of companies.

TABLE 34. DEALERS PREFERENCE OF COMPANIES

Sl. No.	Attribute	No. of Respondents	Total Score	Mean Score	Rank
1.	Product efficacy	17	1245	73.24	II
2.	Credit availability	4	285	71.25	V
3.	Profit margin	9	561	62.33	VII
4.	Timely supply	1	42	42	X
5.	Good brand image	11	797	72.46	IV
6.	High sales	12	800	66.67	VI
7.	Promotional support	2	100	50	IX
8.	Product price	4	292	73	III
9.	Incentives	7	428	60.43	VIII
10.	Priority of fertilizers & pesticides	1	82	82	I

IV. MARKET SHARE ANALYSIS

Market share of pesticides are analysed both chemical wise and company wise from farmers survey for rice crop in the study region and the results are presented in Table-35 and Table 36.

1. Chemical-wise Market Share

An analysis of results presented in table-35 would show the dominance of carbofuran with a market share of 42.16 per cent, followed by phorate with 18.54 per cent, dithane M-45 with 9.02 per cent, quinalphos with 7.02 per cent and monocrotophos with 4.82 per cent. Chemicals such as phosphamidon and kitazin accounted for 3.51 per cent and 3.29 per cent, respectively. All other chemicals put together numbering ten, accounted for only 11.89 per cent of the total use for rice crop.

2.Company-wise Market Share

An analysis of company wise market share presented in table-36 revealed the large market share of rice pesticides held by Rallis with 42.52 per cent, followed by Cyanamid with 15.88 per cent, Novartis with 13.08 per cent, Bayer with 11.92 per cent, Pesticide India with 3.28 per cent, Nocil with 3.08 per cent and SPIC with 2.64 per cent. All other 11 companies accounted for a total market share of only 7.60 per cent with eight companies registering only less than one per cent of the market share individually.

3. Market Share: Chemicals vis-à-vis Companies

The details of the chemical wise share of pesticide companies from the farmers survey are presented in table 37. It could be inferred from the table that carbofuran with a market share of 41.96 per cent was the chemical marketed by Rallis, under the trade name of furadon, in the study area. The next important chemical that occupied an appreciable market share of 18.45 per cent was Phorate, marketed by Cyanamid, SPIC and MFL Companies. Cyanamid had 82.80 per cent of the market share for phorate while SPIC and MFL had a market share of 10.60 per cent and 7.60 per cent, respectively. The third important chemical dithane M-45 occupied 8.98 per cent, which was marketed by Bayer.

TABLE 35. CHEMICAL WISE MARKET SHARE REPORTED BY FARMERS

Sl. No.	Chemicals	Quantity (in litres / kg)	Per cent	Rank
1.	Carbofuran	515.00	42.16	I
2.	Phorate	226.50	18.54	II
3.	Dithane M-45	110.22	9.02	III
4.	Quinalphos	85.77	7.02	IV
5.	Monocrotophos	58.92	4.82	V
6.	Phosphamidon	42.85	3.51	VI
7.	Kitazin	40.25	3.29	VII
8.	Malathion	35.70	2.92	VIII
9.	Bavisitn	23.75	1.94	IX
10.	Edifenphos	21.17	1.73	X
11.	Dichlorvas	17.00	1.39	XI
12.	Acephate	16.85	1.37	XII
13.	Butachlor	12.66	1.04	XIII
14.	Dimethoate	7.12	0.58	XIV
15.	Triazophos	6.00	0.49	XV
16.	Endosulphon	1.25	0.10	XVI
17.	Zinc phosphide	0.40	0.03	XVII

TABLE 36. COMPANY WISE MARKET SHARE REPORTED BY FARMERS

S. No.	Company	Quantity (in litres / kg)	Per cent	Rank
1.	Rallis	522.12	42.54	I
2.	Cyanamid	194.85	15.88	II
3.	Novartis	160.60	13.08	III
4.	Bayer	146.25	11.92	IV
5.	Pestcides India	40.25	3.28	V
6.	Nocil	37.75	3.08	VI
7.	SPIC	32.35	2.64	VII
8.	BASF	23.75	1.94	VIII
9.	Anu	17.00	1.39	IX
10.	MFL	15.00	1.22	X
11.	Excel	10.75	0.88	XI
12.	Shaw wallace	8.00	0.65	XIII
13.	Agr-Evo	6.00	0.49	XII
14.	Sudharshan	6.00	0.49	XIV
15.	Monsanto	3.16	0.26	XV
16.	Scientific Agro	3.00	0.24	XVI
17.	PCI	0.40	0.03	XVII
18.	NFCL	0.15	0.01	XVIII

