

ECONOMICS OF MARKETING OF
FERTILIZERS IN RAHURI TALUKA
OF AHMEDNAGAR DISTRICT
(MAHARASHTRA STATE)

A Thesis submitted to

MAHATMA PHULE KRISHI VIDYAPEETH

(AGRICULTURAL UNIVERSITY)

RAHURI, District Ahmednagar, (Maharashtra State)

in partial fulfilment of the requirements for the degree of

Master of Science (Agriculture)

in

Agricultural Economics

By

DATTATRAYA SHRIRANG VYAVAHARE

B. Sc. (Agri.) First Class

DEPARTMENT OF AGRICULTURAL ECONOMICS

Post-Graduate School, Rahuri

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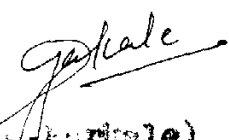
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This is to certify that the thesis entitled "Economics of marketing of fertilizers in Rahuri Taluka of Ahmednagar District (Maharashtra State)" submitted to the Faculty of Agriculture, Mahatma Phule Krishi Vidyapeeth (Agricultural University), Rahuri (Maharashtra), in partial fulfilment of the requirements for the degree of Master of Science (Agriculture) in Agricultural Economics embodies the results of a piece of bonafide research work carried out by Shri Vyavahere Dattatraya Shrirang under my guidance and supervision and that no part of the thesis has been submitted for any other degree or publications.

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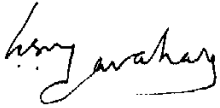
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(S. S. Vyavahare)

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CHAPTER I
INTRODUCTION

CHAPTER I

INTRODUCTION

Behind the success story of green revolution is a dedicated effort to increase productivity of land. Self-sufficiency in food production is the cherished goal for which we had been striving ever since our independence. To feed ever increasing masses, the existing level of food production has to be increased shortly to ensure that food production is not outstripped by population growth. Together with irrigation, hybrid seeds and pesticides, fertilizer forms a vital input for agricultural production. A balanced application of three primary plant nutrients - nitrogen, phosphorus and potash is the key to rapid improvement in production of food.

The distribution of fertilizers assumes a vital significance when we visualise that by 1979-80, the distribution of fertilizers will be of the magnitude of 11 million tonnes involving an expenditure of the order of Rs. 1500 million in distribution alone. The problems of fertilizer distribution have not so far caught the attention of researches and logistic experts for any investigation in depth. It is high time, attention is focussed on certain vital questions in fertilizer distribution strategies and systems.

1.1 Magnitude of Challenge of Fertilizer Marketing :

The production programme for agriculture, particularly of food grains involves the assurance of timely supply of adequate fertilizers to farmers. The quantity of fertilizers which has to be sold to farmers for achieving our production

targets will reach a figure of 80 to 90 lakh tonnes of nutrients in 1978-79, which at the present retail prices of fertilizers will be of the value of 1600 to 1800 crores of rupees. To be able to sell these quantities of fertilizers to the large number of cultivators throughout the India, the fertilizer marketing organizations have to strengthen themselves to meet the challenge. In the background of the general lack of knowledge of the scientific use of fertilizers and farmers inadequate financial resources, the marketing system of fertilizers has to organise itself so as to carry its message effectively to the remotest village. It has to develop adequate agencies that can sell fertilizers in time and in the quantities required by farmers and provide advisory service to them.

1.2 Fertilizer use and agricultural production in India :

India can be genuinely proud of the achievements in the sphere of agriculture in 26 years since independence. There have been periods of progress and slight slow downs or setbacks, but the overall picture can be viewed with a fair degree of satisfaction. The factors to be attributed for this satisfaction are mainly greater use of improved varieties of crops, modern cultivation practices, increasing area under irrigation and intensive application of fertilizers.

The use of fertilizers in India has expanded considerably over the years. A fairly close positive relationship is observed between increases in the use of fertilizers and

increases in total crop output. The foodgrains production in 1950-51 was 55.05 million tonnes which rose to 69.38 million tonnes during 1955-56 and 82.21 million tonnes during 1960-61. Further it increased to 89.34 million tonnes during 1964-65 and it was 107.8 million tonnes during 1970-71. On the contrary, N P K fertilizer consumption increased from 0.69 lakh tonnes to 1.31 lakh tonnes during 1950-51 to 1955-56. Further it rose to 2.97 lakh tonnes, 7.57 lakh tonnes, 17.97 lakh tonnes during 1960-61, 1964-65 and 1970-71 respectively. Imports of foodgrains which were successively reduced from 10.4 million tonnes in 1966 to about 2 million tonnes in 1970-71, have been brought almost to zero. This clearly shows, how fertilizers have contributed towards attainment of self-sufficiency in foodgrains. Of course, there are other factors such as high yielding varieties, irrigation, plant protection measures, increased cropped area which contributed towards increased foodgrain production; but use of fertilizers is the most important factor among them.

2.3 Fertilizer as a Major Input in Food Production :

Fertilizer is one of the major inputs which bring about substantial increase in the crop production. Irrigation alone can bring the yield to the level obtained in a year of good rainfall but can not increase it further as no amount of irrigation can enrich the soil. Without fertilizers it is not possible to increase the yield per hectare substantially and it is futile to talk of multiple cropping with

irrigation when the production is limited by the amount of nutrients given to the soil. Fertilizer is the largest single factor in increasing the total crop production per hectare and has now been accepted as the major input in Intensive Cultivation Programmes. It accounts for about 50 per cent of the increase in the yield per hectare.*

Fertilizer production and consumption should also have received a very high priority, though it was not the case so far as India is concerned. The figures of production, import and consumption based on quantity distributed of N, P, K nutrients and other information is given in Table 1.1.

1.4 Fertilizer Consumption in India :

The use of fertilizers in India, increased only after the implementation of 'Grow More Food Campaigns' in 1943. The utilization of Nitrogen during the three plan periods increased about 9 times from 0.6 lakh tonnes in 1951 to 5.47 lakh tonnes in 1965-66. It further increased to 16.53 lakh tonnes during 1971-72 which was nearly 28 times more than 1951. The phosphate consumption increased about 17 times from 7167 tonnes to 1.32 lakh tonnes and that of potash from a meagre 3311 tonnes to 0.77 lakh tonnes during the period of 1951 to 1965-66. Further, the phosphate consumption increased about 66 times from 7167 tonnes to 4.74 lakh tonnes and that of

* Vaidya V.C. (1971) Suphala, Bombay Complex Fertilizer, ICI Ltd. p. 7.

Table 1.1 : Production, Import and Distribution of Fertilizers during the period 1951 to 1972.
(Tonnes)

	1950-51	1955-56	1960-61	1965-66	1968-69	1970-71	1971-72
Nitrogen (..)							
Production	20,000	76,859	1,11,987	2,37,889	5,62,901	8,32,528	9,49,222
Import	25,000	51,379	1,71,226	3,76,270	7,03,652	4,81,615	4,62,285
Distributed	58,460	1,07,455	2,11,695	5,47,363	12,53,953	13,10,018	16,52,691
Per cent of Imports	43	50	81	69	62	37	28
Phosphate (..)							
Production	7,167	12,365	53,722	1,16,779	2,13,229	2,28,075	2,90,335
Import			128	21,766	90,828	32,467	2,40,691
Distributed	7,167	13,028	53,134	1,32,478	3,23,351	3,05,068	4,73,527
Per cent of Imports				16	29	11	51
Potash (..)							
Production	3,311	10,295	24,845	93,641	1,65,243	1,29,047	2,67,098
Import	3,311	10,295	29,052	77,746	1,77,507	1,99,016	2,56,269
Distributed	100	100	100	100	100	100	100
Total NPK Utilized	60,938	1,30,008	2,93,071	7,57,237	17,49,871	18,24,102	23,82,487
NPK used kg/ha.	0.5	0.6	1.6	4.7	10.9	13.67	16.03
NPK consumption per capita in '51.		0.33	0.70	1.50	3.24	N.A.	N.A.
Ratio of NPK consumed per capita in '72 to '51	1/0.12/0.06	1/0.12/0.09	1/0.25/0.13	1/0.24/0.14	1/0.45/0.24	1/0.31/0.15	1/0.32/0.17
	10:12:1	11:15:1	8:2:1	7:2:1	7:2:1	7:2:1	6:2:1

(Source - Fertilizer Statistics - 1971-72 - 1st 1972)

N.A. = Not available.

potash from a meagre 3311 tonnes to 2.56 lakh tonnes i.e. 77 times during the period of 1951 to 1971-72.

The high yielding varieties programme gave a fillip to fertilizer use and the per capita consumption went upto 3.34 kg of N, P, K nutrients in 1968-69, but even this is much lower as compared to other countries and world average of 15.15 kgs. The consumption per hectare of agricultural land similarly went upto 12.20 kg in 1970-71 and the world average was 11.4 kg per hectare. It is no way nearer to the fertilizer consumption in some of the advanced countries like Japan, U.K. and U.S.A. using 329.10, 96.90, 35.20 kg per hectare respectively.

1.5 Fertilizer Consumption in Maharashtra State :

The N, P, K consumption in Maharashtra was 130148, 67480, 43813 tonnes during 1971-72 which was 7.87 per cent 14.25 per cent, 17.10 per cent of the N, P, K consumption of India, respectively. While consumption of total quantity of N P K was 241441 tonnes which was 10.13 per cent of India's total N P K consumption during the same period.

Ratio of N P K consumption in Maharashtra was 3:1.5:1 while, in India it was 6:2:1 during 1971-72.

The consumption of all N P K fertilizers for Maharashtra was 12.42 kg per hectare of cropped area while, for India, it was 16.03 kg per hectare of cropped area during 1971-72.

1.6 Fertilizer Consumption in Ahmednagar District :

Ahmednagar is the highest fertilizer consuming district in Maharashtra. The consumption of N, P, K in Ahmednagar

district was 7094, 2358, 1704 tonnes respectively during 1970-71. It was 6.38 per cent, 4.54 per cent, 4.75 per cent of the N, P, K consumption of Maharashtra respectively. The consumption of N P K taking together was 11156 tonnes which was 5.60 per cent of Maharashtra's total fertilizer consumption during 1970-71.

1.7 Balanced fertilisation :

Plants need sixteen elements to grow viz. carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, boron, zinc, copper, molybdenum and chlorine. Out of these last thirteen elements (i.e. except carbon, hydrogen and oxygen) are taken from soil. Nitrogen, phosphorus and potassium are used in large quantities and hence known as primary nutrients. Majority of the soils are deficient in them and these are made good by adding fertilizers. They are therefore called as fertilizer elements also. Remaining ten elements are generally found in adequate quantities, so they are not needed to apply through fertilizers.

Thus, balanced fertilization means application of nitrogenous, phosphatic and potassic fertilizers in definite proportion to the soil so as to get maximum crop yield. For Indian soils 4:2:1 ratio is considered as desirable.

In India, proportion of nitrogen consumed is still very much higher than phosphate and potash consumption because of the immediate effect that nitrogenous fertilizers have on the vegetative growth of the crop and their consequent

popularity with the farmers. The ratio of N, P, K has no doubt come down from 16:2:1 in 1951-52 to 7:2:1 in 1965-66 and 6:2:1 during 1971-72. Thus it will take a long time to bring upto 4:2:1 which is considered desirable for present Indian conditions and serious attempt will have to be made towards educating the farmers about balanced fertilization.

1.3 Problems of Study :

With the spread of modern scientific farming and increased demand for agricultural production, consumption of fertilizers expected is at a very fast rate in the near future. This situation calls for necessary marketing machinery to move the product from the plant to the farmer. Indian fertilizer market has been complex in nature due to seasonal sales, large number of illiterate farmers and large market area with few production centres. Also very little attention has been paid to evaluate the present marketing agencies. The study of existing problems and future prospects of fertilizer marketing will help to organize the marketing channels consistent with future needs.

In this context, it is necessary to identify the problems of fertilizer marketing pertaining to the supply of and demand for fertilizers, factors affecting demand for and supply of the same, cost of marketing etc. Under the conditions of present crises of fertilizer production and distribution and its adverse effect on national food production, the author felt that a study of "Economics of Marketing of Fertilizers in Bahuri Taluk of Ahmednagar district" would give some clue to the problem.

The study, therefore, was taken up with the following objectives -

1.9 Objectives of the Study :

- 1) To work out the demand estimate for fertilizers in the taluka as a whole.
- 2) To study channels of distribution.
- 3) To study the cost of marketing of fertilizers.
- 4) To identify problems faced by cultivators.

1.10 Scope of Study :

The scope of this investigation limits itself to the aspects mentioned in the above objectives. Due to limitations of time and resources the investigation has been limited to a randomly selected representative sample consisting of five co-operative societies dealing with fertilizers marketing and 75 cultivator members of these co-operative societies.

1.11 Utility of Study :

The information and findings of the study would be of immense use in giving a guidance to the planners in formulating the future short term and long term fertilizer production plans and creating such agricultural facilities inducing the farmers for increased use of fertilizers.

The study would also be helpful in identifying the marketing problems of cultivators and fertilizer marketing institutions and thereby suggesting to the Government to make

necessary reformative amendments in the marketing act so as to minimize the marketing and distribution cost of fertilizers and help for the promotion and growth of the fertilizer marketing institutions in the country.

Chapter Opener Page

CHAPTER II
REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

While conducting the research, it is always useful to review the work done on similar problems in order to have the guidelines in respect of the concepts used, method of approaching the problem, analysis and results of the data collected. For this purpose, the research studies which were mostly in the published form are considered in this chapter. For a convenience of the reader the reviews are divided under six topics. Naturally, this division is not exclusive and many subjects in these topics tend to overlap. However, for bringing out the main problem in a sharp focus, this division is helpful. The review is divided into -

- 1) Importance of fertilizers.
- 2) Problems of fertilizer marketing.
- 3) Demand estimate of fertilizers.
- 4) Factors affecting demand for fertilizers.
- 5) Distribution system of fertilizers.
- 6) Prices of fertilizer.

2.1 Importance of fertilizers :

Parker L.W.³⁰ (1962) pointed out that increased food and agricultural production is one of the first essentials for economic development, especially in the 'take-off' stage. The general use of chemical fertilizers is required for substantial and sustained increases in food and agricultural production in nearly all of the less developed countries. If modest levels of nutrition are to be attained by 1980, the

less developed regions of the world must increase fertilizer consumption to about 30 million tonnes of plant nutrients. International assistance programs have helped to accelerate fertilizer production and use, but the level of such assistance must be raised, if the requirements for 1980 are to be met.

³⁵ Radlinski, (1962) estimated the influence, the chemical development has had on the level of agricultural production in Poland. The author concluded by stating that the increase of chemical production contributes to raising agricultural yields. In order to utilize these possibilities to the utmost, farmers and agricultural workers should be vocationally trained.

While working out statistics on fertilizer consumption in North Dakota, Voelker, Stanley and Farvia⁴⁵ (1962), found that an important technological development in North Dakota agriculture during past decade has been the substitution of fertilizer for land and other capital. Consumption of fertilizer increased about tenfold from 1951 to 1961.

Williams, Hoyle and John⁴⁷ (1962) carried out the investigation in preparation of the report confirmed and refined earlier studies, made in FAO and elsewhere, which have shown how close is the relationship between fertilizer use on a national scale, and average crop yields. The report concluded that if agricultural production is to increase in most countries of the world, for most crops under most conditions, the increased use of fertilizer must accompany the application

of other methods of technological and scientific development to farming.

The Famine Inquiry Commission¹⁹ (1945) expressed that next to the provision of an assured supply of water, the use of manure offers the most important single means of increasing the yield of crops. If the standard of living of the Indian cultivator is to be raised it is essential that the use of organic and inorganic manures should be greatly extended. If this is to be achieved, every source of fertilising material must be utilized to the fullest extent, the supply and distribution of manures and fertilisers must be so organised to ensure that they are available in all parts of the country at the cheapest possible rates, cultivators must be educated in their use and agricultural departments must be in a position to give detailed advice as to the quantity and the manner in which they should be applied.

2.2 Problems of Fertilizer Marketing :

Mushikesh Varu³⁷ (1968) stated that the chief constraint to increased agricultural production is not the backwardness of the farmer, but in insufficiency of modern inputs, particularly chemical fertilizers.

Lantwala¹⁰ (1967) pointed out the real bottleneck in the further extension of fertilizer use in India is its availability. Fertilizer production programme in India makes a poor showing and the government can not be absolved from the blame for this poor performance.

with a view to identify the problems of different categories of farmers with respect to fertilizer use and of launching proper extension activities to educate them about fertilizer application, an investigation was undertaken in one progressive village (Chatesar) and one non-progressive village (Mizampur) in the Kanjhawala block of Delhi Territory by Chaudhary and Prasad⁶ (1972). Frequency percentage and 't' tests were used to analyse the results. The high cost of chemical fertilizers and lack of money appear to be the real problems of the farmers. There is a need to co-ordinate fertilizer promotion programmes and the provision of irrigation facilities to the farmers. The timely supply of fertilizers and adequate knowledge about the fertilizer is also required.

Parker³ (1969) expressed that in India, marketing services should be directed primarily to making fertilizers more readily available to the farmers; assisting in providing credit to dealers and farmers; and promoting the efficient use of fertilizers, complementary inputs and improved practices for crop production.

Some problems faced by distributing agencies and farmers in the distribution of fertilizers are discussed by Subramanian⁴ (1969). The study was based on data collected by the Agricultural Economics Research Centre, University of Madras in selected rice-growing district of South India. The main problems faced are lack of sufficient security from the primary co-operatives to extend the credit limit, irregular

inflow of stocks, insufficient financial assistance from government; failure to deliver stocks by the railway authorities in time etc. It was suggested that wholesaling should be transferred from district to taluka level societies. This would enable the primary co-operatives as well as the private traders who are acting as retailers to take delivery of their allotment without much difficulty, which will also enable the farmers to get their fertilizers in time.

While presenting paper at seminar on self-sufficiency in food, organised by U.S. Information Service at Bombay, Olson²⁸ (1966) stated that profitability of use has apparently increased the demand for improved seeds as well as fertilizers but whether or not a farmer actually increases the use of these inputs, depends upon the availability of additional supplies and whether he can get them delivered whenever he needs them at appropriate times.