TABLE 37. CHEMICAL WISE SHARE OF PESTICIDE FIRMS RELATING TO PADDY CULTIVATION IN THE SURVEYED AREA (Results of farmers survey)

Companies	Chemicals																	
	Di-Meth-oate	Fur-adon	Dithane M-45	Edifen-phos	Ace-phate	Buta-chlor	Endo-sulphon	Mono-Croto phos	Phospha-midon	Quinal-phos	Dichlor-vos	Zinc phos-phide	Bavi-stin	Mala thion	Phorate	Tri-azo-phos	Kitazin	Total
Rallies	7.12 (100.00)	515.00 (100.00)																522.12 (42.54)
Cyanamid														7.35 (20.60)	187.5 (82.800			194.85 (15.88)
Novartis								21.025 (35.70)	42.85 (100.00)	79.775 (93.00)	17.00 (100.00)							160.60 (13.08)
Bayer			110.225 (100.00)	27.175 (100.00)	8.85 (52.50)													146.25 (11.92)
Pesticide India																	40.75 (100.00)	40.25 (3.08)
Nocil								37.75 (64.10)										37.75 (2.64)
SPIC														8.35 (23.40)	24.00 (10.60)			32.35 (1.94)
BASF													23.75 (100.00)					23.75 (1.39)
Anu														17.00 (47.60)				17.00 (3.32)
MFL															15.00 (7.60)			15.00 (1.22)
Excel						9.5 (75.000	1.25 (100.00)											10.75 (0.88)
Shaw wallace					8.00 (47.50)													8.00 (0.65)
Agr Evo																6.00 (100.00)		6.00 (0.49)
Sudhar shan										6.00 (7.00)								6.00 (0.49)
Monsanto						3.16 (25.00)												3.16 (0.26)
Scientific Agro														3.00 (8.40)				3.00 (0.24)
PCI												0.40 (100.00)						0.40 (0.03)
NFCL								0.15 (0.20)										0.15 (0.01)
Total	7.12 (0.58)	515.00 (41.96)	110.225 (8.98)	27.175 (2.21)	16.85 (1.37)	12.66 (1.03)	1.25 (0.102)	58.925 (4.80)	42.85 (3.49)	85.775 (6.99)	17.00 (1.39)	0.40 (0.03)	23.75 (1.94)	35.70 (2.91)	226.5 (18.45)	6.00 (0.49)	40.75 (3.32)	227.38 100.00)

(Numbers in parentheses indicate percentage to the total)

Market Share Estimation of Pesticides

The projected market share of each product and the rate of gains or losses over the current market were estimated through Markov Chain Analysis. For the analysis; fungicides, insecticides and soil insecticides were considered separately to examine relative gain or loss of a pesticide over its substitutes.

The gain column indicates the number of farmers shifted from any other brand to the particular brand in the same row. Likewise, the loss column indicates the number of farmers shifted from that brand to any other brand. The retention column shows the number of farmers who continue to use that particular brand in the next year or the subsequent year. These analyses were done separately with the year 1998 and 1999 as base years.

A. Markov Analysis with 1998 as Base Year

The distribution of farmers using different pesticides during the year 1998 and 1999 are given in the table 38. The retention, gain or loss of respondents were estimated. The details are presented in table 39, 40 and 41 for Fungicides, Insecticides and Soil insecticides, respectively.

State Transition Matrix

Using retention, gain and loss probability the state transition matrix was constructed and given in table 42.

Future Market Share

The expected future market shares for the next period was estimated using the market shares in the year 1998 and transition matrix which is presented in table 43.

Results presented in table 38 showed that under fungicides, there was loss for dithane M –45, Hinosan and Kitazin, while Bavistin achieved some gain and the number of non users also increased. In the case of insecticides there was a marginal loss for

TABLE 38. DISTRIBUTION OF FARMERS USING DIFFERENT BRANDS OF PESTICIDES DURING 1998 AND 1999

Sl. No.	Brands	Number of farmers in Year 1998	Gain	Loss	Number of farmers in year 1999	Number retained
Fungicides						
1.	Dithane M-45	60	4	8	56	52
2.	Bavistin	12	3	1	14	11
3.	Hinosan	12	2	3	11	9
4.	Kitazin	5	2	3	4	2
5.	Non users	31	5	1	35	30
	Total	**120**	**16**	**16**	**120**	
Insecticides						
1.	Ekalux	31	1	2	30	29
2.	Dimecron	30	4	5	29	25
3.	Nuvacron	15	2	3	14	12
4.	Rogor	8	2	1	9	7
5.	Monocil	8	2	1	9	7
6.	Others	14	2	3	13	11
7.	Non users	14	3	1	16	13
	Total	**120**	**16**	**16**	**120**	
Soil Insecticides						
1.	Furadon	30	5	1	34	29
2.	Thimmet	9	5	2	12	7
3.	Vijay phorate	3	1	2	2	1
4.	Spic Phorate	3	1	2	2	1
5.	Non users	75	1	6	70	69
	Total	**120**	**13**	**13**	**120**	

TABLE 39. FUNGICIDES: RETENTION, GAIN OR LOSS.

Brands	Dithane M-45	Bavistin	Hinosan	Kitazin	Non users	Number of farmers in year 1998
Dithane M-45	52	1	2	2	3	60
Bavistin	1	11	0	0	0	12
Hinosan	1	1	9	0	1	12
Kitazin	2	0	0	2	1	5
Non users	0	1	0	0	30	31
Number of farmers in year 1999	56	14	11	4	35	120

TABLE 40. INSECTICIDES: RETENTION, GAIN OR LOSS.

Brands	Ekalux	Di mecron	Nuvacron	Rogor	Monocil	Others	Non users	Number of farmers in year 1998
Ekalux	29	1	1	0	0	0	0	31
Dimecron	0	25	1	2	1	1	0	30
Nuvacron	0	1	12	0	1	0	1	15
Rogor	0	0	0	7	0	1	0	8
Monocil	0	1	0	0	7	0	0	8
Others	1	0	0	0	0	11	2	14
Non users	0	1	0	0	0	0	13	14
Number of farmers in year 1999	30	29	14	9	9	13	16	120

TABLE 41. SOIL INSECTICIDES: RETENTION, GAIN OR LOSS.

Brands	Furadon	Thimmet	Vijay Phorate	Spic Phorate	Non users	Number of farmers in year 1998
Furadon	29	1	0	0	0	30
Thimmet	1	7	0	0	1	9
Vijay Phorate	0	2	1	0	0	3
Spic Phorate	0	2	0	1	0	3
Non users	4	0	1	1	69	75
Number of farmers in year 1999	34	12	2	2	70	120

TABLE 42. STATE TRANSITION MATRIX CONSTRUCTED WITH 1998 AS BASE YEAR

Fungicides: State Transition Matrix

	Dithane M-45	Bavistin	Hionsan	Kitazin	Non users
DithaneM-45	0.88667	0.01667	0.03333	0.03333	0.0
Bavistin	0.083333	0.091667	0	0	0
Hinosan	0.083333	0.08333	0.75	0	0.08333
Kitazin	0.4	0	0	0.4	0.2
Non users	0	0.03226	0	0	0.96776

Insecticides: State Transition Matrix

	Ekalux	Dimecron	Nuvacron	Rogor	Monocil	Others	Non users
Ekalux	0.9355	0.0323	0.0323	0	0	0	0
Dimecron	0	0.833	0.0333	0.0667	0.0333	0.0333	0
Nuvacron	0	0.0667	0.8	0	0.0667	0	0.0667
Rogor	0	0	0	0.875	0	0.125	0
Monocil	0	0.0125	0	0	0.875	0	0
Others	0.0714	0	0	0	0	0.875	0.1429
Non users	0	0.0714	0	0	0	0	0.9286

Soil insecticides: State Transition Matrix

	Furadon	Thimmet	Vijay Phorate	Spic Phorate	Non users
Furadon	0.96667	0.03333	0	0	0
Thimmet	0.11111	0.77778	0	0	0.11111
Vijay Phorate	0	0.66667	0.33333	0	0
Spic Phorate	0	0.66667	0	0.33333	0
Non users	0.05333	0	0.01333	0.01333	0.92