Ram Lalal Singh, Haz Surwar and Chri...²⁹ (1973) made an attempt to study the farmers' problems in regard to the availability of fertilizers under different input supply systems. They observed that 91.90 per cent of the knowledgeable in the case of seed store reported the problem of high supply cost. The problems of forced supply, required demand not fulfilled and procedure not simple were of the order of 81.19 and 86.50 per cent respectively. On the other hand, in case of co-operatives the problems of supply not in time, high supply cost, demand not fulfilled, malpractices and procedure not

simple were in the order of 34.50, 44.80 and 27.60, 44.80, 32.70 per cent respectively while the problems of high rate adulteration, forced supply and high interest were not at all reported. In case of market purchase the problems of high rate, adulteration, high interest rate and malpractices were worked out to be 100.00, 95.70, 44.30 and 100.00 per cent respectively, while problems pertaining to time, supply cost, demand not fulfilled, forced supply and procedure not simple were not reported by any respondents.

Sankhayan, Mishra and Bangi³⁸ (1973) found that among the various difficulties experienced by the farmers, untimely supply, underweighting, inadequacy, compulsions to purchase some unwanted fertilizer with a required brand of fertilizer, prices higher than quoted ones, poor quality etc. were the most important. Among the farmers who purchased fertilizers from co-operative societies, 35 per cent complained for having received fertilizers not in time, 30 per cent complained that fertilizer bags were under-weighted. Twenty, 15 and 5 per cent of the farmers getting fertilizer supplies from the co-operative societies complained of inadequate supply, compulsions and poor quality respectively.

Sharma and Desai⁴⁰ (1973) used two stage stratified random sampling technique and selected 20 small, 8 medium and 4 large farm families. They investigated that there was mean periodic delay of 21 days with the standard deviation of 7 days i.e. about 33.3 per cent of the co-efficient of variation. There was inverse relationship of periodic delay

to the size of holdings i.e. the large cultivators could secure required fertilizers earlier than medium cultivators who in their turn secured earlier than the small cultivators. Further it was found that the most essential nutrient of crops i.e. nitrogen was scarce in the market. Finally authors found that due to shortage of fertilizers the prices of superphosphate, Ammonium sulphate and urea were 48.30 per cent, 54.00 per cent and 36.00 per cent higher than controlled prices respectively. They estimated that 19 per cent loss in production due to delay of 21 days in the supply of fertilizers.

Chawla, Dharwal and Singh⁷ (1973) studied sixty farmers 15 small (holding lands below 10 acres), 15 medium (10 to 15 acres), 15 large (15 to 20 acres) and 15 big (20 and above), randomly selected from three villages of Verka block, district Amritsar. They found that farmers experienced difficulties with regard to procurement, quality, timely supply and prices of different fertilizers. Fifteen small, 10 medium, 8 large and 5 big farmers reported that they had to pay Rs. 40 per bag of Calcium Ammonium Nitrate fertilizers against the official price of Rs. 27.65. Three small and 2 big farmers referred to poor quality of fertilizers. Ten small, 7 medium, 3 large and 2 big farmers pointed out that the manager of the society directed them to approach progressive farmers for purchasing fertilizers and they charged high prices. The farmers did not have the knowledge of recommended doses. Eight small, 6 medium, 4 large and

3 big farmers reported this difficulty. All the farmers did not have optimum irrigation water supply resulting in less application of fertilizers.

2.3 Demand estimate of fertilizers :

Warriar⁴⁶ (1969) made a forecast of the fertilizer marketing situation in the states of Assam, Bihar, Orissa, West Bengal, Manipur, Tripura, MPEA, Nagaland and the Andaman (union territory). It was estimated that fertilizer production in the region would likely to be expected to reach a level of 1.138 million tonnes in terms of N and 0.434 million tonnes in terms of P in 1975. It was further estimated that the effective demand for the region by the end of fourth plan (1973-74) would reach a level of 0.437 million tonnes of N, 0.174 million tonnes of P and 0.166 million tonnes of K against the targets of consumption of 0.664 million tonnes of N, 0.309 million tonnes of P and 0.189 million tonnes of K. In regard to market conditions, it was anticipated that the region would have large surpluses of nitrogenous and phosphatic fertilizers which will have to find markets in other regions.

The demand for fertilizers in India for the 1970 has been estimated by Burney⁴⁷ (1969) from three sources (1) on the basis of nutritional responses in relation to production estimates (2) projected cropping patterns; and (3) nutritional removal rates for different crops. Estimates did not differ significantly. The broad requirement worked out was 3.7 million tonnes of N, 2.7 million tonnes of P and 1.1 million tonnes of K by 1973-74.

Rajgopalan, Varadarajan and Prinivasan³⁶ (1973)

covered twenty five farmers in Sarkar Samalalan Panchayat Union area of Coimbatore district and additional information was gathered from 17 dealers. Authors attempted to estimate the aggregate demand and supply of nitrogenous fertilizers for the selected area. The total demand for fertilizers for the entire block was estimated at the average rate of quantity used per acre by the sample farmers for various crops. They found that aggregate supply i.e. 375,496 kg exceeded the aggregate demand i.e. 303,426. The supply included 2,08,753 kgs. of N supplied in the form of fixed fertilizers which the farmers accept with reluctance. Shortages occurred as the farmers showed preference to a few types of straight fertilizers such as ammonium sulphate or urea over others which ultimately resulted in rise in price and speculation.

Garuday Singh and Bascharairan⁴¹ have estimated the effective demand for nitrogen in Mysore for the years between 1970-71 and 1978-79 by fitting a sigmoid curve to annual nitrogen use data from 1960-61 to 1969-70. The curve used was asymptotic to the potential for nitrogen use. The potential was estimated by multiplying the irrigated and unirrigated area under different crops (and varieties) by the recommended rates of application. Two estimates of potential were used for fitting the curve, one based on the conditions prevailing in 1972-73, and the other based on anticipated conditions for 1978-79. According to authors, the sigmoid curve they have used was more realistic for projecting the future demand from

the past trends than the linear curve which under-estimates and the semi-log curve which over-estimates the growth in demand. For 1978-79 the projections made from different curves were 1,36,000 tonnes (linear curve), 4,60,700 tonnes (semi-log curve), 1,85,900 tonnes (sigmoid curve which was asymptotic to 4,00,000 tonnes, the potential estimated for 1972-73) and 1,98,000 (sigmoid curve which was asymptotic to 5,00,000 tonnes, the anticipated potential for 1978-79). The values of r^2 for all these curves were over 0.90 and significant at 0.01 level.

Lurty and Boral *et al.*²⁵ (1970) made an attempt to estimate the total demand for N and P and for multinutrient fertilizers for 1967-68 and 1972-73 for the Kanpur district as a whole. They studied a sample of 160 farms from four blocks in eight villages out of which 93 were multinutrient fertilizer users and 30 were straight fertilizer users. On the basis of rate of application of N and P per acre, they estimated the demand for the district as a whole. The estimates for total N consumption in the district for the year 1967-68 varied between 17,300 tonnes as lower limit and 21,000 tonnes as the upper limit. They state that at 12 per cent linear rate of growth, total N consumption would increase to 28,000 tonnes by the year 1972-73. The estimate of total P consumption for the year 1967-68 was about 9100 tonnes and they predicted that consumption of P would increase to 18000 tonnes by the year 1972-73.

An investigation was carried out by Lal ¹, and Lal ² (1973) on fertilizer demand for wheat in Punjab. For this purpose, the Punjab state was divided into three zones homogeneous with respect to the agro-climatic conditions. In all, there were 72 cultivators from zone I, 72 from zone II and 72 from zone III. Response surfaces were fitted for each zone and the optimum doses worked out for each zone. Authors found that if the farmers are motivated to use the optimum dose of fertilizer which are optimum in the tth year with respect to those levels of other inputs which exists during the tth year, the demand for N would be 3499.82 thousand quintals as against the estimated consumption of 1882.82 thousand quintals for the wheat crop during 1971-72. The estimated consumption of P for this crop was 528.31 thousand quintals as against the requirement of 1454.23 thousand quintals during 1972-73. A comparison of the two sets of demand projections indicated that the gap between optimum use and the estimated average use was narrowing. For the year 1984-85 the differences in the estimates of demand obtained by using the two different approaches became negligible. This is the time when the farmers on an average will be using 160 kg/ha of N and 80 kgs/ha of P for the wheat crop and these are the target recommendations.

Chawla, Shariwal and Singh⁸ (1973) conducted the study in three villages of Verka block, district Amritsar in the year 1971-72. Sixty farmers in all, 15 small (holding lands

below 10 acres), 15 medium (10 to 15 acres), 15 large (15 to 20 acres) and 15 big (20 and above) were randomly selected. The per acre use of C.A.N. and superphosphatic fertilizers varied positively with the farm size. The ^{per} acre use of C.A.N. was 253.56, 272.20, 325.45 and 330.15 kgs against the recommended doses of 258.94, 282.89, 286.51 and 281.41 kgs giving a shortage of 5.38 and 10.69 kgs for the small and medium farmers and an excess of 39.62 and 43.68 kgs for large and big farmers respectively. The per acre use of superphosphate fertilizers was 52.65, 61.99, 63.61 and 57.93 kgs against the recommended levels of 252.41, 223.92, 239.93 and 177.07 kgs for these farm sizes with shortages of 199.75, 161.92, 176.28 and 114.84 kgs. Only on large and big farms, the per acre use of potash was 18.71 and 21.06 kgs against the recommended levels of 37.42 and 38 kgs. respectively. The shortages for these sizes were 18.71 and 16.34 kgs.

Ashturkar, Deole and Ambegaonkar¹ (1973) selected 82 cultivators from five villages. The cultivators were divided into three main groups on the basis of their holdings. Again each group was divided into three sub-groups on the basis of utilization of recommended practices in respect of inputs i.e. nitrogen, phosphoric acid and potash fertilizers and insecticides and pesticides. The result of the study revealed that in the case of first group, that is holdings utilizing inputs more than 80 per cent, on an average, the utilization of fertilizer varied between 84 and 87 per cent of the recommended doses. In the second group where the utilization of

inputs was between 40 to 60 per cent of recommended doses, on an average, the utilization of fertilizers varied between 58 and 61 per cent. In regard to the third group utilizing the input below 40 per cent of the recommended doses, the use of fertilizers was to the extent of 31 per cent of recommended doses.

2.4 Factors Affecting Demand for Fertilizers :

Brake³(1960) examined south Atlantic region and East North Central region of U.S.A. In derivation of prediction equations he applied 'least square' method. The results revealed that the price of fertilizer was indicated to exact a significant influence on consumption in both regions; crop income and the planted acreage of tobacco were significant factors in the south Atlantic region; for the north east region; there was some evidence that soil qualities affected fertilizer consumption.

Hsu²⁰(1972) studied demand for fertilizer in developing country and made a case study by selecting Taiwan. He showed that relative price is important in the demand for N but not P and K. Price incentives for N can be effectively utilized. To encourage the use of N and K, however measures such as extension services, demonstration farms and courses are necessary. Time and experience are considered to be important factors in enlarging the farmers' economic horizon with respect to use of new inputs.

A study made by the Ministry of economic planning, Government of Nepal¹⁸(1965) indicated that the rate of use

of fertilizers per hectare of cultivated land under paddy crop decreased with increases in size of holdings.

Mitra and Gupta²³ (1970) used multiple regression analysis to ascertain variation in the amount of fertilizer use on 131 selected farmers in Bihar I.A.D.P. district. Farm size and value of marketable produce were significant independent variables. The value of non-land fixed investments, proportion of area irrigated and adjusted crop intensity had no significant relationship to the amount of fertilizer use. It was found that 3.5 acres per farm and a value of marketed produce to worth Rs. 347.9 were the minimum requirements for satisfactory acceptance of fertilizer practices.

Patel³³ (1971) analysed the factors which determine the variations in fertilizer use in Saroda and Sonagadh in Gujarat by using simple and multiple regression analysis. The study revealed that (1) irrigation is an important factor determining the level of fertilizer use. (2) fertilizers and manures are complementary upto a certain level of fertilizer use and substitution starts only when fertilizers are applied at a sufficiently high rate. (3) there is a positive relationship between the period for which fertilizer has been used and intensity of fertilizer use. (4) farmers using fertilizers in dry farming areas have one or more of the following characteristics : medium or large size of holding, membership to co-operative society, relatively high level of education, intermediate or high caste; and growing superior cereals or cash crops; and (5) fertilizer use is much below the



recommended rate. The reasons for such a low rate are lack of finance, inadequacy of irrigation water, high price of fertilizer, preference for farm yard manure and imperfect supply arrangements.

Jati and Tripathi²¹ (1972) made an attempt to find out extent of fertilizer consumption in relation to various crops and the reasons for non-adoption of fertilizers in parts of India. The Sambalpur district in Orissa was selected and it was found that out of the total number of growers under maize, wheat and paddy, 86 per cent, 85 per cent and 73.8 per cent of growers respectively utilized fertilizers. 66 per cent of the growers under groundnut, 63 per cent under oilseed and 52 per cent respondents under jute and mesta used fertilizer. From the sample selected for study 73.3 per cent of farmers have adopted the use of fertilizer and 26.7 per cent of farmers were found to be non-adopters. The major causes for non-adoption were lack of timely and adequate supply of fertilizers and absence of assured irrigation.

Fifth Techno-Economic Group¹⁶ (1970) of Petro-Chemical India Corporation Ltd. made a survey on market potential for a new fertilizer complex in Southern India and found that fertilizer consumption in India is increasing although well behind targets. An analysis was made of consumption figures projected by various agencies for India and South India in particular and it was found that targets are unlikely to be met. Several reasons for this were listed -

(1) lack of credit (2) poor advisory service (3) the high price of fertilizer (4) an effective marketing system. It was estimated that most farmers require credit for fertilizer purchase and that dealers themselves require credit backing at least 90 days at a time. More specialist backing and bulk supply centres were required. Increased use of fertilizers could be achieved with more irrigation and extension.

Desai G.J. and Mellor¹³ (1969) examined fertilizer use pattern in India at cultivator, district and state levels and found that growth in cultivators demand for fertilizer between 1959 and the mid of 1960's was mainly due to diffusion of fertilizer use on irrigated areas under two major food crops and a few fertilizer responsive cash crops. The improvement in the price situation after 1960 tended to accelerate this process. The demand for fertilizers will continue to grow as long as irrigated areas under most crops are not fertilized and the priced situation is as favourable as in the 1960's. Despite the favourable impact of high yielding varieties the growth in demand for fertilizer is likely to slacken before the necessary levels of application are achieved. A comprehensive policy of improvement in available varieties of foodgrains, development of fertilizer responsive varieties for non-irrigated areas, and expansion of irrigated areas is necessary to avoid this danger.

Lisra²⁴ (1971) made an examination of farmers' preferences and attitude to orthodox practices and recommenda-

tions with regard to fertilizer use. He found that larger farms with good irrigation facilities tend to use more fertilizers. Crop intensity, however is found to be higher among non-users. Share cropping encourages more use of fertilizers since costs are shared; was also found.

Desai G.J.¹⁴ (1970) analysed fertilizer use in India from 1954-55 to 1964-65 at the level of individual cultivator, the districts and the states. Fertilizer practices of samples of cultivators from different parts of India were analysed to bring out the main features of the pattern of past usage and the reasons behind it. A consistent pattern of fertilizer practices was observed among samples of cultivators from different parts of the country as far as relative spread and rates of application on different crops were concerned. Some crops such as sugarcane, tobacco, vegetables, rice and wheat were more extensively fertilized than other crops such as cotton, oilseeds and foodgrains other than rice and wheat. Applications averaged considerably below recommended rates. Cross sectional differences in sales of nitrogen within individual states were related to differences in cropping patterns and in irrigation. Differences between states were related to differences in irrigation and in relative prices of nitrogen and crops. As the level of nitrogen use approaches 2 million tonnes per year, further expansion in effective demand depends on the pace of change (a) in improved varieties of foodgrains (b) the development of nitrogen responsive non-foodgrain commercial crops and (c) the increase of irrigation.

The study made by Parikh³² (1965) to identify and measure the quantitative significance of various economic factors in explaining the increasing consumption of N fertilisers in 1951-61 revealed that for Bihar and Orissa, economic variables such as irrigated area and prices appear to play a major role in explaining the variations in consumption. For Punjab and Kerala only irrigated area seems to explain the fluctuations in consumption.

National Council of Applied Economic Research²⁶ (1964) studied factors affecting fertilizer consumption. Two areas were selected, one with highest fertilizer consumption and the other where it was relatively low. The first set consisted of 7 districts in which intensive Agricultural Development Programme was originally introduced in 1961. The control area consisted of seven districts with the largest gap between actual and potential fertilizer use. In all 840 farmers from 70 villages of 28 blocks in two areas were investigated. The important factors influencing fertilizer consumption were shown to be prices of fertilizers, organization of distribution and marketing, arrangements for credit facilities and farmers' attitudes towards the use of fertilizer.

2.5 Distribution System of Fertilizers :

Trotter and Warren⁴⁴ (1958) analysed the fertilizer manufacturing and distribution operations of 31 co-operatives in 16 southern states of U.S.A. and found the place of

co-operatives in fertilizer distribution, trends in distribution, use of mixed fertilizer and separate materials, and delivery and merchandising practices. Co-operative supplied about 13 per cent of all fertilizer used in the south for 1955-56. For the same year, mixed fertilizers made up 61 per cent of co-operative volume.

Parashar²⁹ (1966) gave concrete suggestion that besides strengthening the production sources, the existing distributive system should be improved. To meet the seasonal requirements, there should be timely and efficient supply. Production planning and use of inputs in the villages should be planned in such a way that the inputs are on hand well in advance of each cropping season. This will mean establishing a regular and co-ordinated channels at different levels, connecting the production units or the facility points with the village. The village supply points should be provided with sufficient stocks of inputs to enable them to meet the village requirements adequately.

National Council on Applied Economic Research²⁷ (1964) stated that it is essential to bring the supply system within the easy reach of farmers. To facilitate this, apart from the co-operatives, private sale points in the village should also be expanded in order to make the distribution more competitive.

Report of the fertilizer credit committee²⁵ (1968) stated that minimum consumption of fertilizer in India for 1970-71 has been established at 2.4 million tonnes of N,

1 million tonnes of P and 0.7 million tonnes of K. Wider application of fertilizer is necessary and this requires effective distribution facilities. Distribution is mainly the responsibility of the co-operative credit institutions. However, if adequate use is to be made of imports of fertilizers on a nation wide scale, structural changes are necessary which will improve the financial status and scope of operations of the co-operative credit institutions. Moreover, it is suggested that retailers of fertilizers should provide or extend credit facilities wherever possible.