TABLE 43. PROJECTED MARKET SHARE OF DIFFERENT BRANDS WITH 1998 AS BASE YEAR

Sl. No.	Brands	Market share 1998	Market share 1999	Projected Market share during			
				2000	2001	2002	2003
Fungicides							
1.	Dithane M-45	50.00	46.66	43.11	41.66	38.14	35.93
2.	Bavistin (Carbendazim)	10.00	11.66	13.27	14.53	15.76	16.86
3.	Hinosan (Edifenphos)	10.00	9.19	8.53	7.77	7.18	6.66
4.	Kitazin	4.17	3.33	2.90	2.60	2.39	2.23
5.	Non users	25.83	29.16	32.19	33.34	36.53	38.32
Insecticides							
6.	Ekalux (Quinalphos)	25.83	25.02	24.16	23.33	22.53	21.77
7.	Dimecron (Phosphamidon)	25.00	24.19	23.61	23.26	23.03	22.90
8.	Nuvacron (Monocrotophos)	12.49	11.69	10.95	10.32	9.79	9.32
9.	Rogor (Dimethoate)	6.67	7.50	8.17	8.73	9.19	9.57
10.	Monocil (Monocrotophos)	6.67	7.50	8.15	8.64	9.03	9.32
11.	Others	11.67	10.80	10.25	9.87	9.62	9.48
12.	Non users	11.67	13.30	14.71	15.85	16.81	17.64
Soil insecticides							
13.	Furadon (Carbofuron)	25.00	28.33	31.61	34.70	37.56	40.19
14.	Thimmet (Phorate)	7.50	10.01	10.95	11.34	11.54	11.67
15.	Vijay Phorate	2.50	1.66	1.33	1.17	1.08	1.01
16.	Spic Phorate	2.50	1.66	1.33	1.17	1.08	1.01
17.	Non users	62.50	58.34	54.78	51.62	48.74	46.12

TABLE 44. DISTRIBUTION OF FARMERS USING DIFFERENT BRANDS OF PESTICIDES DURING 1999 AND 2000

S. No.	Brands	Number of farmers in Year 1999	Gain	Loss	Number of farmers in year 2000	Number retained
1.	Dithane M-45	56	4	8	52	48
2.	Bavistin	14	4	2	16	12
3.	Hinosan	11	3	2	12	9
4.	Kitazin	4	1	2	3	2
5.	Non users	75	3	1	37	34
	Total	**120**	**15**	**15**	**120**	
1.	Ekalux	30	1	3	28	27
2.	Dimecron	29	3	5	27	24
3.	Nuvacron	14	2	3	13	11
4.	Rogor	9	3	1	11	8
5.	Monocil	9	3	1	11	8
6.	Others	13	3	4	12	9
7.	Non users	16	4	2	18	14
	Total	**120**	**19**	**19**	**120**	
1.	Furadon	34	4	2	36	32
2.	Thimmet	12	4	1	15	11
3.	Vijay phorate	2	1	1	2	1
4.	Spic Phorate	2	2	1	3	1
5.	Non users	70	1	6	64	64
	Total	**120**	**12**	**12**	**120**	

TABLE 45. FUNGICIDES: RETENTION, GAIN OR LOSS

Brands	Dithane M-45	Bavistin	Hinosan	Kitazin	Non users	Number of farmers in year 1999
Dithane M-45	48	3	3	1	1	56
Bavistin	1	12	0	0	1	14
Hinosan	2	0	9	0	0	11
Kitazin	1	0	0	2	1	4
Non users	0	1	0	0	34	35
Number of farmers in year 2000	52	16	12	3	37	120

TABLE 46. INSECTICIDES: RETENTION, GAIN OR LOSS

Brands	Ekalux	Di mecron	Nuva cron	Rogor	Monocil	Others	Non users	Number of farmers in year 1999
Ekalux	27	0	1	1	1	0	0	30
Dimecron	0	24	1	0	1	2	1	29
Nuvacron	0	1	11	2	0	0	0	14
Rogor	1	0	0	8	0	0	0	9
Monocil	0	1	0	0	8	0	0	9
Others	0	1	0	0	0	9	3	13
Non users	0	0	0	0	1	1	14	16
Number of farmers in year 2000	28	27	13	11	11	12	18	120

TABLE 47. SOIL INSECTICIDES: RETENTION, GAIN OR LOSS

Brands	Furadon	Thimmet	Vijay Phorate	Spic Phorate	Non users	Number of farmers in year 1999
Furadon	32	0	1	1	0	34
Thimmet	1	11	0	0	0	12
Vijay Phorate	1	0	1	0	0	2
Spic Phorate	1	0	0	1	0	2
Non users	1	4	0	1	64	70
Number of farmers in year 2000	36	15	2	3	64	120

TABLE 48. STATE TRANSITION MATRIX

Fungicides : State Transition Matrix

	Dithane M-45	Bavistin	Hionsan	Kitazin	Non users
DithaneM-45	0.857143	0.053571	0.053571	0.017857	0.017857
Bavistin	0.071429	0.857143	0	0	0.071429
Hinosan	0.181818	0	0.818182	0	0
Kitazin	0.25	0	0	0.5	0.25
Non users	0	0.028571	0	0	0.971429

Insecticides : State Transition Matrix

	Ekalux	Dimecron	Nuvacron	Rogor	Monocil	Others	Non users
Ekalux	0.9	0	0.033333	0.33333	0.33333	0	0
Dimecron	0	0.827586	0.034483	0	0.034483	0.068966	0.034483
Nuvacron	0	0.071429	0.785714	0.142857	0	0	0
Rogor	0.11111	0	0	0.88889	0	0	0
Monocil	0	0.11111	0	0	0.88889	0	0
Others	0	0.076923	0	0	0	0.692308	0.230769
Non users	0	0	0	0	0.0625	0.0625	0.875

Soil insecticides: State Transition Matrix

	Furadon	Thimmet	Vijay Phorate	Spic Phorate	Non users
Furadon	0.941176	0	0.029412	0.029412	0
Thimmet	0.083333	0.916667	0	0	0
Vijay Phorate	0.5	0	0.5	0	0
Spic Phorate	0.5	0	0	0.5	0
Non users	0.014286	0.057143	0	0.014286	0.914286

TABLE 49. PROJECTED MARKET SHARE OF DIFFERENT BRANDS WITH 1999 AS BASE YEAR

Sl. No.	Brands	Market share 1999	Market share 2000	2001	2002	2003	2004
Fungicides							
1.	Dithane M-45	46.66	43.33	40.53	38.20	36.25	34.61
2.	Bavistin (Carbendazim)	11.66	13.33	14.63	15.63	16.42	17.00
3.	Hinosan (Edifenphos)	9.17	10.00	10.50	10.76	10.85	10.82
4.	Kitazin	3.34	2.51	2.04	1.73	1.55	1.42
5.	Non users	29.17	30.83	32.30	33.68	34.93	36.13
Insecticides							
6.	Ekalux (Quinalphos)	25.00	23.33	22.03	20.98	20.17	19.53
7.	Dimecron (Phosphamidon)	24.20	22.52	21.20	20.18	19.38	18.77
8.	Nuvacron (Monocrotophos)	11.70	10.83	10.06	9.37	8.75	8.22
9.	Rogor (Dimethoate)	7.50	9.16	10.47	11.48	12.24	12.80
10.	Monocil (Monocrotophos)	7.50	9.16	10.63	11.92	13.07	14.06
11.	Others	10.80	10.00	9.41	8.99	8.68	8.45
12.	Non users	13.30	15.00	16.20	17.08	17.71	18.17
Soil insecticides							
13.	Furadon (Carbofuron)	28.35	30.01	32.14	34.44	36.83	39.25
14.	Thimmet (Phorate)	10.00	12.50	14.50	16.10	17.31	18.19
15.	Vijay Phorate	1.66	1.66	1.71	1.80	1.91	2.04
16.	Spic Phorate	1.66	2.50	2.89	3.08	3.19	3.26
17.	Non users	58.33	53.33	48.76	44.58	40.76	37.26

ekalux, dimecron, nuvacron and other minor insecticides, while rogor and monocil achieved marginal gain. The non users also marginally increased. In the case of soil insecticides, furadon and thimmet had gained, while there was a marginal loss for Vijay and Spic phorates. The non users also declined.

The results of the Markov chain analysis for the three categories of pesticides presented in table 43 would show that under fungicides, the market will go down from 50.00 per cent in 1998 to 35.93 per cent in the year 2003 for dithane M- 45. There will be reductions for fungicides like hinosan which will go down from 10.00 per cent to 6.66 per cent and kitazin which will go down from 4.17 per cent to 2.23 per cent, whereas use of bavistin will increase from 10.00 per cent to 16.86 per cent and the non users will increase from 25.83 per cent to 38.32 per cent.

There will be similar loss to major insecticides like ekalux, dimecron, nuvacron and other minor pesticides. Whereas rogor and monocil will gain with the market share increasing from 6.67 per cent to 9.57 per cent and from 6.67 per cent to 9.32 per cent, respectively, during the period from 1998-2003.

The analysis further revealed that in case of soil insecticides furadon and thimmet will gain substantially by registering an increase from 25.00 per cent to 40.19 per cent and from 7.50 per cent to 11.67 per cent respectively during the above period with marginal loss for Vijay and Spic phorates. The non users in this category declined from 62.50 per cent to 46.12 per cent.

To cross check the results of Markov analysis, the same analysis was done using 1999 as base year. The results obtained are presented in tables 44 to 49. For the same set of chemicals, when the share during 1999 was taken as base year, except for hinosan under fungicides and vijay and Spic phorates under soil insecticides, similar trends continued for other chemicals.

In both the analyses with 1998 and 1999 as the base year, with the exception of soil insecticides, for the other two categories, the non-users had increased. This would clearly indicate that the chemicals were facing competition from their substitutes.

SUMMARY AND CONCLUSION

CHAPTER VI

SUMMARY AND CONCLUSION

In this chapter, a summary of the research work undertaken, tools used, results and conclusions drawn based on the results are given .