Dalal⁹ (1968) expressed that India's fertilizer industry is in a transition stage from a seller's to a buyer's market. Imaginative and aggressive sales promotion co-ordinated with distribution logistics will be required. Most Indian companies in the next five years need to develop an extensive network of distributors on a national scale supported by a national advertising programme; strong regional markets with active dealers and better services to farmers. Brand name promotion and improved packaging also are suggested.

Guraishi¹⁰ (1972) mentioned that by the end of the Fifth Five Year Plan, the co-operatives would be expected to disburse about Rs. 600 to 700 crores worth of credit against the total estimated credit requirement of about Rs. 1600 to 1800 crores for fertilizers. In order to enable co-operatives to perform their functions effectively, it would be

necessary that (i) an adequate quantity of fertilizers be made available to the co-operatives for distribution and (ii) that they should get a distribution margin which would give them the necessary incentive to discharge this responsibility. He also mentioned that co-operatives were well equipped to perform this function and described the various facilities and infrastructure that the co-operatives had like wholesale and retail outlets, storage points etc. Further he stated that the short term loans advanced by co-operatives in 1973-74 may be of the order of Rs. 680 crores out of which the component for fertilizer may be of the order of Rs. 300 crores.

Chaturvedi⁵(1971) in his "Seminar on Marketing, promotion and financing for optimum use of Fertilizers in I.I.", reviewed the role of co-operative sector in fertilizer distribution and credit. He said that during 1969-70 co-operatives distributed 59 per cent and private traders 41 per cent of the total fertilizer sales in the state.

Datey¹²(1972) in his paper, explained as to how co-operatives had a major role to play in the distribution of credit and therefore in the increased use of fertilizers. He further pointed out certain handicaps the co-operatives faced at present namely (i) the material was in short supply (ii) the co-operatives did not have the margin money required for obtaining credit from commercial sources, and (iii) there was lack of managerial efficiency in the co-operatives particularly with regard to distribution of fertilizers.

Das¹¹ (1973) stated that it is needless to emphasise the importance of supply system for various agricultural inputs such as fertilizers, seeds, irrigation etc; on crop production. A survey in several blocks revealed that the supply of fertilizer was inadequate and untimely. Its selling price was found to be much higher than the controlled price. There was also the problem of supply of preferred and non-preferred varieties of fertilizers. All the evils such as high prices, hoarding, ill-distribution etc. which emerge due to shortage of any commodity in a free market were also visible in this case. It was suggested that the supply may rest with one organization to avoid complications. At the ground level of supply, total control should rest with the government.

Mishra²³ (1973) made an attempt to study the marketing of fertilizers in two villages of Raipur district of Madhya Pradesh. The study was based on the marketing behaviour of 50 cultivators of different size-groups viz. 2.5, 2.6-7.5, 7.6-15, 16-25 and above 25 acres of land of two villages purposively selected from the Dharnava block of Raipur district. In village Kurva, 71.5 per cent of the total sale and in the other village, Charoda, the entire sale were executed through the co-operative sector and the remaining in the former village was sold through the private sector. Among the different varieties of fertilizers granular, urea and superphosphate appear to be in greater demand than the other varieties. The co-operative banks

financed the entire purchases of fertilizers in Charoda while in Kurra 73.5 per cent of purchases were financed by the co-operative sector, the residual came from the own funds of the cultivators. The co-operative credit had gone disproportionately in favour of the largest size of holdings in both the villages. In Kurra, this group of cultivators cropped 44 per cent of the total cropped area and commanded 53 per cent of co-operative credit against 26 per cent of the cropped area and 39.4 per cent of co-operative loan in Charoda. In the two villages taken together, 12 out of 50 cultivators belonging to the group of less than 7.5 acres of land did not purchase any fertilizers. Four of them were defaulters and hence were refused co-operative loans while others were not convinced of production response to fertilizers.

2.6 Prices of Fertilizers :

Report of the committee on Fertilizers¹⁷ (1965) observed two principles in controlling the prices : equalization of prices of imported and domestically manufactured fertilizers and making prices uniform in different parts of the country by pooling the transport charges for delivery at railheads and by adding a uniform distribution margin to the railhead prices. There were, however, no major subsidies. This is brought out by the fact that though prices of various nitrogenous fertilizers were to be fixed by the Central Fertilizer Pool on a no profit no loss basis by pulling all costs, by 1963-64. The pool had made profits of Rs. 433.59 millions on its operations since 1944-45.

Ganishayan, Sidhu and Kangi³⁹ (1973) collected primary data from a randomly selected sample of 32 farmers of Jullundur district of Punjab by probability proportional method. A sample of 20 farmers who purchased fertilizers from co-operatives and 12 who purchased from private depots were selected. Secondary data on distribution costs were collected from the record of the marketing federation and some other published material. Authors found that the distribution costs ranged from Rs. 3 to Rs. 10.50 per quintal in case of co-operative agency and Rs. 3 to Rs. 20 per quintal in case of private trade. For urea, one of the most commonly used fertilizers in the state, the distribution costs with the private traders were higher upto Rs. 12.38 per quintal. These higher distribution costs for the private trade were primarily due to higher margins which they retained at the retailers' level particularly when the fertilizer was in short supply.

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CHAPTER III
MATERIALS AND METHODS

CHAPTER III

MATERIAL AND METHODS

3.1 Selection of Sample :

a) Selection of tract :

Nahuri taluka is one of the highly irrigated talukas of Ahmednagar district. This taluka is benefitted by Pravara (right) canal and Mula (right and left) canals. The utilisation of canal water of Mula Project has been started from 1971 while Pravara canal is old one. Thus a part of Nahuri Taluka is recently brought under irrigation while some portion of it was already under irrigation. At the same time, some part of Nahuri Taluka is under dry land cultivation. Due to its large irrigated area Nahuri is one of the highly fertilizer consuming as well as with high fertilizer consumption potential talukas of Ahmednagar district. Because of this background, the author selected this taluka for studying marketing of fertilizers.

b) Selection of Co-operative Societies :

The design for selection of sample, adopted was, two stage stratified random sampling with a village co-operative society as a primary unit and member cultivator as a secondary unit.

A list of co-operative societies dealing with fertilizer marketing was obtained from Taluka Co-operative Supervising Union. Ofcourse, these societies also deal with other activities such as advancing of loans to farmers for agricultural production and land improvement, maintaining fair price

shops, supplying agricultural inputs like seeds, oil cakes, insecticides and pesticides, fuel etc. There are 29 co-operative societies dealing with fertilizer marketing in the taluka. The coverage of the whole inquiry had to be planned by taking into consideration the period available for study. It was, therefore, decided to select five co-operative societies in the taluka on the basis of quantity of fertilizers sold during 1972-73.

All the co-operative societies were arranged serially in the descending order of the quantity of the fertilizers sold during 1972-73 and from this list, five co-operative societies were selected randomly by referring to random number table. The co-operative societies selected for study were as under :-

- 1) Chandegaon, multipurpose co-operative society Ltd.
- 2) Lusalmadi, multipurpose co-operative society Ltd.
- 3) Brahmani, multipurpose co-operative society Ltd.
- 4) Guha, multipurpose co-operative society Ltd.
- 5) Baragaon Nankar, multipurpose co-operative society Ltd.

c) Selection of Cultivators :

A list of khatedars of the villages of respective co-operative society was obtained from 'Kangar Lalathi' of revenue department. Another list of the member cultivators of each selected co-operative society was also obtained from respective co-operative society. Finally, the list of persons who are both the members of co-operative society as

well as cultivators was prepared. Then, on the basis of probability proportion of holding size, the total population was divided into three size groups viz., small, medium and large. A total sample of 75 cultivators was randomly selected on basis of proportionate weightage from respective size group. The distribution of cultivators according to size group is given in table 3.1.

Table 3.1 : Details of the sample under study :

Size group	Size of holding in ha.	Number of cultivators
Small	00 - 3.24	46
Medium	3.25 - 5.74	21
Large	5.75 - above	8

3.2 Collection of Data :

Keeping the objectives in view, two separate questionnaires, one for co-operative societies and the other for cultivators, were prepared.

a) Questionnaire for co-operative societies :

By considering the time and other resources at the disposal of investigator, survey method was used for collection of data. A detailed questionnaire * was prepared by taking into consideration the detailed objectives of the study. With the help of the comprehensive questionnaire,

* Questionnaire is enclosed in Appendix- 8

information was collected by the author, personally by interviewing secretaries of each co-operative society and referring to the records of each co-operative society. The data collected pertains to the year 1972-73.

b) questionnaire for cultivators :

Survey method was used for collection of data from the cultivators too. Keeping the objectives in view, a detailed questionnaire * was prepared. With the help of comprehensive questionnaire, information was collected by the author, personally by interviewing the selected cultivators. The data collected covered the year 1972-73 and 1973-74.

3.3 analysis of the data :

The data so collected was further processed, tabulated and analysed. Some of the important points in the analysis of demand for fertilizers, non-arrival and disposals of fertilizers, marketing costs, problems faced by co-operative societies and cultivators etc. and methodology adopted are explained under following headings.

a) assessing analysis :

The data collected from cultivators were for two years i.e. 1972-73 and 1973-74. The demand estimates according to actual rates of application and recommended rates were worked out and from this shortages of fertilizers were worked out. The formula used for demand estimation was :-

* questionnaire is enclosed in appendix. c

Demand estimate = Average rate of application of N or P or K per hectare of irrigated * area & proportion of irrigated area fertilized X total irrigated area under the crop.

Finally, by summing up the cropwise demand estimates, the demand estimate for the taluka as a whole was worked out.

Correlation analysis between fertilizer consumption, income, area under cash crops like sugarcane and cotton and irrigated area under non-cash crops were worked out. Multiple regression analysis was also worked out.

b) Arrivals and disposals analysis :

The data collected from co-operative societies pertained to year 1972-73. The data were further analysed by working out monthwise averages of arrivals and disposals of fertilizers.

c) Cost of marketing :

The data were also analysed to give the itemwise absolute cost as well as the percentage to the average selling price.

d) Problems of marketing :

Problemwise frequency of co-operative societies and percentages to total number of societies were worked out. At the same time problemwise frequency of cultivators and percentages to total number of cultivators in each size group were worked out.

* As the unirrigated area, was not fertilized due to scanty and erratic rainfall, only irrigated area was considered.

3.4 Concepts used in the study :

Some of the important concepts used in the study are explained below :-

a) Demand :

It refers to the quantities of different kinds of fertilizers disposed during a specific period and at the various prices at which they are sold.

b) Supply :

It refers to the quantities of different kinds of fertilizers arrived in the market for sale during a specific period.

c) Fertilizer :

A material which supplies the particular nutrient to the soil.

d) Straight fertilizer :

The fertilizer containing only one of the primary nutrients - N, P, K.

e) Complex fertilizer :

The fertilizer containing two or more of the primary nutrients - N, P, K.

f) Mixture or mixed fertilizer :

The fertilizer mixture of two or more fertilizer materials.

g) Cost of marketing :

Cost of marketing includes transport cost, haulage charges, storage cost, loss during handling and margin taken by co-operative societies.

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CHAPTER IV

**AGRO-ECONOMIC INFORMATION OF THE
TRACT AND SAMPLE CULTIVATORS**

CHAPTER IV

AGRO-ECOLOGICAL INFORMATION OF THE TRACT AND SMALL CULTIVATORS

In developing countries, majority of the farmers do not have adequate resources with which to operate their farms. Though this is true, agricultural production mainly depends upon the agro-climatic conditions and topography of the tract. Thus, the physical factors influence the nature of farming and the farmers have to decide the suitability and profitability of the cropping pattern and adjust it accordingly. It is, therefore, necessary to discuss the natural conditions and general information of the tract which will help readers in getting the necessary background. For better understanding of the conditions existing in the tract under study, they are described below :

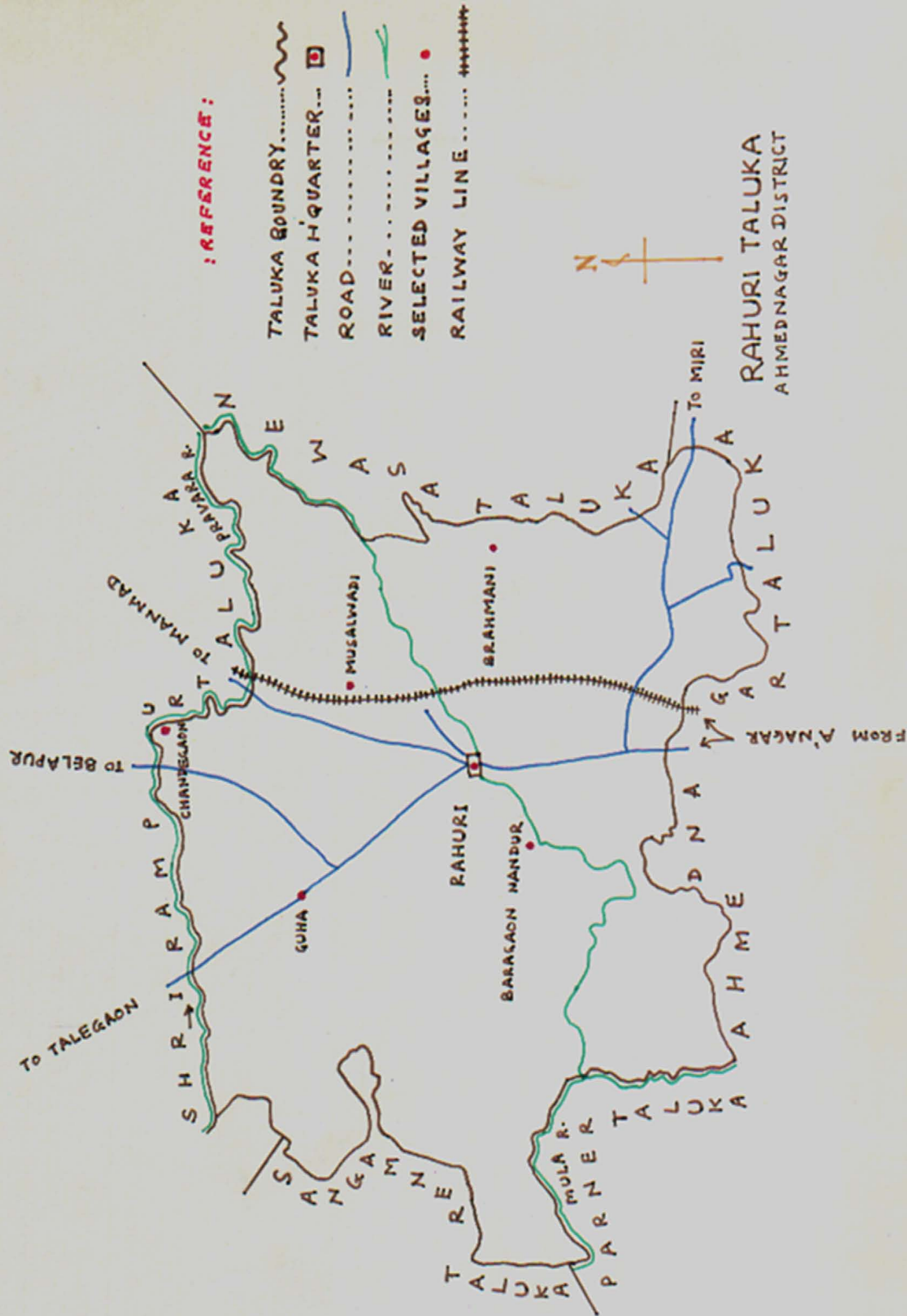
4.1 Geographic location :

Nahuri is one of the thirteen talukas of Ahmednagar district and the district lies between $18^{\circ} 2'$ and $19^{\circ} 9'$ North latitudes and $73^{\circ} 9'$ and $75^{\circ} 5'$ East longitudes. The total area of the taluka is 1046.00 square kilometers. The taluka is bounded by Shrirampur to the north, Karner and Ahmednagar talukas to the south, Mangarner taluka to the west and Sevaca taluka to the east, Ahmednagar city is 37 kilometers from the taluka place Nahuri.

For administrative purposes, the taluka is divided into three circles, namely, Devalali, Nahuri and Vambori.

FIG. 1

MAP OF RAHURI TALUKA SHOWING THE SELECTED VILLAGES



4.2 Population :

As per 1961 census the total population of the taluka was 1,17,726 spread in 83 villages. As per 1971 census the total population of the taluka was 1,59,343. Thus during the last decade (1961-71), the population of the taluka has increased by 35.34 per cent.

4.3 Climate :

Climate of this taluka is dry and pleasant during most part of the rainy and winter seasons.

a) Temperature :

The cold season starts from November and lasts till January, the hot season from February to May and the wet season from June to October. Annual average maximum temperature was 38°C with a range of 33°C to 43°C and the average minimum temperature was 17°C with a range of 3° to 17°C.

b) Rainfall :

Over the taluka, the chief supply of rain is from the South-West monsoon, which begins about the middle of June and lasts till the end of October. In January and February slight rainfall is not unusual, but from March till May the sky as a rule is cloudless. The average annual rainfall of the tract is 312 mm. during Kharif season and 350 mm. during rabi season. However, the year 1972-73 was drought year and rainfall received during the whole year was only 211 mm.

4.4 Soils :

The soils of this taluka can be broadly classified into three types viz., medium black, red and marwad. Soils along river banks are relatively deep, fertile. The soils along hilly areas are barad* type. In general, soils of the selected tract are medium black.

4.5 Land Utilization :

The land utilization pattern for the selected tract is given in Table 4.1.

Table 4.1 : Land utilization pattern of Bahuri Taluka during 1972-73.

(Area in hectares)

Sr. No.	Items	Area	Percentage to total
1	Forest area	15209	14.96
2	Permanent grazing and pasture area	90	0.09
3	Cultivable waste	399	0.39
4	Barren and uncultivable area	9280	9.13
5	Land put to nonagricultural use	52	0.05
6	Current fallow	5304	5.22
7	Other fallow	7090	6.97
8	Net sown area	64261	63.19
9	Total geographical area	101685	100.00
10	Gross cropped area	65715	64.63
11	Net irrigated area	15154	14.90
12	Area irrigated more than once	1454	1.43
13	Gross irrigated area	16608	16.33

(Source : Record of D.D.O. Office, Bahuri).

* Barad type means gray inferior quality soil.