The consumption of chemical pesticides, instrumental to increase the yield of food grains, has also led to an increase in the resistant pest strains and also increase in environmental problems of different kinds. To overcome such problems, the government and organisations world over, have taken up concentrated efforts, to reduce pesticide use and to go for integrated pest management methods. This process of awareness creation about the ill effects of pesticides and concerted efforts to promote the IPM in large scale have let to reduction in pesticide use in the recent years. This had necessitated the pesticide firms to take stock of emerging situation and draw upon production plans and to device marketing strategies to maintain or improve the market share. In the above context only the present study was taken up in respect of rice crop in particular which is the staple food crop in the state, with the following objectives:

- to assess the market share of important pesticides used for rice.
- to assess the market share of companies of these important pesticides.
- to project the market share of different pesticides of different companies and
- to suggest measures for maintaining or enhancing market shares.

Methodology

The study was taken up in Northern Tamil Nadu, exclusively focussing on rice crop which is the staple food crop in the state and second largest consumer of pesticide next to cotton. Based on the area under rice, two districts namely; Villupuram and Dharmapauri were chosen as the first stage of sampling. Based on the area under rice, two taluks from each of these districts were chosen as the second stage of sampling. From the selected taluks, a total of four villages were chosen randomly as the third stage of sampling.

Ultimately, from each village, thirty farmers were selected randomly and the total sample size was fixed at 120. The dealers numbering 20 were selected on the basis of information gathered from the farmers with respect to their source of purchase. Information were gathered using the pretested questionnaire by personal interview method. The secondary data were collected from the offices of the Agriculture Department and Statistics Department present in the study area.

Results

The average size of the farms was 4.8 acres. Marginal farmers were maximum in number, followed by small farmers. These two groups of farmers constituted 41.66 per cent and 35.83 per cent, respectively.

Maximum number of farmers had the experience of cultivating paddy for more than 30 years with 31.66 per cent. Farmers who had the experience of cultivating paddy for more than 10 years and 10-19 years also constituted 31.66 per cent.

The annual income of 55 per cent of the sample farmers was in the range of Rs. 25,000.00 – Rs. 50, 000.00 followed by 26.68 per cent of farmers with an annual income less than Rs. 25,000.00. Only 4.16 per cent of farmers had an annual income exceeding Rs. 1,00,000.00 lakh.

The average expenses on the pesticides in the study villages were Rs. 246.62, 383.75, 218.56 and 233.93 for Pidagam, Madur, Periyamuthur and Panchapalli villages, respectively.

The factors that mainly influenced the farmers to choose a brand of pesticide was the "dealers recommendation" followed by the "fellow farmer using", "product efficacy" and "Agriculture officer's recommendation" in that order. On the other hand, the farmers' preference of dealers was mainly influenced by the "reliability " factor followed by the "nearness" of the outlets to the farmers, "credit facility" and "loyalty" in that order.

As regards, mode of purchase, 74 per cent of the sample farmers purchased the chemicals in terms of cash alone and the remaining farmers purchased on cash and credit basis.

Furadon and phorate were the major chemicals used for the paddy cultivation. These two chemicals had a market share of 41.96 per cent and 18.45 per cent respectively, as observed from the farmers' survey.

The analysis of market share of the companies for paddy pesticides alone, showed that Rallis was the company ranked first with a market share of 42.52 per cent, followed by Cyanamid and Novartis with their share of 15.88 per cent and 13.08 per cent respectively, in the market.

"Manufacture and distribution of fertilizers and pesticides", "Product efficacy" and "Product price", were the most important factors which influenced the dealers, to prefer a particular company.

Dealers with the experience of dealing with pesticides in the range of 16-25 years and 6-15 years accounted for 30.00 per cent, under each category. In Pidagam and Madur villages, there was no dealer who had the experience of dealing with pesticides for less than five years, which showed that the dealers in these villages had good experience in dealing with pesticides.

Most of the dealers, dealt with a narrow range of products of less than five and they accounted for 60 per cent, while 30 per cent of the dealers traded the pesticides of 6-10 different companies.

The dealers mainly dealt with pesticides and fertilizers, which was evident from the results that 40 per cent of the dealers handled pesticides and fertilizers. The combination of dealing with pesticides, fertilizers, seed and farm equipments by the dealers was found only in Pidagam village.

The sales turnover of the paddy pesticides was equal in all the previous three years for the sample dealers. In this regard, 60 per cent of the dealers had sales turnover of less than or equal to Rs. 5 lakhs per annum.