It is seen from the table 4.1 that the gross cropped area was 64.63 per cent while gross irrigated area was 16.33 per cent of the total geographical area respectively. The current fallow was 5.22 per cent to total geographical ^{area} which was considerably high because of severe drought during 1972-73 year. The area under forest accounted for 14.96 per cent while barren and uncultivable area was 2.13 per cent respectively. Barren and uncultivable area is more because, this tract lies in scanty rainfall zone. Other fallows accounted for 6.97 per cent to total geographical area.

4.6 Irrigation :

The intensity of cropping can be judged from the area under irrigation. Land can be put to more than two crops in a year when irrigation facilities are available. Irrigation facilities also have reflection on the area under sugarcane, fruit crops and vegetable crops. Table 4.2 represents the net area irrigated by different sources in the selected tract.

It can be observed from the table 4.2 that the percentage of net irrigated area to net cropped area is 25.84 per cent. The percentage of area irrigated by wells to the total net irrigated area was 70.32 per cent during 1972-73. This clearly indicates that cultivators are mainly dependent upon well irrigation.

Table 4.2 : Area irrigated by different sources in the tract during 1972-73.
(Area in hectares)

Sr. No.	I t e m	Number	Area
1	Government Canal	3	4497
2	Private Canal	-	-
3	Wells	7457	10657
4	Other sources	-	-
	Total net irrigated area		15154
	Area irrigated more than once		1454
	Gross area irrigated		16608
	Percentage of net irrigated area to net cropped area		25.84
	Percentage of well irrigated area to the total net irrigated area		70.32

(Source : B.E.C. Office, Bahuri).

4.7 Cropping pattern :

The information about area under different crops in 1972-73 is given in Table 4.3. It is evident from the table that food crops dominate the cropping pattern. Jowar accounted for 63.13 per cent area to gross cropped area while Sugarcane accounted for 11.36 per cent. Wheat was the third important crop which occupied 8.30 per cent area of the gross cropped area. The high fertilizer consuming crops like Sugarcane, Cotton, Oilseeds and Wheat together shared

proportionately quite large area (30.75 per cent) in the cropping pattern.

Table 4.3 : Cropping pattern of Bahuri Taluka during 1972-73.

(Area in hectares)

Sr. No.	C r o p s	Area	Percentage gross cropped area	Irrigated area
1	Jowar	42,485	63.13	3087
2	Bajara	1,773	2.70	82
3	wheat	5,453	8.30	2793
4	Raddy	110	0.17	110
5	Kaize	45	0.07	45
6	Other cereals	10	0.002	-
	Total cereals	48,876	74.37	6217
7	Gram	1,740	2.65	298
8	Tur	74	0.11	-
9	Other pulses	352	0.54	-
	Total pulses	2,166	3.30	298
	Total grain crops	51,042	77.67	6415
10	Sugarcane	7,463	11.36	7463
11	Spices & condiments	92	0.14	92
12	Fruits	284	0.43	284
13	Vegetables	204	0.31	204
	Total food crops	59,085	89.91	14458
14	Cotton	825	1.26	812
15	Oil Seeds	5,200	7.91	1180
16	Other non-food crops	605	0.92	158
	Total non-food crops	6,630	10.09	2150
	Total gross cropped area	65,715	100	16608

(Source : Record of B.L.C. Office, Bahuri).

4.8 General information of village multipurpose sample co-operative societies :

The societies selected for study were not exclusively dealing directly with marketing of fertilizers. Sale and purchase of fertilizers was one of the activities of these societies. The societies generally dealt the business of marketing of fertilizers through granting of short term loans to their member cultivators. However, a general information of these societies is briefed below :

a) Multipurpose Co-operative Society, Lunkani :

This society is situated 16 kms. towards East to taluka headquarter. The society distributed short term loans of Rs. 3,97,901 out of which Rs. 1,63,010 were financed for fertilizers during 1972-73. The area of operation of the society is within a radius of 6 kilometers.

b) Multipurpose Co-operative Society, Baragan Landur :

This society is situated 6 kms. towards South-West of taluka headquarter. The society distributed short term loans of Rs. 10,31,311 out of which about 50 per cent (Rs. 5,01,235) were distributed for purchase of fertilizers during 1972-73. The area of operation of the society is within a radius of 9 kilometers.

c) Multipurpose Co-operative Society, Chandegaon :

This society is situated 20 kms. towards North from taluka headquarter. Total amount of short term loan distributed was Rs. 3,15,690, out of which Rs. 60,120 were

distributed for fertilizers.

d) Multipurpose Co-operative Society, Guha :

Location of this society is 12 kms. towards North-west of taluka headquarter. The total amount of short term loan distributed accounted to Rs. 1,38,683 out of which Rs. 76,001 were distributed for fertilizers. The area of operation of this society is within a radius of 5 kilometers.

e) Multipurpose Co-operative Society, Kundli :

This society lies 11 kms. away from taluka headquarter towards North-East. Total amount of short term loan distributed accounted Rs. 4,63,315 out of which Rs. 1,98,833 were distributed for fertilizers.

4.9 Agro-economic information of sample cultivators :

a) Cropping pattern :

Cropping pattern of the sample holdings is briefed in table 4.4.

It is evident from table 4.4 that food crops dominate the cropping pattern. Jowar accounted for 22.29 per cent area of gross cropped area while Bajara and wheat occupied 21.82 and 13.33 per cent respectively. Area under sugarcane was 25.44 per cent of gross cropped area. Groundnut, Gram and Cotton accounted 8.45, 2.73 and 8.68 per cent gross cropped area respectively. The high fertilizer consuming crops like Sugarcane, Cotton and wheat together

accounted 39.45 per cent area of gross cropped area.

Table 4.4 : Cropping pattern of sample cultivators.

(Area in hectares)

Sl. No.	Crops	area	% gross cropped area	Irrigated area
1	Jowar	59.29	22.29	36.73
2	Bajara	58.04	21.82	42.84
3	Wheat	35.47	13.33	35.07
4	Sugarcane	67.67	25.44	67.67
5	Groundnut	22.49	8.45	21.68
6	Orza	7.26	2.73	6.06
7	Cotton	1.81	0.68	1.81
8	Others	13.98	5.26	9.95
	Total gross cropped area	266.03	100.00	221.83

b) Land use pattern :

Table 4.5 gives an idea regarding land use pattern of the selected holding.

Table 4.5 : Size groupwise land use pattern on sample holding.

(Area in hectares)

Size group	Owned land	Uncultivable area	Total operated area
Small	1.92	0.04	1.80
Medium	3.88	0.25	3.72
Large	7.08	0.35	6.73
Overall	4.29	0.21	4.08

It is revealed from the table 4.5 that the land owned by small, medium and large size of holdings accounted on an average 1.92, 3.88 and 7.03 hectares respectively. The land under cultivation on these respective sizes of holding was observed to be 1.30, 3.72 and 6.73 hectares leaving the remaining area as uncultivable area. It is further observed that the proportion of uncultivable area increased with the increase in the size of holding. This indicated that smaller the holding more is the intensiveness of cultivation.

c) Irrigation of sample farms :

Sources of irrigation and area irrigated by the sample cultivators through each of these sources is given in table 4.6.

Table 4.6 : Area irrigated by different sources of sample holdings.
(area in hectares)

Sr. No.	Item	Area
1	Government Canal	53.10
2	Private Canal	-
3	Wells	375.21
4	Other sources	0.23
	Total	428.54
	Gross cropped area	360.03
	% irrigated area to gross cropped area	85.13

It can be observed from table 4.6 that the percentage of gross irrigated area to gross cropped area is 85.18.

The figures in table 4.6 revealed that proportion of area under irrigation on sample holdings (85.18 per cent) was considerably high than the taluka (25.94 per cent). Well irrigation was the main source of irrigation followed by Government canals. Area irrigated by wells was found to be about 3 times more than that of area irrigated by Government canal.

Chapter Opener Page

CHAPTER V
DEMAND FOR FERTILIZERS

CHAPTER V
DEMAND FOR FERTILIZERS

The magnitude for total market in the taluka can be judged from demand estimate. The demand estimates for fertilizers at the state and national level are generally based on 'recommended rates of application' rather than on the basis of the actual rates of application as obtained from real world of situation. Here, an attempt is made to estimate demand on the basis of actual rates of application followed by the sample cultivators as well as the recommended rates of application.

5.1 (a) Fertilizer Consumption of Different Crops :

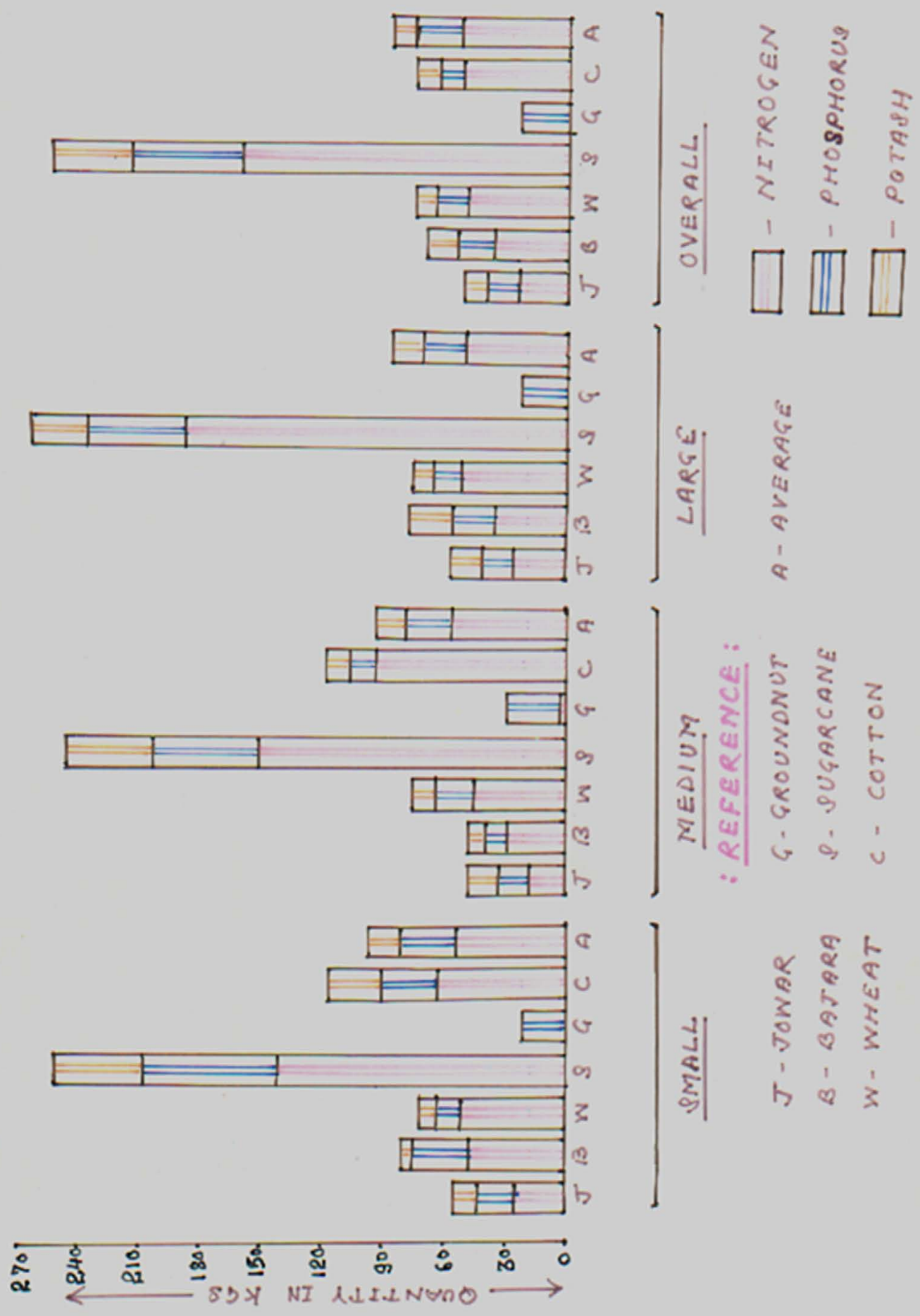
Average rates of application for the year 1972-73 and 1973-74 were worked out and are shown in table 5.1(a).

The overall average rates of application of Nitrogen per hectare of irrigated area for Jowar, Bajara, wheat, Sugarcane, Groundnut and Cotton were 20.71, 24.40, 47.54, 160.09, 00.00 and 45.38 kgs/hectare respectively during 1972-73, while during 1973-74, they were 23.13, 37.02, 49.65, 158.83, 0.97 and 51.83 kgs/hectare respectively.

The rate of application of N fertilizers observed to be maximum in case of Sugarcane and minimum in case of Jowar in both the years. The maximum and minimum range was 160.09 kgs and 20.71 kg in case of Sugarcane and Jowar in 1972-73 and 158.83 kgs and 23.13 kgs in 1973-74 respectively.

FIG. 2

SIZE GROUPWISE - RATE OF APPLICATION OF N, P, K PER HECTARE



However, the figures of percentage increase consumption in 1973-74 to that of 1972-73 in this respect showed that Bajra occupied the top position (51.72 per cent) followed by Cotton (14.21 per cent), Jowar (11.69 per cent), wheat (4.44 per cent) and Sugarcane (-0.74 per cent) respectively. Sugarcane showed a negative increase indicating thereby a decline in N fertilizer consumption.

The overall rates of application of Nitrogen were increased by 2.42, 12.62, 2.08, 0.97 and 6.45 kgs/hectare in case of Jowar, Bajra, wheat, Groundnut and Cotton respectively during 1973-74 while in case of sugarcane it was decreased by 1.26 kgs/hectare during 1973-74.

The overall rates of application of phosphorus were increased by 2.14, 7.92, 0.59, 0.38, 0.86 kgs/hectare in case of Jowar, Bajra, wheat, Sugarcane and Groundnut respectively while it was decreased by 2.90 kgs/hectare in case of cotton.

More or less the same trend is observed in case of potashic fertilizers.

This revealed that the rate of fertilizer application, in general, has increased in case of foodgrain crops, whereas the same has been decreased in case of sugarcane and Cotton. This may be due to the Government encouragement and emphasis on the production of foodgrain crops to that of cash crops like Sugarcane and Cotton, with an objective to meet the food deficit arising during scarcity period.

Further, it is revealed from the table that the rate of Nitrogen application of small size group is increased by 9.01, 123.98, 24.65, 48.71 per cent for Jowar, Bajra, Wheat and Cotton respectively, while in case of Sugarcane it was decreased by 11.48 per cent. The rate of phosphorus application is increased by 65.23, 155.93, 16.30, 9.59, 30.33 and 143.74 per cent for Jowar, Bajra, Wheat, Sugarcane, Groundnut and Cotton respectively during 1973-74. The rate of Potash is increased by 22.16, 3.30, 534.19 per cent respectively in case of Jowar, Sugarcane and Cotton, while it decreased by 30.99 and 0.63 per cent for Bajra and wheat respectively.

In case of medium size group rate of Nitrogen application is increased by 5.45, 72.91, 8.78 per cent respectively for Jowar, Bajra and Sugarcane while it decreased by 20.05 and 1.53 per cent for wheat and Cotton respectively. The rate of phosphorus application increased by 2.90, 17.82, 1.04 per cent for Jowar, Wheat and Sugarcane crops respectively, and it decreased by 24.03, 5.94 and 66.63 per cent in case of Bajra, Groundnut and Cotton respectively. The rate of Potash application is decreased in all crops except Jowar. The increase in the rate of Nitrogen application in case of Bajra was the highest as compared to other crops because Bajra being the most popular foodgrain in this area and also a pressing need for increasing foodgrain production. Moreover, fertilizer requirement of cash crops like

Sugarcane and Cotton being relatively higher than Bajra, the cultivators could not afford to apply fertilizers to these crops due to its acute shortage and galloping prices.

In case of large size group the rate of Nitrogen application is increased in all crops except Bajra while the rate of Phosphorus application is decreased in all crops except Bajra. The same trend is observed in case of Potash. This clearly indicates that large size farmers are not adopting government policies efficiently. In concern with fertilizer consumption on different sized group holdings, it is seen that on an average medium sized holding relatively consumed more fertilizers per hectare than small and large sized holdings. There was no much difference in fertilizer consumption between small and large sized holdings during 1972-73.

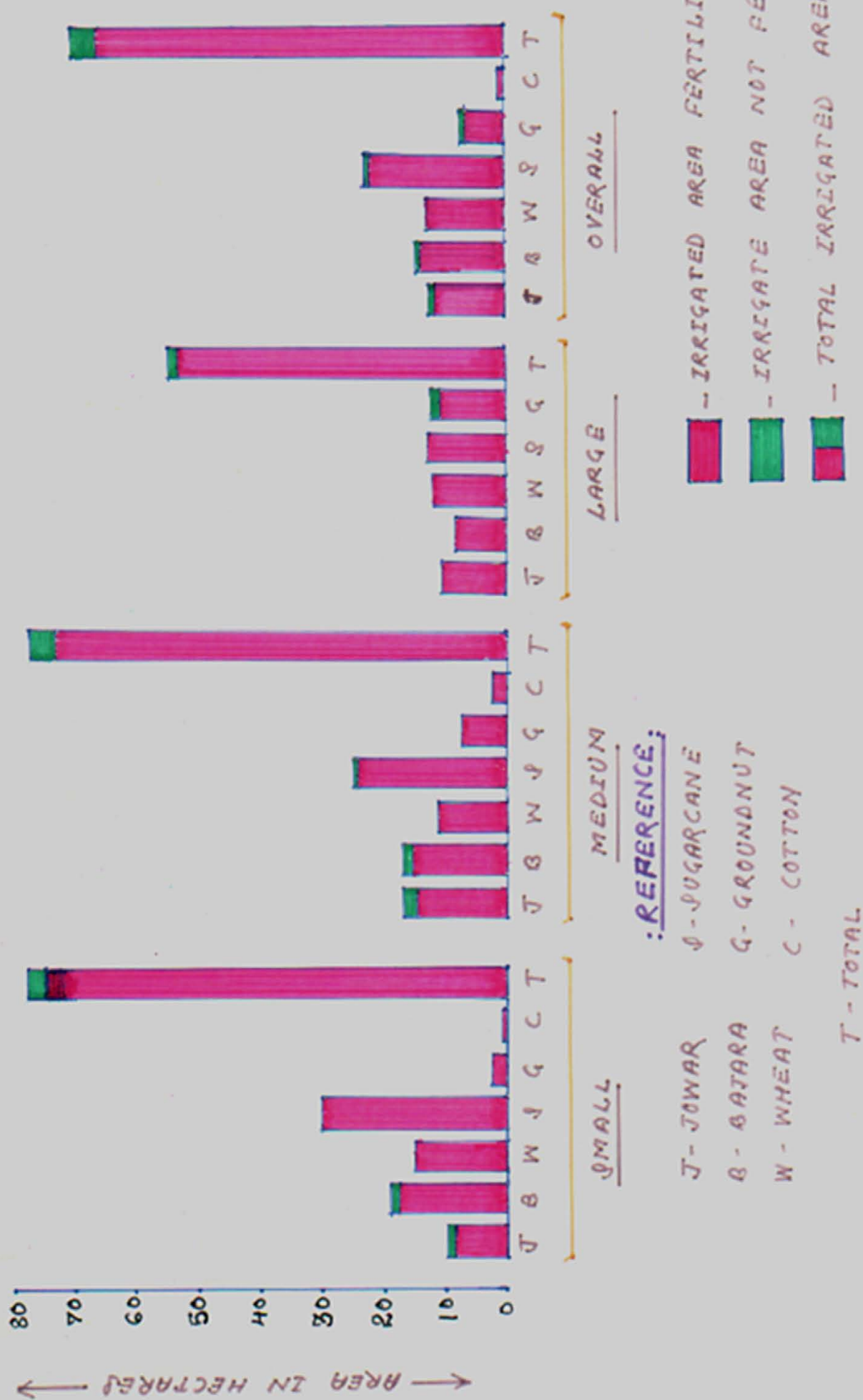
(b) Area fertilized of different crops

The cropwise proportion of irrigated area fertilized were worked out on the basis of sample cultivators which is presented in Table 5.1 (b).