The Markov chain analysis revealed that the market share of dithane M-45, hinosan and kitazin under fungicides, ekalux, dimecron and nuvacron under insecticides and Vijay phorate and Spic phorate under soil insecticides would go down in the immediate 3-4 years which will be covered partially by bavistin under fungicides, rogor and monocil under insecticides and furadon and thimmet under soil insecticides apart from the fact that the users of these chemical will come down from 74.17 per cent to 63.69 per cent for fungicides and 88.33 per cent to 82.36 per cent for insecticides. In the case of soil insecticides the percentage of the users is expected to go up from 37.50 per cent to 53.88 per cent.

Conclusions

The results would show that

Credit facilities for purchase of pesticides is not anticipated from the side of farmers.

The dealers recommendation happened to be the main factor apart from fellow farmer using, product efficacy and the Agricultural Officer's recommendation which would decide the farmers brand loyalty. The farmers' loyalty towards dealers is determined by the reliability of the dealers apart from nearness, credit facility and loyalty. So it could be concluded that the dealers are the nerve centres of the pesticides industry.

Among all the chemicals, Carbofuran and Phorate clearly dominated the pesticide market for rice in the northern Tamil Nadu.

The dealers preferred the companies, which manufacture both the fertilizers and pesticides together and the product price factor was the second option for the dealers to select the companies.

In the study area, Rallis was the company dominating the market for paddy pesticides with a share of 42.52 per cent, followed by Cyanamid and Novartis in the second and third position, respectively.

The future market share of the pesticides derived through Markov chain analysis would show that the soil insecticides will have an increasing trend in the coming years as indicated by the loss of non-users. The fungicides and insecticides will have a decreasing trend in the market share in the next three to four years.

Suggestions and Policy options

The farmers mostly relied upon the dealers' recommendations apart from the fellow farmer using, product efficacy and Agricultural Officer's recommendation, for the brand to be used. Therefore the pesticide Companies can organize periodical meetings for the dealers to make them aware of the effectiveness of their brands, conduct demonstrations in the fields of progressive farmers and by enlisting the cooperation of extension personnel.

The number of private dealer outlets should be increased in such a manner that these are within the reach for the farmers. The dealer-farmer relationship should be promoted to facilitate the farmers' loyalty towards the dealers, which in turn would help to increase the sale of the pesticides.

The technical officers of the organization should conduct periodical survey of the major crops grown in the area, the potential for the pests and diseases attacks and symptoms and should conduct the analysis of market share, the rate of brand switching by the farmer to understand the change in the preference of the farmers to maintain or win back their loyalty, through appropriate marketing strategies and product efficacy.

Since IPM emphasise need base application of chemicals, the decrease in market share of paddy pesticides will reach an equilibrium state beyond which the market share will not fall. Hence it is recommended that the company should maintain good will with the dealers and farmers through technical guidance to sustain and improve their market share.

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APPENDIX

APPENDIX I

DEPARTMENT OF AGRICULTURAL AND RURAL MANAGEMENT
CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES
TAMIL NADU AGRICULTURAL UNIVERSITY
TITLE: AN ANALYSIS OF MARKET SHARE OF RICE PESTICIDES IN NORTHERN TAMIL NADU

NAME: C.KANNAN COURSE:MBM ID No. :98-608-006

FARMERS INTERVIEW SCHEDULE

A. GENERAL

Name of the Village: Taluk: District:

Name of the Respondent :
Address :
Experience in farming :_____ Years
Experience in other Crops :

B. FAMILY PARTICULARS:

S. No.	Relationship	Age	Education	Sex	Primary Occupation	Secondary Occupation	Annual Income
1.							
2.							
3.							
4.							
5.							

C. DETAILS OF HOLDINGS:

S. No.	Particulars	Wetland (ac)	Gardenland (ac)	Dryland (ac)	Total (ac)
1.	Area Owned				
2.	Area Leased in (Rent Paid)				
3.	Area Leased out (Rent Received)				
4.	Operational Area				

Price of Land: (I). Wet Land/acre: (ii). Gardenland/acre: (iii). Dryland/acre:

D. PLANT PROTECTION INVENTORY:

S.No.	Plant Protection Equipment and Tools	Year Of Purchase
1.	Duster	
2.	Sprayer	
3.		
4.		

E. CROPPING PATTERN (1998-1999):

S.No.	Seasons	Crop	Variety	Area (ac)	Irrigated/rainfed
1.	Season I				
2.					
3.					
1.	Season II				
2.					
3.					
1.	Season III				
2.					
3.					

F. CROPPING PATTERN (1999-2000):

S.No.	Seasons	Crop	Variety	Area (ac)	Irrigated/rainfed
1.	Season I				
2.					
3.					
1.	Season II				
2.					
3.					
1.	Season III				
2.					
3.					