The overall percentage of irrigated area fertilized was 80.79, 81.65, 97.39, 100.00, 83.87 and 100.00 per cent respectively for Jowar, Bajra, wheat, Sugarcane, Groundnut and Cotton during 1972-73 while it was 90.60, 92.30, 100.00, 99.42, 92.53 and 100.00 per cent respectively for the same crops during 1973-74. These percentages showed that the overall proportion of area fertilized has

FIG. 3

SIZEGROUPWISE IRRIGATED AREA FERTILIZED OF DIFFERENT CROPS



significantly increased in case of foodgrain crops like Jowar, Bajra, Wheat etc. More or less the same trend was observed in small, medium and large groups also. Within the size groups the Sugarcane and Cotton being the only cash crops of this region and therefore, the major source of cash income, area fertilized was observed to be almost cent per cent.

Area fertilized was observed to be declined in general in case of Groundnut in small and large size holdings.

5.2 The cropwise estimates of N, P, K fertilizers for the taluka :

The fertilizer estimates as shown in Table 5.2 are worked out according to the formula explained on page no. 39 under the chapter Materials and Methods of this investigation.

Table 5.2 : Cropwise N, P, K consumption for the Taluka :
(Quantity in Tgs)

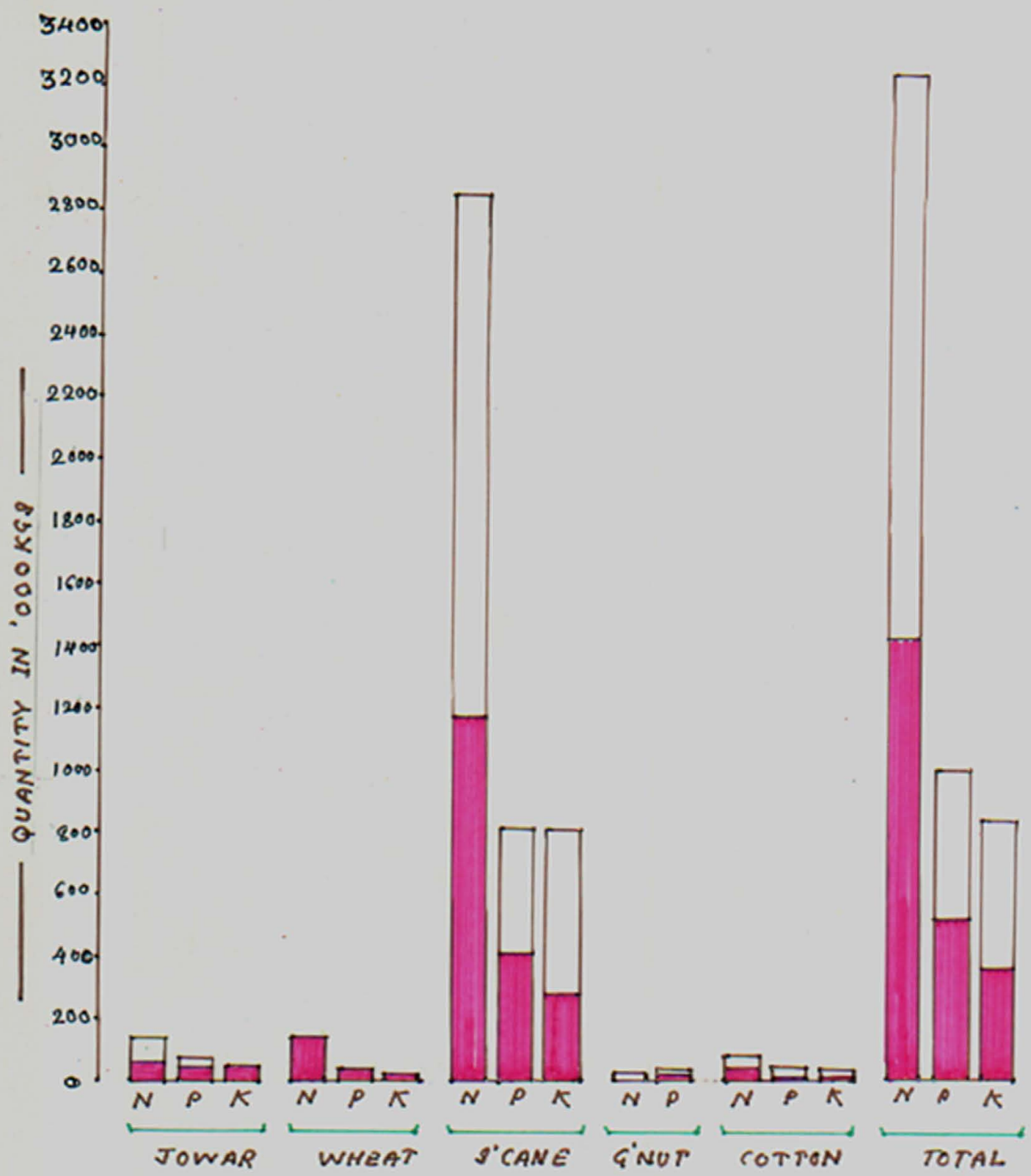
Crops	1972-73			1973-74		
	N	P	K	N	P	K
Jowar	51784.43	36306.21	35201.32	64975.18 (25.77)	41655.96 (14.20)	40899.66 (15.92)
Bajra	1640.66	703.83	703.31	2792.76 (70.22)	1235.82 (17.57)	955.05 (35.79)
Wheat	128793.52	37974.08	31451.97	133672.45 (7.67)	39554.47 (4.32)	29242.71 (-7.03)
Sugarcane	1194751.67	412853.16	286952.35	1173489.58 (-1.23)	412532.11 (-1.31)	279869.96 (-2.47)
Groundnut	-	20352.42	-	915.63 (0.45)	12273.96 (6.03)	-
Cotton	36348.56	13032.60	11181.24	42085.96 (14.21)	10077.50 (-22.00)	10677.80 (+4.51)
Total	1413818.93	521201.84	422931.56 (0.64)	520735.37 (-1.05)	520735.37 (-1.05)	361645.18 (-1.07)

(Figures in the bracket indicate per cent increase or decrease over 1972-73).




FIG. 4

CROPWISE FERTILIZER ESTIMATES ACCORDING TO

ACTUAL AND RECOMMENDED DOSES FOR THE TALUKA



REFERENCE:

-  - ACTUAL
-  - RECOMMENDED
-  - SHORTAGE

The contents of table 5.2 revealed that fertilizer consumption was highest in case of Sugarcane followed by Wheat, Jowar, Cotton and Bajra respectively. This was mainly due to the higher fertilizer consuming habitat and responsiveness of Sugarcane crop.

The total demand for N, P, K for the year 1972-73 for the whole taluka was worked out to be 1423818.93, 521201.84 and 365570.19 kgs respectively, while it was 1422931.56, 526735.27 and 361645.18 kgs respectively during 1973-74.

The Nitrogen and Phosphorus consumption was increased by 9112.63 and 5533.43 kgs respectively while Potash consumption was decreased by 3925.01 kgs. The increase in the estimates of N and P fertilizers may be attributed to the relatively higher awareness of the cultivators due to their spectacular and direct plant growth effect over potashic ones.

The absence of or a very negligible demand for N and K fertilizers for Groundnut was mainly because of the technical recommendations of more phosphatic fertilizer application to this crop.

5.3 Comparison of recommended and actual rates of application :

The Comparison showing the rates at which the cultivators actually applied the fertilizers to different crops as well as the recommended doses is given in Table 5.3.

Table 5.3 : Actual and recommended rates of fertilizer application.

(Dose in kg/hectare)

Sr. No.	Crop	N		P		K	
		Act-ual	Reco-mend-ed	Act-ual	Recom-mended	Act-ual	Recommen-ded
1	Jowar	23.13	50.00	16.66	25.00	14.56	-
2	Lajra	37.02	25.00	18.38	25.00	12.66	-
3	Wheat	49.65	50.00	14.60	12.00	10.47	-
4	Sugarcane	158.83	386.00	55.70	110.00	37.88	110.00
5	Groundnut	0.97	20.00	23.39	40.00	-	-
6	Cotton	51.83	100.00	13.15	60.00	13.15	40.00

The actual rates of Nitrogen application were 23.13, 37.02, 49.65, 158.83, 0.97 and 51.83 kgs/hectare for Jowar, Lajra, wheat, Sugarcane, Groundnut and Cotton respectively while recommended rates are 50.00, 25.00, 50.00, 386.00, 20.00 and 100.00 kgs/hectare respectively.

The actual rate of Phosphorus application were found to be 16.66, 18.38, 14.60, 55.70, 23.39, 13.15 kgs/hectare for Jowar, Lajra, wheat, Sugarcane, Groundnut and Cotton respectively while recommended rates are 25.00, 25.00, 12.00, 110.00, 40.00, 60.00 kgs/hectare respectively.

The actual rates of application of Potash were 14.56, 12.66, 10.47, 37.88, 0.00 and 13.15 kgs/hectare for Jowar, Lajra, wheat, Sugarcane, Groundnut and Cotton respectively while recommended rates are 0.00 for Jowar, Lajra, wheat,

Groundnut and 110.00, 40.00 for Sugarcane and Cotton respectively. The actual rates of application of potash were much higher than recommended rates in case of Jowar, Bajra, Wheat and Groundnut because most of the farmers might have used knowingly or unknowingly multinutrient fertilizers with higher potash content merely on the basis of their free availability, as compared to other forms of fertilizers, urgently required for the fertilizer responsive hybrid and high yielding crops grown by them. The Potash application in case of Cotton and Sugarcane is much below the recommended levels. On the basis of this information, it can be said in general that the actual rates of fertilizer application in almost all the crops were much lower than the recommended ones.

5.4 Estimates of fertilizer requirements for the taluka :

The information in table 5.4 gives an idea regarding fertilizer requirement of taluka on the basis of actual rates of application and on the recommended rates.

The statistics in the above table pointed out that the cultivators, in general, were applying fertilizers relatively at a very low rate as compared to the recommended rates.

The shortage of Nitrogen was found to be 53.74, 0.70, 50.85, 95.15 and 48.17 per cent for Jowar, wheat, Sugarcane, Groundnut and Cotton.

Table 5.4 : Cropwise fertilizer estimates according to actual and recommended doses for the taluka.
(quantity in tonnes)

Crops	Fertilizer requirement according to recommended doses										Difference	
	P	F	N	K	P	F	N	K	P	F	P	K
Jowar	64.98	41.66	40.90	140.46	70.23	-	-	-	-75.48 (53.74)	-28.57 (40.89)	40.90	(
Bajra	2.79	1.24	0.96	1.89	1.89	-	-	-	0.90 (48.08)	-0.65 (34.47)	0.96	8
Wheat	138.67	39.55	29.24	139.65	33.52	-	-	-	0.98 (0.70)	6.03 (18.02)	29.24	
Sugarcane	1173.50	411.53	279.87	2881.91	812.72	812.72	812.72	812.72	-1678.41 (50.85)	-401.19 (49.36)	-532.85	(65.56)
Groundnut	0.92	22.08	-	18.88	37.76	-	-	-	-17.96 (95.15)	-15.68 (41.53)	-	-
Cotton	42.09	10.68	20.88	81.20	48.72	32.48	32.48	32.48	-39.11 (48.17)	-77.15 (78.08)	-21.80	(67.12)
Total	1422.93	526.74	361.65	3233.98	1004.83	845.20	845.20	845.20	-1811.04 (66.00)	-527.21 (47.52)	-483.55	(57.21)

(Minus figures indicate shortage and plus figures indicate excess)

(Figures in the bracket indicate percentage shortage or excess to recommended estimates).

Referring to Phosphate estimate it was found that the shortages were in the order of 40.69, 34.47, 49.36, 41.53 and 78.08 per cent in case of Jowar, Bajra, Sugarcane, Groundnut and Cotton respectively.

In case of Potash, shortage of 65.56, 67.12 per cent were found in case of Sugarcane and Cotton while excess utilization occurred in case of Jowar, Bajra and Wheat. Excess consumption of K in case of foodgrains reported due to the use of multinutrient fertilizers because of their easy availability and cultivation of highly responsive to Potash application hybrid and high yielding crop varieties.

Total shortage of N, P and K was found to be to the extent of 66.00 per cent Nitrogen, 47.52 per cent Phosphorus and 57.21 per cent of Potash. The above figures of total difference in recommended rates and actual rates of N, P and K fertilizer application showed that, there is an acute shortage of all fertilizer nutrients in the taluka.

5.5 Co-relation between demand and different factors affecting the same :

For determining the factors affecting ^{demand} for fertilizers, correlation and regression study was undertaken. The independent variables considered were income, area under cash crops and irrigated area under non-cash crops.

a) Correlation analysis study :

Consumption of fertilizers on a farm generally depends on area under different crops and the capital available with a farmer. Hence, relationship between fertilizer consumption

With the important factors such as area under cash crops, irrigated area under non-cash crops and the income of the farmer was studied by employing correlation analysis technique. The values of the correlation co-efficient were worked out for studying the correlation between fertilizer consumption per farm and the three factors and the values are given in table 5.5.

Table 5.5 : Values of correlation co-efficients.

Sr. No.	Relationship between	Values of correlation co-efficients
1	Fertilizer consumption and income	0.90 **
2	Fertilizer consumption and area under cash crops	0.85 **
3	Fertilizer consumption and irrigated area under non-cash crops	0.64 **

* Indicates values significant at 5.00 per cent

** Indicate values significant at 1.00 per cent.

It is observed from above table that, there was high correlation between fertilizer consumption and income and irrigated area (both area under cash and non-cash crops) as the values of correlation co-efficients were 0.90, 0.85 and 0.64 respectively. As regards relationship between fertilizer consumption and area under non-cash crop, it was observed that the value of correlation co-efficient between these two factors was of low order (0.64) though it was highly significant.

b) Multiple correlation and regression analysis :

In many relationship studies a dependable variable is not solely dependable on one independent variable but more than one variable, in such situation it would be appropriate to undertake multiple correlation and regression analysis study. So in order to determine the effect of one independent variable on the dependent variable, eliminating the effect of other independent variables the multiple regression equation of the following type was fitted to the data.

$$Y = a + b_1 \lambda_1 + b_2 \lambda_2 + b_3 \lambda_3$$

where,

Y = fertilizer consumption/farm (dependent variable)

λ_1 = Income

λ_2 = area under cash crops

λ_3 = Irrigated area under non-cash crops

b_1, b_2, b_3 = partial regression co-efficients of $\lambda_1, \lambda_2, \lambda_3$ on Y.

a = Constant term.

The multiple regression equation thus fitted to the data and the value of multiple correlation co-efficients were as follows :

$$Y = 0.02193 + 0.11467 \lambda_1 + 1.63150 \lambda_2 + 0.24387 \lambda_3$$

$$R^2 = 0.9005 \quad S.E. = 0.9937$$

$$R = 0.9489$$

The analysis of variance was worked out for testing the joint effect of partial regression co-efficients on Y showed the calculated value of R^2 (0.9005) was highly

significant. This indicated that a larger part of the variation (90.05 per cent) is explained by the three independent factors together. On separating out the variation explained by each of the independent factors, it was observed that the factors viz. income on a farm, area under cash crop explained 42.25 per cent and 36.65 per cent variation out of the total variation in fertilizer consumption. The variation explained by irrigated area under non-cash crops was the lowest (11.15 per cent) showing thereby the variation in fertilizer consumption was not influenced much by the variation in irrigated area under non-cash crops.

The values of partial regression co-efficients of independent variables on dependent variable and their standard errors are presented in table 5.6.

Table 5.6 : Values of partial regression co-efficients and their standard errors.

Sr. No.	Partial regression due to	Value of partial regression co-efficients	S.E.	t values
1	Income (X_1) in '000 Rs.	0.11467	0.0174	6.59 **
2	Area under cash crops (X_2) in hectares	1.63150	0.2300	7.09 **
3	Irrigation area under non-cash crops (X_3) in hectares	0.24187	0.0727	3.33 *

* Indicates values significant at 5 per cent

** Indicates values significant at 1 per cent.

The results presented in table 5.6 showed that values of partial regression co-efficients of the three independent variables on fertilizer consumption were significant. It also indicated that each of the three independent variables influenced the fertilizer consumption and hence while predicting the quantity of fertilizer consumption on a farm the extent of income on a farm, area under cash crops and irrigated area under non-cash crops are required to be considered. The value of partial regression co-efficient (0.11467) of income on fertilizer consumption indicated that with the increase in income by one unit (Rs.1000) the fertilizer consumption would be increased by 0.11467 quintals of N, P, K while with the increase in one hectare area under cash crop and irrigated area under non-cash crops would increase the fertilizer consumption by 1.6315 and 0.24187 quintals of N, P, K respectively. On comparing the partial regression co-efficients due to area under cash crops and irrigated area under non-cash crops it was observed that the fertilizer consumption was much more higher with increase in area under cash crops as compared with the increase in irrigated area under non-cash crops.