G. EXTENT OF PADDY CULTIVATION:

S.No.	Year of Cultivation	Gross Cropped Area	Area Under Paddy
1.	1998-1999		
2.	1999-2000		
3.	2000-2001(Plan)		

H. INFORMATION ON PADDY PESTS AND CONTROL:

S. No	Major Pests / Diseases	Product (Brand Used)		Dosage	No. of Sprays	Product Cost per Spray	Applic-ation Charges Per Spray	Total Cost (Rs)
		'98	'99					
1.	Leaf Folder							
2.	Stem Borer							
3.	G.L. Hopper							
4.	B.P.Hopper							
5.	Ear Head Bug							
6.	Damping Off							
7.	Blast							
8.	Brown Spot							
9.	Sheath Blight							
10	Nematodes							
11.	Rodents							
12.	Others (Specify)							

I. INFORMATION ON OTHRER CROP PESTS AND CONTROL:

S.No	Major Pests / Diseases	Product (Brand Used)		Dosage	No. of Sprays	Product Cost per Spray	Applic-ation Charges per Spray	Total Cost (Rs)
		'98	'99					
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10								
11.								
12.								

J. SOURCE OF PURCHASE:

1. Co-operatives :
2. Private dealers :
3. Others (Specify) :

K. IF PRIVATE DEALERS:

S.No.	Name	Address
1.		
2.		
3.		

L.MODE OF PURCHASE: 1. Cash: 2. Credit:

M. FACTORS INFLUENCING THE BRAND PREFERED: RANK

1. Product efficacy
2. Credit facility
3. Product cost
4. Dealer recommendation
5. Fellow farmer using
6. Advertisement
7. Sales Rep's recommendation
8. Easy availability
9. Agricultural officer's recommendation

N. REASONS FOR PREFERING A PARTICULAR DEALER: RANK

1. Easy availability
2. Credit facility
3. Nearness
4. Loyalty
5. Fellow farmers influencing
6. Reliability

O. TREND IN PESTICIDE USE FOR PADDY: Low/High

Reasons 1.
2.
3.

APPENDIX II

DEPARTMENT OF AGRICULTURAL AND RURAL MANAGEMENT
CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES
TAMIL NADU AGRICULTURAL UNIVERSITY
TITLE: AN ANALYSIS OF MARKET SHARE OF RICE PESTICIDES IN NORTHERN TAMIL NADU

NAME: C.KANNAN COURSE:MBM ID No. :98-608-006

INTERVIEW SCHEDULE FOR DEALERS

I.GENERALPARTICULARS

1. Name and Address :
2. Age :
3. Education ;
4. Experience :
5. No.of. Employees Engaged :
6. Dealership Possessed :

a. d. g.
b. e. h.
c. f. i.

II PRODUCT LINE DEALT

1. Insecticides 2. Fungicides 3. Herbicides
4. Nematicides 5. Rodenticides 6. Fertilizers
7. Seeds 8. Farm Equipment 7.Others,(Specify)

III ESTABLISHED BRANDS FOR PADDY PESTS:

S.No.	Major Pests/ Diseases	Product /Chemicals	Brands Sold						
			1.	2.	3.	4.	5.	6.	Others
1.	Leaf Folder								
2.	Stem Borer								
3.	G.L. Hopper								
4.	B.P.Hopper								
5.	Ear Head Bug								
6.	Damping Off								
7.	Blast								
8.	Brown Spot								
9.	Sheath Blight								
10.	Nematodes								
11.	Rodents								
12.	Others (Specify)								

IV. SALES TURNOVER:

S.No.	Year	Total sales (Value/Volume)	Paddy alone
1.	1996 - 97		
2.	1997 - 98		
3.	1998 - 99		

V. SALES TURNOVER OF PESTICIDES USED FOR PADDY:

S.No.	Product / Chemical	Brand and Turnover(Value/Volume)							Total
		1.	2.	3.	4.	5.	6.	Others	
1.	Phophamidon								
2.	Monocrotophos								
3.	Endosulphon								
4.	Quinlophos								
5.	Dimethoate								
6.	Malathion								
7.	Carbofuron								
8.	Chlorpyriphos								
9.	Phorate								
10.	Methyl Parathion								
11.	Carbaryl								
12.	Carbendazim								
13.	Mancizeb								
14.	Edifenphos								
15.	Kitazin								
16.	Butachlor								
17.	Zinc Phosphide								

VI. FACTORS INFLUENCING RICE PESTICIDES BRAND PREFERENCE BY DEALERS:

Particulars RANK

1. Product Efficacy
2. Credit availability
3. Profit margin
4. Timely supply
5. Good - Brand image
6. High sales
7. Promotional supoort
8. Product price
9. Incentives