An attempt is made to estimate the consumption of fertilizers in the taluka as a whole by projecting the fitted consumption function. The figures in respect of total irrigated area under cash crops and non-cash crops for the taluka are made use of for this purpose. However, statistics of

gross income of all the cultivators having irrigated area, were not available. The gross income is therefore estimated on the basis of average gross income of the sample farmers. The number of cultivators having irrigated area in the taluka is worked out by dividing total irrigated area by the average irrigated area per farm of the sample cultivators.

The consumption function as projected for the taluka becomes

$$Y = 0.02183 (4528) + 0.11467 \times 60368 + 1.6315 \times 8275 \\ + 0.24187 \times 8333.$$

Thus, the projected demand for the year 1973-74 worked out to 22546.39 quintals of A, B and C. This is almost equal to the actual consumption of A, B and C in the taluka during the same year.

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CHAPTER VI

**FERTILIZER MARKET ARRIVALS, DISPOSALS,
STRUCTURE AND COSTS**

CHAPTER VI

FERTILIZER MARKET ARRIVALS, DISPOSALS, STOCKS AND COSTS

6.1 Arrival of straight, complex and mixed fertilizers in sample societies :

It is revealed from table 6.1 that, straight fertilizers, complex fertilizers and mixed fertilizers were purchased of the value of Rs. 1,82,913.62, Rs. 2,32,055.50 and Rs. 4,67,055.00 respectively.

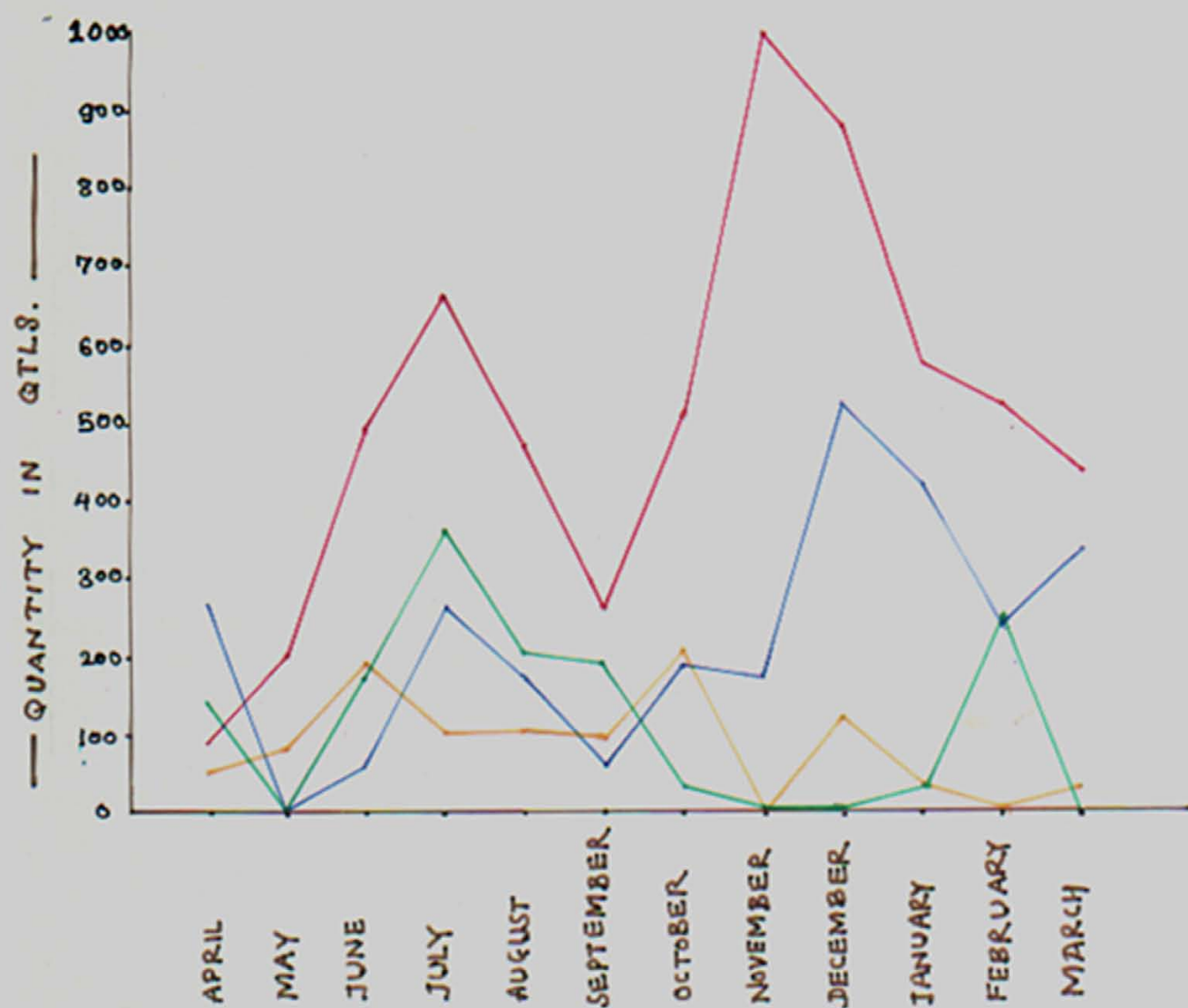
Largest quantities of Urea were arrived during July followed by February, August, September and June. This happened because of greater demand for Urea due to its highest N content and noticeable growth effect in the initial crop growth period and in general for other fertilizers in this group, during these months for fertilizing kharif and rabi crops and January planted sugarcane.

While in case of Suphala arrival was highest during December followed by January, March, April and July because larger quantities of fertilizers are required to give basal doses of January planted sugarcane as well as June planted sugarcane and other kharif crops.

In case of mixed fertilizers highest quantities were arrived during November followed by December, July, January, February and June. Purchases were found to be highest during November because of non-availability of straight and complex fertilizers. In general, it is observed that larger quantities of mixed fertilizers were arrived during all months due to non-availability of straight and complex fertilizers.

FIG. 5

MONTHWISE ARRIVAL OF FERTILIZERS

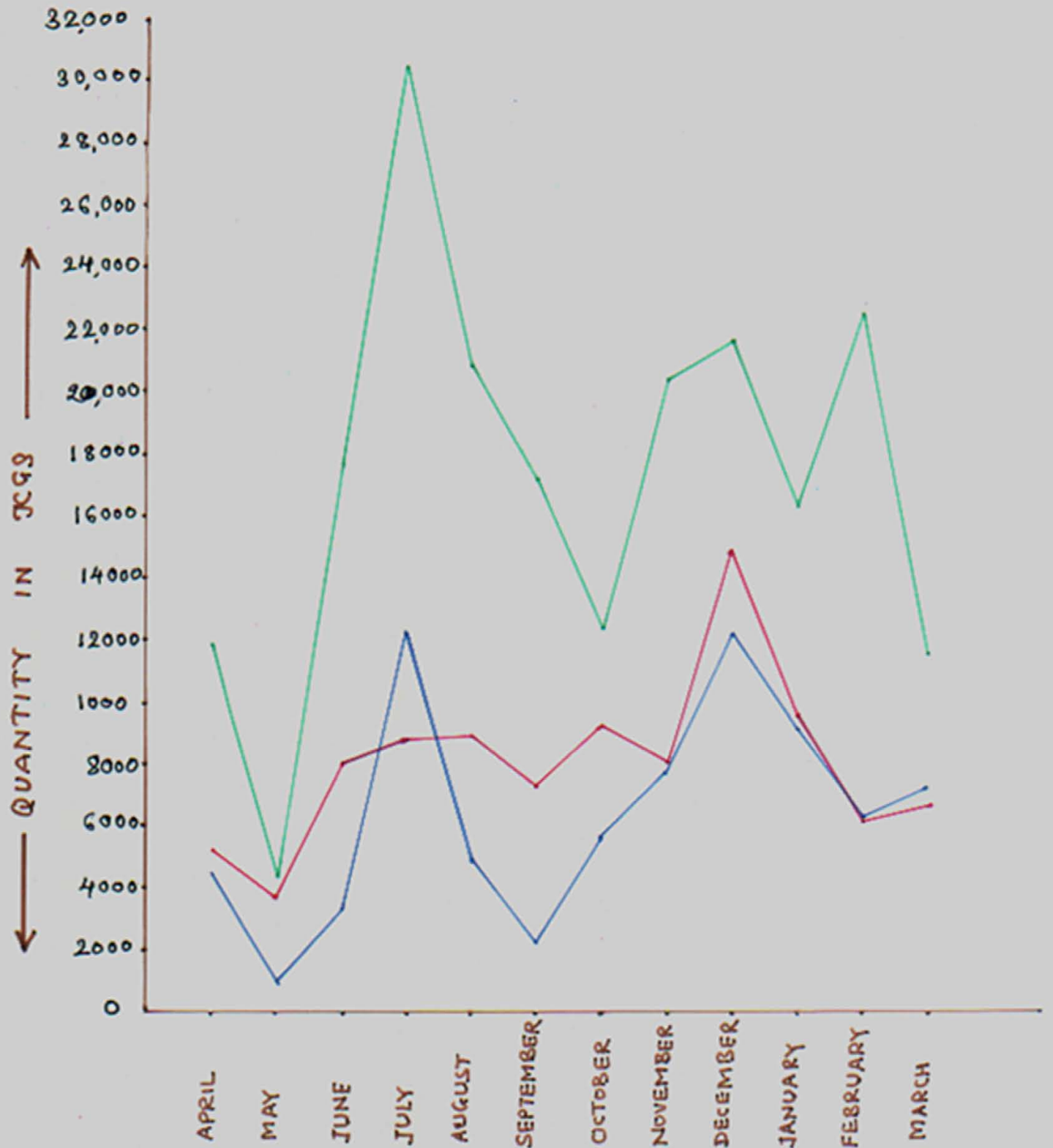


REFERENCE:

- Mixture
- Urea
- Suphala
- Superphosphate

FIG. 6

MONTHWISE ARRIVAL OF N. P. K



REFERENCE :

- NITROGEN
- PHOSPHORUS
- POTASH

6.2 Disposals of straight, complex and mixed fertilizers in sample societies :

It is observed from table 6.2 that the disposals of straight, complex and mixed fertilizers were of the value of Rs. 195706.70, 333713.63 and 517961.06 respectively.

In case of Urea largest quantity was disposed off during July followed by June, September and February due to the reasons mentioned under arrival of straight fertilizers and also due to the seasonal demand for fertilizers. More or less same trend is observed in case of Superphosphate.

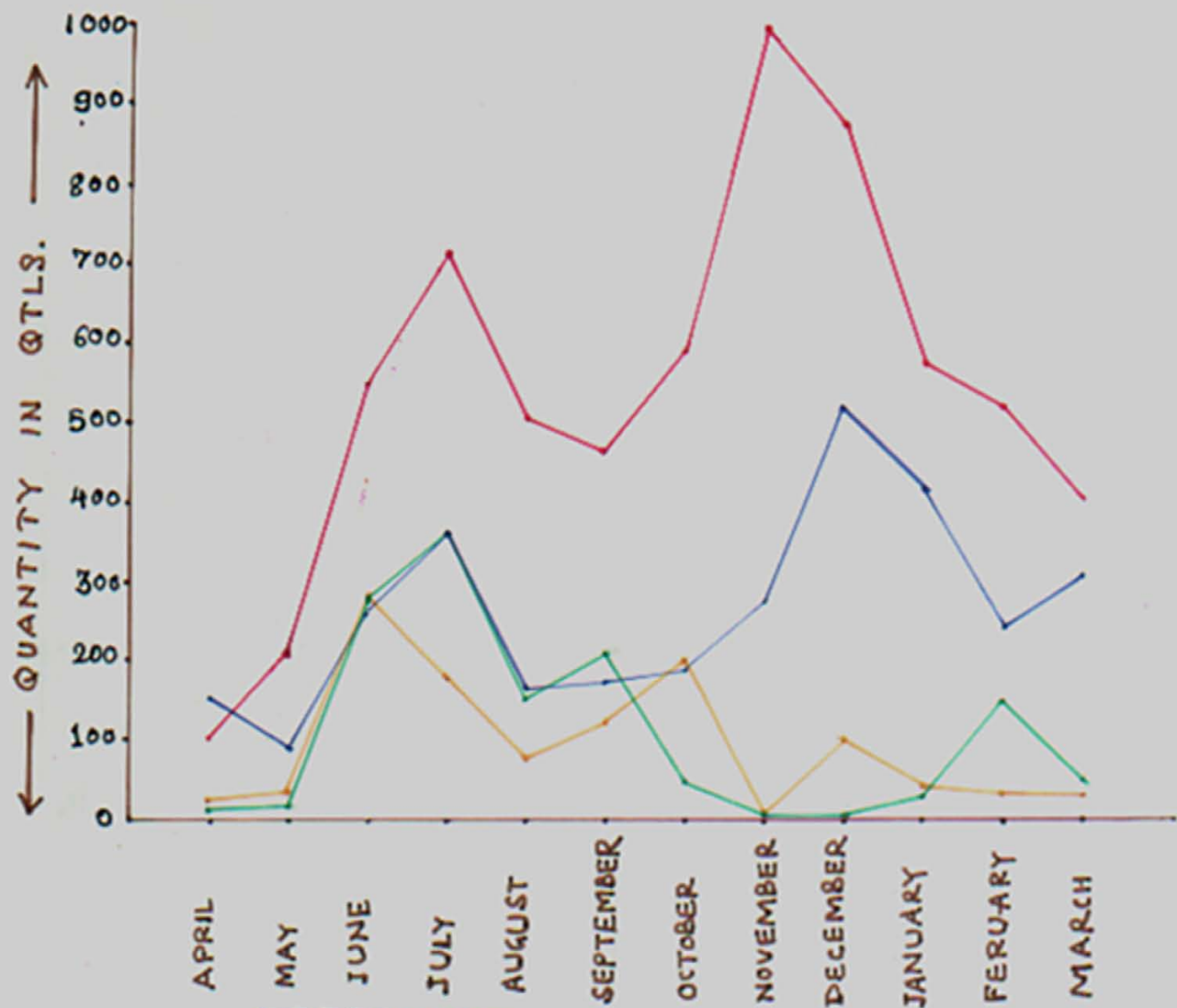
Largest quantities of Suphala were disposed off during December followed by January, July etc. Largest quantities of Suphala were disposed off during December because supply of straight fertilizers was scarce while demand was more for January Sugarcane plantation.

Disposal of mixed fertilizers was highest during November followed by December, July etc. Largest quantities of mixed fertilizers were disposed off during November. This highest disposal of these fertilizers can be attributed to relatively short supply of straight and complex fertilizers during November. The greater fertilizer demand was observed to be maximum in the month of July because basal dose is generally to be applied to all Kharif crops as well as Sugarcane crop sometime during this period.

Monthwise spread of disposal showed that the value of disposed fertilizers was highest during July followed by December, November, June etc. This phenomenon was observed because most of the Kharif crops were fertilized during

FIG. 7

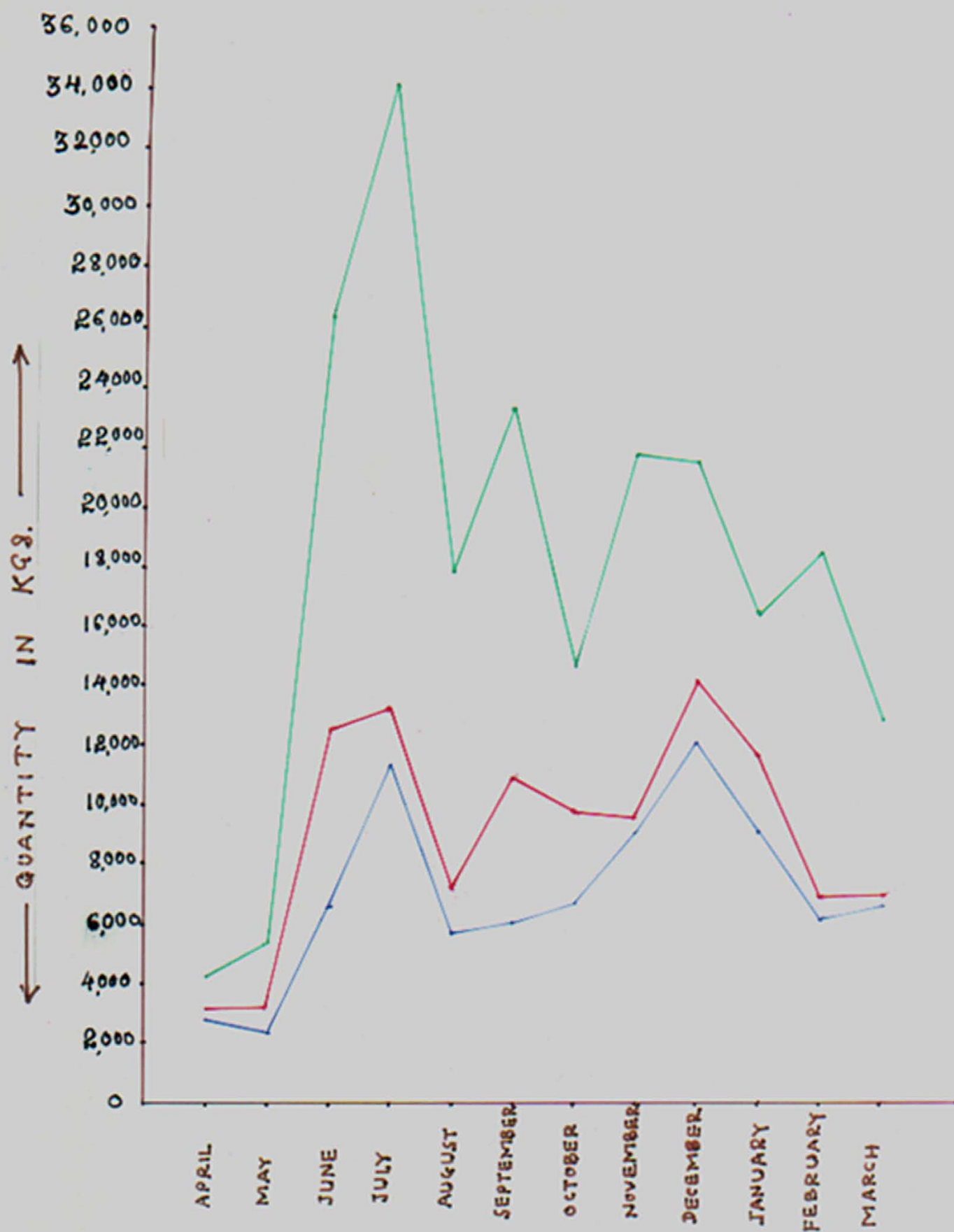
MONTHWISE DISPOSAL OF FERTILIZERS



REFERENCE:

- MIXTURE
- UREA
- SUPHALA
- SUPERPHOSPHATE

FIG. 8
MONTHWISE DISPOSAL OF N, P, K.



REFERENCE:

- NITROGEN
- PHOSPHORUS
- POTASH

June and July while rabi crops were fertilized during November and January planted Sugarcane required basal dose during December.

Total quantity of N, P, K disposed off was highest in July followed by December, June and November.

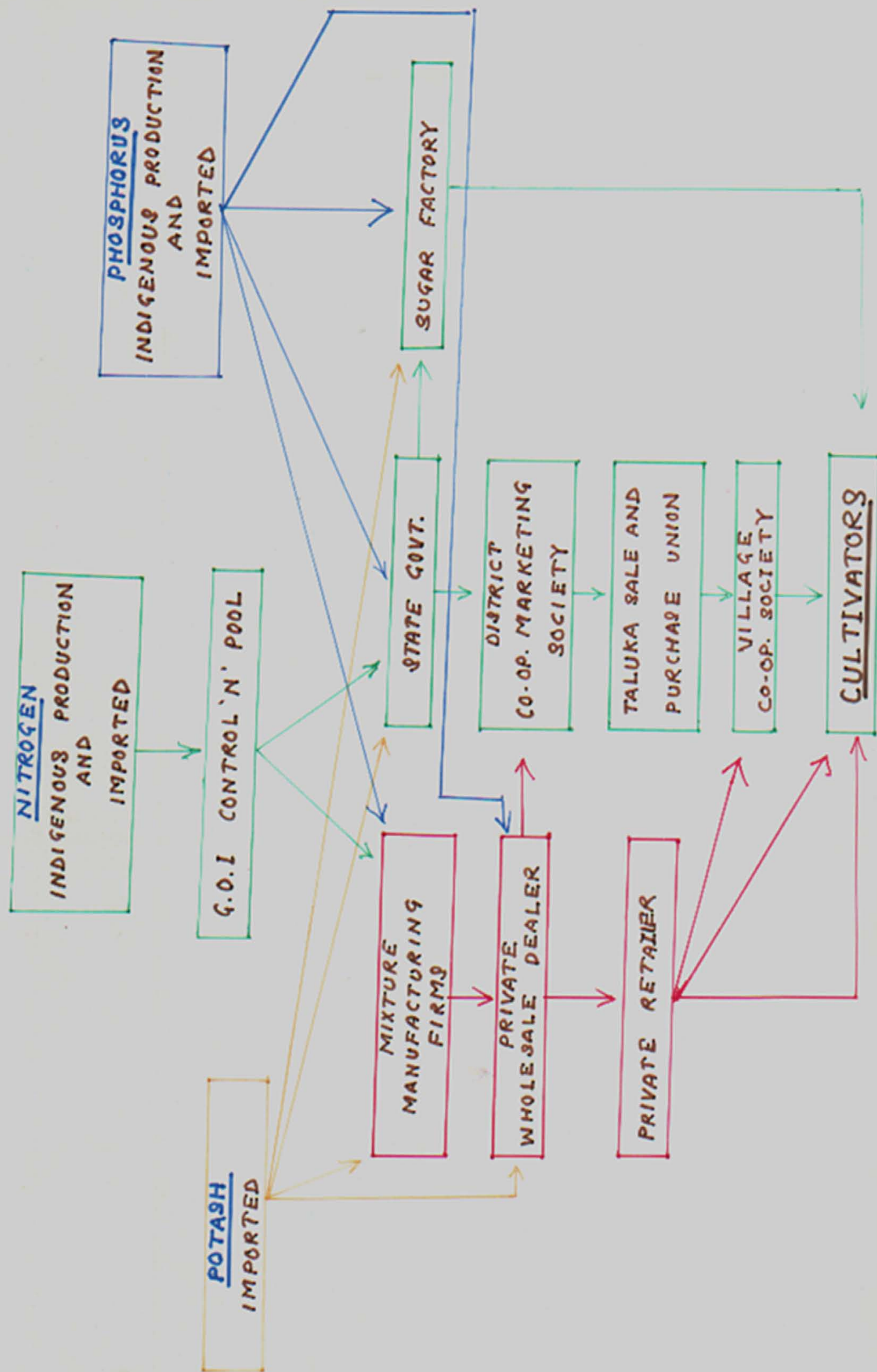
Further it was revealed from the table that total value of disposed off fertilizers was more in November than in June while total quantity of N, P, K disposed was more in case of June than in November. This was because of comparatively more supply of mixed fertilizers during November and their higher price per unit of nutrient than that of straight fertilizers. Farmers, therefore, always preferred to get straight fertilizers followed by complex fertilizers and mixed fertilizers.

6.3 Structure of fertilizer market :

Before 1966, the distribution of domestically produced nitrogenous fertilizers and imported fertilizers was a government monopoly at the national level. At the state level, the State Government indented their fertilizer requirements from the Central Fertilizer Pool which allocated fertilizers to different states according to supplies available. The State Governments distributed fertilizers either through a co-operative agency or a government agency. In Ahmednagar district nitrogenous fertilizers were distributed through co-operative agencies as well as private dealers. The District Co-operative Marketing Society was the wholesale distributor of the nitrogenous fertilizers in

FIG. 9

CHANNELS OF FERTILIZER DISTRIBUTION



the district. It distributed fertilizers through taluka co-operative purchase and sale unions and finally through village co-operative societies. As far as the distribution of complex and mixed fertilizers such as Cuphaia, 15:5:5 was concerned, these fertilizers were sold on free (uncontrolled) sale basis. However, in Bahuri taluka the distribution of these fertilizers was also mostly in the hands of Co-operative Societies.

A channel of all types of fertilizer distribution is diagrammatically shown by the chart No. 9. There are many channels of distribution of fertilizers. However, in Bahuri taluka, co-operative sector dominated the private sector in the field of fertilizer distribution. Most of the farmers met their fertilizer requirements by purchasing the same from Village Co-operatives. Village Co-operative Societies in turn obtained the fertilizers from taluka Co-operative purchase and sale union and private dealers too. Occasions of acute fertilizer scarcity compelled the cultivators to meet their demands by purchasing them at extra-ordinarily high price from private dealers in the locality.

6.4 Cost of marketing of fertilizers :

It is a common experience that marketing of manufactured goods is less expensive than marketing of agricultural products on account of certain peculiar features which manufactured products possess. As fertilizer is only one of them it has to move from the producer to the consumer in order to meet the demand of the consumers. The process of

moving the produce from producer involves a number of functions such as transport, storage, distribution etc. Each functionary has to receive the remuneration for the services rendered by it. The cost of marketing of fertilizers, in this context, includes cost of transport, haulage, storage, loss during handling etc. Marketing cost is generally measured by the difference of price received by its producer or seller or owner, and the price paid for it by the final buyer. The element of profit payable to a middleman engaged in marketing process, must also be considered as an expense if the middleman is to continue in that business and undertake marketing activities. As the study is restricted to the taluka level the cost of marketing in this investigation is worked out at this level only.

The study of cost of marketing enable to know as to which intermediary agencies intervene between the producer and final consumer, the services rendered by them and the remuneration received on this account. Further, it also throws some light regarding the necessity of their existence in the market. Detail study of cost of marketing may help to suggest the ways and means of reducing the same.

(a) Itemwise distribution of cost of fertilizer marketing :

The information on various items of cost of fertilizer distribution was collected from the selected Co-operative societies. On the basis of this data, cost of marketing per tonne is worked out and presented as itemwise distribu-

tion of cost of straight, complex and mixed fertilizers and is given in table 6.3.

Table 6.3 : Itemwise cost of marketing of different types of fertilizers (per tonne).

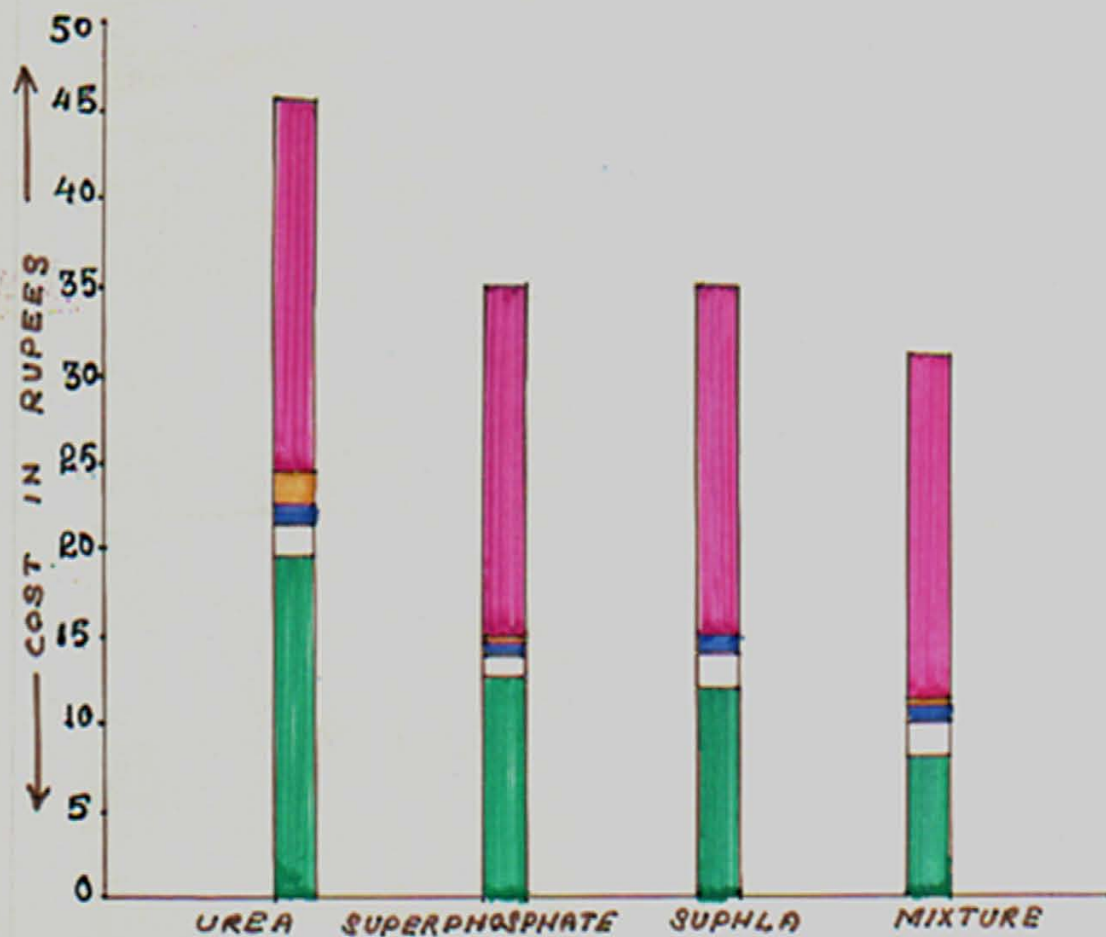
Sr. No.	Particular	Straight		Complex	Mixed
		Urea	Super-phosphate	Duphala	15:15:15
1	Average purchase price	956.20 (95.49)	432.00 (92.51)	891.16 (96.23)	743.80 (96.04)
2	Total cost of marketing	45.13 (4.21)	35.00 (7.97)	34.90 (3.77)	30.90 (3.96)
	a) Transport	19.50 (1.95)	12.50 (2.66)	12.00 (1.29)	3.00 (1.03)
	b) Casual	1.88 (0.19)	1.25 (0.27)	1.90 (0.21)	1.70 (0.22)
	c) Storage	1.00 (0.10)	1.00 (0.21)	1.00 (0.11)	1.00 (0.13)
	d) loss during handling	1.75 (0.17)	0.25 (0.05)	-	0.20 (0.02)
	e) Margin	21.00 (2.10)	20.00 (4.28)	20.00 (2.16)	20.00 (2.56)
3	Average selling price	1001.33 (100.00)	467.00 (100.00)	926.06 (100.00)	779.70 (100.00)

(Figures in the brackets indicate percentages to selling price).

It is observed from the table that per tonne expenditure incurred in bringing different types of fertilizers either from the points of production or whole-sale dealers in different big cities varied from Rs. 3.00 to Rs. 19.50. The maximum expenditure on this account was observed to be Rs. 19.50 in case of Urea followed by Rs. 12.50 (Superphosphate) Rs. 12.00 (Duphala) and Rs. 3.00 (Mixed).


FIG. 10

COST OF MARKETING OF DIFFERENT TYPES OF FERTILIZERS.



: REFERENCE :

 - TRANSPORT

 - STORAGE

 - HAMALI

 - LOSS DURING HANDLING

 - MARGIN

respectively. The variation in transport cost in different types of fertilizers may be attributed to the distance from which they are required to be transported. The variation in distance may exist because of all the types of fertilizers are not equally available at the same market place. Moreover, the demand for different fertilizers vary depending on it's effect on the crop growth, technical recommendations and their availability in the nearby market.

The percentage share of average selling price on this item of marketing cost was worked out to be 1.95, 2.68, 1.29 and 1.63 in case of Urea, Superphosphate, sulphur and Mixtures respectively. The figures in the table showed that transport consumed proportionately large expenditure in the total market cost of all types of fertilizers next to the item of profit margin of the Co-operative Society.

Profit margin earned by the Co-operative Societies during the process of marketing found to be the another highest cost item of fertilizer marketing. This was found to be per unit more or less same i.e. about Rs. 20.00 per tonne. The proportion of profit margin, however, ranged from 2.16 to 4.28 per cent of the average selling price. This was mainly because of the difference in the per unit purchase and sale price of the different types of fertilizers.

The amount per tonne spent on handling, storage and loss during handling together was calculated as Rs. 4.63, Rs. 2.50, Rs. 2.90 and Rs. 2.90 in case of Urea, Superphosphate, sulphur and Mixtures respectively. These items, therefore, can be said as very minor items of market cost in case of all

types of fertilizers in the total cost of marketing, if compared with that of transport and profit margin.

The total cost of marketing per tonne of different fertilizers was worked out to Rs. 45.13, Rs. 35.00, Rs. 34.90 and Rs. 30.90 in case of Urea, Superphosphate, Sulfala and Mixtures respectively. The cost of marketing per tonne of Urea was relatively higher than other types. This was perhaps because of the proportionately more expenditure on transport of Urea for the reasons explained under the item of transport. The variation in total cost of marketing of Superphosphate, Sulfala and Mixtures was quite insignificant. The percentages of total cost of marketing, however, were found to be more or less same.

The cost of marketing per tonne of nutrient, on the basis of N, P and K contents in different types of fertilizers, was also worked out. It was found that the marketing cost per tonne of nutrients was lowest (Rs. 77.56) in case Sulfala followed by Urea (Rs. 98.10), Mixture (Rs. 123.60) and Superphosphate (Rs. 218.75) respectively. The difference in the cost of marketing on the basis of nutrient contents may be due to the variations in the nutrient contents. (N, P and K contents) in different types of fertilizers.

This finding would suggest the policy makers and fertilizer manufacturers for undertaking the production of those fertilizers having high nutrient contents only. This would certainly bring down the cost of marketing per unit of nutrient and ultimately increase the farm profits of the cultivators.

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CHAPTER VII
PROBLEMS OF MARKETING

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PROBLEMS OF MARKETING

7.1 Problems faced by co-operative societies :

Problems of untimely and inadequate fertilizer supply, availability of adequate capital and marketing malpractices such as black marketing etc. of the sample societies were studied through discussion with the secretary of each society. The various problems being faced by co-operative societies were categorized and the number of societies facing each category of problem is given in table 7.1.

Table 7.1 : Problems faced by co-operative societies.

Sr. No.	Nature of problem	Number of societies facing the problem
1	Untimely supply	5 (100.00)
2	Inadequate supply	5 (100.00)
3	Non-availability of desired fertilizers	1 (20.00)
4	Inadequate and untimely finance	1 (20.00)
5	Black marketing	1 (20.00)

(figures in the bracket indicate percentages to the total number of societies).

Among the various difficulties experienced by co-operative societies, untimely supply, inadequate supply, non-availability of desired fertilizers, inadequate and

untimely finance, black marketing were reported to be the most important.

All the selected co-operative societies complained for having received the fertilizers not in time and in required quantities. Twenty per cent of the societies complained that desired fertilizers were not available, finance was inadequate and untimely and existence of malpractices in the form of black marketing. One co-operative society purchased urea at the rate of Rs. 123 per quintal from the private dealer by black marketing. The main reason for this was the acute shortage of the Urea.

7.2 Problems faced by cultivators :

Problems of sample farmers were also studied through discussion with each farmer. The various problems faced by the farmers were categorised and the number of farmers facing each category of problem is given in table 7.2.

Among the various difficulties experienced by the farmers, untimely and inadequate supply, inadequate irrigation, inadequate finance, high prices, poor quality, lack of technical know how etc. were the most important. The problem of untimely and inadequate supply of fertilizers was reported by 84.21, 90.49 and 75.00 per cent cultivators of small, medium and large size groups respectively. The problem of inadequate irrigation was faced by 37.47, 14.29 and 25.00 per cent of small, medium and large size cultivators respectively.

Table 7.2 : Problems faced by sample farmers in obtaining fertilizers.

Sr. No.	Diffi- culty experi- enced	Size group	Small holdings	Medium holdings	Large holdings	Overall
1	Untimely ferti- lizer supply		32 (84.21)	19 (90.48)	6 (75.00)	57.00 (85.07)
2	Inadequate fer- tilizer supply		32 (84.21)	19 (90.48)	6 (75.00)	57.00 (85.07)
3	Inadequate irri- gation		15 (39.47)	3 (14.29)	2 (25.00)	20.00 (29.85)
4	Inadequate finance		16 (42.11)	2 (9.52)	3 (37.50)	21.00 (31.34)
5	Fertilizer prices					
	a) Very high		7 (18.42)	2 (9.52)	3 (37.50)	12.00 (17.91)
	b) High		30 (78.95)	19 (90.48)	5 (62.50)	54.00 (80.60)
	c) Moderate		1 (2.63)	-	-	1.00 (1.49)
6	Poor quality of fertilizer					
	a) Urea		-	-	-	-
	b) Mixtures		4 (10.53)	4 (19.05)	-	8.00 (11.94)
7	Lack of technical know how					
	a) Recommended doses		24 (63.16)	11 (52.38)	5 (62.50)	40 (59.70)
	b) Balanced fertilization		32 (84.21)	16 (76.19)	6 (75.00)	54.00 (80.60)

(Figures in the brackets indicate percentages to the total farmers in each size group).

About 42.11, 9.52 and 37.50 per cent of farmers faced the difficulty of inadequate finance in small, medium and large size groups respectively. The complaint of very high prices of fertilizers was reported by 18.42, 9.52 and 37.50 per cent in small, medium and large size groups respectively and complaint about high prices was in the order of 78.95, 90.48 and 62.50 per cent respectively. The problem of poor quality in case of Urea was not reported by any cultivator, however, in case of mixtures, 10.53 and 19.05 per cent of small and medium size group cultivators reported this problem. The absence of technical know how in the form of not knowing the recommended doses of fertilizer application was reported to be 63.16, 52.38 and 62.50 per cent small, medium and large cultivators respectively. The knowledge of balanced fertilization was not known to 84.21, 76.19 and 75.00 per cent cultivators in case of small, medium and large size groups respectively.

7.3 Factors affecting the fertilizer use :

Attitude towards using fertilizers on the farm of different event categories of farmers is also one of the important aspect to be considered while analysing the problems of the fertilizer marketing. Out of the 46 small sized cultivators 8 cultivators were found to be non-users of fertilizers due to lack of irrigation facilities, while in case of medium and large size groups all the cultivators were fertilizer users.

a) Year of adoption :

The size groupwise detailed information regarding the number of fertilizer users and the years of adoption is briefed in table 7.3.

Table 7.3 : Year of adoption of fertilizers by sample cultivators.

Year	Size group	Small holdings	Medium holdings	Large holdings	Overall
Before 1955		5 (5.26)	-	-	2 (2.99)
1956-60		5 (13.16)	2 (9.52)	1 (12.50)	8 (11.94)
1961-65		7 (18.42)	2 (4.76)	1 (12.50)	9 (13.43)
1966-70		9 (23.60)	9 (42.36)	4 (50.00)	22 (32.84)
After 1971		15 (39.47)	9 (42.86)	2 (25.00)	26 (38.81)

(Figures in the bracket indicate percentages to number of adapters of respective size group).

It is revealed from the table that out of 30 cultivators in small group, 2 cultivators started fertilizer use before 1955. Small farmers were observed to be comparatively early adopters. This may be due to intensive cultivation practices followed by small farmers. The figures in the table further showed that the number of fertilizer adopters increased, in general, after 1955. The popularity of fertilizer use has increased with the passage of time mainly because of agricultural development activities started by the state during

different five year plans. The number of fertilizer adopters were relatively more in all the size groups of holdings particularly during the period of 1966-70. This was mainly because of implementation of high yielding varieties programme in the state.

b) Profitability of fertiliser application to different crops :

The extent of use of any farm input is determined by its profitability. The sample cultivators were asked about the profitability of fertilizer application to sugarcane and foodgrain crops. Their general opinion regarding profitability is presented in Table 7.4.

Table 7.4 : Profitability of fertilizer application to different crops.

Size group	Sugarcane			Foodgrains		
	High Profit	Medium profit	Low profit	High profit	Medium profit	Low profit
Small holdings	35 (92.11)	3 (7.89)	-	8 (21.05)	29 (76.32)	1 (2.63)
Medium holdings	21 (100.00)	-	-	3 (14.29)	17 (80.95)	1 (4.76)
Large holdings	6 (75.00)	2 (25.00)	-	1 (12.50)	6 (75.00)	1 (12.50)
Overall	62 (92.54)	5 (7.46)	-	12 (17.91)	52 (77.61)	3 (4.48)

(Figures in the bracket indicate percentages to total number of cultivators of respective size group).

Among small size group 92.11 per cent cultivators reported high profitability of fertilizer application to sugarcane and 7.89 per cent reported medium profitability

to the same crop. On the other hand, in case of foodgrains the profitability reported was 21.95, 76.32 and 2.63 per cent in the order of high, medium and low profitability in the same size group of cultivators respectively.

In the medium size group cent per cent cultivators were in the group of high profitability of fertilizer application to sugarcane. The percentages reported in case of foodgrains were 14.29, 80.95 and 4.76 indicating high, medium and low profitability respectively.

However, in large size group 75.00 and 25.00 per cent farmers reported high and medium profitability of fertilizer application to sugarcane and 12.90, 75.00 and 12.50 per cent cultivators reported high, medium and low profitability of fertilizer application to foodgrains.

The cultivators' opinion of profitability from all the size groups, in general, showed that sugarcane was high profit earning crop.

Further, the cultivators' opinion concluded that more than 3/4th cultivators (78.39 per cent), in general, observed medium profitability in case of foodgrains. Less than 1/4th (17.91 per cent) cultivators expressed high profitability in this respect.

Relatively high profitability in case of sugarcane can be attributed to the stable sugarcane price mechanism and other incentives and concessions given to sugarcane growers by the co-operative sugar factories in this region.

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CHAPTER VIII
SUMMARY AND CONCLUSIONS

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The distribution of fertilizers assumes a vital significance when we visualise that by 1979-80, the distribution of fertilizers will be of the magnitude of 11 million tonnes involving an expenditure of the order of Rs. 1500 million in distribution alone. To be able to sell these quantities of fertilizers to the large number of cultivators throughout India, the fertilizer marketing organizations have to strengthen themselves to meet the challenge.

With the spread of modern scientific farming and increased demand for agricultural production, consumption of fertilizers expected is at a very fast rate in the near future. This situation calls for necessary marketing machinery to move the product from the plant to the farmer. Indian fertilizer market is complex in nature due to seasonal sales, large number of illiterate farmers and large market area with few production centres. A very little attention, so far, has been paid to evaluate the present marketing agencies. Therefore an attempt in this study, has been made to identify the problems pertaining to supply of and demand for fertilizers, factors affecting demand for fertilizer, cost of marketing, problems faced by cultivators and co-operative societies etc. The study was undertaken with the objectives viz.

- 1) To work out demand estimate for fertilizers in the taluka as a whole.

- 2) To study channels of distribution.
- 3) To study the cost of marketing of fertilizers.
- 4) To identify problems faced by cultivators.

The design for selection of sample adopted was two stage stratified random sampling with village co-operative society as a primary unit and member cultivator as a secondary unit. Five co-operative societies dealing with fertilizer marketing were selected randomly. While selecting sample cultivators, the total population was divided into three size groups viz. small, medium and large, on the basis of probability proportion of holding size. A total sample of 75 cultivators was randomly selected on the basis of proportionate weightage from respective size group. Taking into consideration the limitation of time and other resources survey method was used for collection of data.

The findings of the study are summarized below :-

The rate of fertilizer application has increased in case of foodgrain crops, whereas the same has been decreased in case of sugarcane and Cotton during 1973-74. This may be due to Government encouragement and greater emphasis on the production of foodgrain crops to that of cash crops like sugarcane and Cotton with an objective to meet the food deficit arising during recent scarcity period. The overall rates of application of Nitrogen were increased by 2.42, 12.62, 2.08, 0.97 and 6.45 kgc per hectare in case of Cow P, Bajra, wheat, Groundnut and Cotton respectively during 1973-74 while

in case of Sugarcane it was decreased by 1.26 kg per hectare during 1973-74. The overall rates of phosphorus application were increased by 2.14, 7.92, 0.59, 0.38, 0.86 kgs per hectare in case of Jowar, Bajra, Wheat, Sugarcane and Groundnut respectively while it was decreased by 2.90 kgs per hectare in case of cotton. More or less same trend was observed in case of potashic fertilizers.

In case of large size group the rate of Nitrogen application is increased in all crops except Bajra while the rate of phosphorus application is decreased in all crops except Bajra. The same trend is observed in case of potash. This clearly indicates that large farmers are in a position to buy high cost black marketed fertilizers required for the production of cash crops like Sugarcane and Cotton and thereby indirectly creating bottlenecks in implementing more food-grain production policy of the Government. On an average medium sized holdings consumed more fertilizers per hectare than small and large holdings. There was no much difference in fertilizer consumption between small and large sized holdings during 1972-73. The proportion of area fertilized has significantly increased in case of foodgrain crops like Jowar, Bajra, Wheat etc. in all size groups. Sugarcane and Cotton being the only cash crops of this region, area fertilized was observed to be almost cent per cent.

The total demand for N, P, K for the year 1972-73 for the whole taluka was worked out to be 1413818.93, 521201.84 and 365570.19 kgs respectively, while it was calculated to

1422931.56, 536735.27 and 361645.18 kgs respectively during 1973-74. The actual rates of Nitrogen application were 23.13, 37.02, 49.65, 158.83, 0.97 and 51.83 kgs per hectare for Jowar, Bajra, wheat, Sugarcane, Groundnut and Cotton respectively while recommended rates are 50.00, 25.00, 50.00, 386.00, 20.00 and 100.00 kgs per hectare respectively. The actual rates of phosphorus application were found to be 16.66, 19.38, 14.60, 55.70, 23.39 kgs per hectare for Jowar, Bajra, wheat, Sugarcane, Groundnut and Cotton respectively while recommended rates are 25.00, 25.00, 12.00, 110.00, 40.00, 60.00 kgs per hectare respectively. The actual rates of application of Potash were 14.56, 12.66, 10.47, 37.88, 0.00 and 13.15 kgs per hectare for Jowar, Bajra, wheat, Sugarcane, Groundnut and Cotton respectively while recommended rates are 0.00 for Jowar, Bajra, wheat, Groundnut and 110.00, 40.00 for Sugarcane and Cotton respectively. The total shortage of N, P and K for the taluka was found to be to the extent of 66.00 per cent Nitrogen, 47.52 per cent Phosphorus and 57.21 per cent of Potash. The correlation and multiple regression analysis showed that income, area under cash crops and irrigated area under non-cash crops were the important factors which affect demand for fertilizers.

Largest quantities of Urea were arrived during July followed by February, August, September and June while in case of Sulphala arrival was highest during December followed by January, March, April and July. In case of mixed fertilizers arrival was highest during November because of

non-availability of straight and complex fertilizers. In case of urea largest quantity was disposed off during July followed by June, September and February due to its highest Nitrogen content and noticeable growth effect in the initial crop growth period and seasonal demand. Largest quantities of Dapchala were disposed off during December because supply of straight fertilizers was scarce while demand was more due to January Sugarcane plantation. The greater fertilizer demand was observed to be maximum in the month of July because basal dose is generally to be applied to all Kharif crops as well as Sugarcane crop sometime during this period. The total value of disposed off fertilizers was more in November than in June while total quantity of N, P, K disposed was more in case of June than in November. This was because of comparatively more supply of mixed fertilizers during November and their higher price per unit of nutrient than that of straight fertilizers. Farmers, therefore, always preferred to get straight fertilizers followed by complex fertilizers and then mixed fertilizers.

In Ahmednagar district nitrogenous fertilizers were distributed through co-operative agencies as well as private dealers. The District Co-operative Marketing Society was the wholesale distributor of the nitrogenous fertilizers in the district. It distributed fertilizers through taluka co-operative purchase and sale unions and finally through village co-operative societies. As far as the distribution of com-

plex and sized fertilizers such as Suphala, 15:5:5 was concerned, these fertilizers were sold on free (uncontrolled) sale basis. However, in Bahuri taluka, the distribution of these fertilizers was also mostly in the hands of co-operative societies.

Among all cost items of fertilizer marketing, the expenditure per tonne on account of transport was observed to be Rs. 19.50 in case of Urea followed by Rs. 12.50 (Superphosphate) Rs. 12.00 (Suphala) and Rs. 8.00 (Mixtures) respectively. The variation in transport cost in different types of fertilizers may be attributed to the distance from which they are required to be transported. The profit margin earned by the co-operative societies during the process of marketing was found to be per unit more or less same i.e. about Rs. 20.00 per tonne. The amount per tonne spent on cartage, storage and loss during handling together was Rs. 4.63, Rs. 2.50, Rs. 2.90 and Rs. 2.90 in case of Urea, Superphosphate, Suphala and Mixtures respectively. The total cost of marketing per tonne of different fertilizers was worked out to Rs. 45.13, Rs. 35.00, Rs. 34.90 and Rs. 30.90 in case of Urea, Superphosphate, Suphala and Mixtures respectively. The marketing cost per tonne of nutrients was lowest (Rs. 77.56) in case of Suphala followed by Urea (Rs. 98.10), Mixture (Rs. 123.60), and Superphosphate (Rs. 218.75) respectively. The difference in the cost of marketing on the basis of nutrient contents may be due to the variations in the nutrient contents (N, P and K contents) in different

types of fertilizers.

All the sample co-operative societies complained for having received fertilizers not in time and in required quantities. Twenty per cent societies complained that desired fertilizers were not available, finance was inadequate and untimely and existence of malpractices in the form of black marketing.

The problem of untimely and inadequate supply of fertilizers was reported by 84.21, 90.48 and 75.00 per cent cultivators of small, medium and large size groups respectively. The problem of inadequate irrigation was faced by 39.47, 14.29 and 25.00 per cent of small, medium and large size cultivators respectively. About 42.11, 9.52 and 37.50 per cent of farmers faced the difficulty of inadequate finance in small, medium and large size groups respectively. The complaint of very high prices of fertilizers was reported by 18.42, 9.52 and 37.50 per cent in small, medium and large size groups respectively and complaint about high prices was in the order of 78.95, 90.48 and 62.50 per cent respectively. The problem of poor quality in case of Urea was not reported by any cultivator, however in case of mixtures, 10.53 and 19.05 per cent of small and medium size group cultivators reported this problem. The absence of technical know how in the form of not knowing the recommended doses of fertilizer application was reported to the extent of 63.16, 52.38 and 62.50 per cent by small, medium and large cultivators respectively. The knowledge of balanced fertilization was not

known to 84.21, 76.19 and 75.00 per cent cultivators in case of small, medium and large size groups respectively.

CONCLUSIONS :

1) During the scarcity period of 1971-73 the rate of fertilizer application, in general, increased in case of food-grain crops over cash crops.

2) On an average medium sized holdings consumed more fertilizers per hectare than small and large holdings.

3) The total shortage of N, P and K on the basis of difference between the recommended doses and actual application, for the taluka was found to the extent of 66.00 per cent Nitrogen, 47.52 per cent phosphorus and 57.21 per cent Potash.

4) As the basal dose of fertilizer for all the kharif crops and sugarcane is generally applied in the month of July, the highest demand for all types of fertilizers recorded in this month.

5) Because of the non-availability of straight fertilizers, farmers bought mixed fertilizers in large quantities during November eventhough their prices were comparatively higher.

6) Co-operatives play a dominant role in the distribution of fertilizers in Ahmednagar district.

7) Transport was the most costly item in fertilizers marketing.

8) The average profit margin earned by co-operative societies amounted to Rs. 20.00 per tonne of fertilizer.

9) A general complaint of not getting the fertilizers in required quantities and intime alongwith the existance of black marketing practices was reported by co-operative societies as well as individual farmers.

SUGGESTIONS :

While studying the problem it was observed that the cultivators from all size groups as well as cooperative societies had to face number of difficulties. In order to achieve the economic uplift of these cultivators, the difficulties coming in the way can not be neglected. It is intended here to give some suggestions which will be of some use while tackling the problem of fertilizer marketing at national, state and village level.

1) The Government should give more emphasis on starting of short term or long term fertilizer production plants both in public and private sectors immediately to overcome the shortage of fertilizers particularly of Nitrogenous fertilizers.

2) The cultivators may be induced and encouraged for more use of Farm Yard Manure, Green Manure and Compost through effective Agricultural Extension Service. This will help to meet the fertilizer shortage to some extent during the present fertilizer crises.

3) The village co-operative societies should purchase fertilizers well in advance before the application to the crop so as to facilitate timely supply.

4) The fertilizer manufacturers should undertake the production of those fertilizers having high nutrient contents which would certainly bring down the cost of marketing per unit of nutrient and ultimately increase the farm profits of the cultivators.

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APPENDIX

APPENDIX A

Formulas in correlation analysis

1. Simple correlation coefficients :

$$A) \quad r_{YA_1} = \frac{\sum YA_1 - \frac{\sum Y \sum A_1}{n}}{\sqrt{\left\{ (\sum Y^2) - \frac{(\sum Y)^2}{n} \right\} \left\{ (\sum A_1^2) - \frac{(\sum A_1)^2}{n} \right\}}}$$

$$B) \quad r_{YA_2} = \frac{\sum YA_2 - \frac{\sum Y \sum A_2}{n}}{\sqrt{\left\{ (\sum Y^2) - \frac{(\sum Y)^2}{n} \right\} \left\{ (\sum A_2^2) - \frac{(\sum A_2)^2}{n} \right\}}}$$

$$C) \quad r_{YA_3} = \frac{\sum YA_3 - \frac{\sum Y \sum A_3}{n}}{\sqrt{\left\{ (\sum Y^2) - \frac{(\sum Y)^2}{n} \right\} \left\{ (\sum A_3^2) - \frac{(\sum A_3)^2}{n} \right\}}}$$

where

Y = Fertilizer consumption

A₁ = Income

A₂ = Area under cash crops

A₃ = Irrigated area under non-cash crops.

2. Multiple correlation co-efficient :

$$R^2_{1.234} = 1 - (1 - r_{14}^2) (1 - r_{13.4}^2) (1 - r_{12.34}^2)$$

where,

1 = Fertilizer consumption

2 = Income

3 = Area under cash crops

4 = Irrigated area under non-cash crops

ANNEXURE - II

Questionnaire for Co-operative Societies.

I) General information about the co-operative society.

Village - Taluka - Dist -

Name of Chairman -

Age -

Education -

Name of Secretary -

Age -

Education

II) Details of Society (Position as on _____)

1) No. of members -

2) Shares of members -

3) Deposits of members -

4) Bank loan -

5) Reserve fund -

6) Other funds

7) Working capital

8) Profit

9) Loans Distributed - Total - Fertilisers -

10) Recovery

11) Debts to be received at the end of the
year -

12) Overdues -

13) Area of Operation -

III) Monthwise arrival of fertilizers (1972-73).

Month	Urea		Suphala		Purchase of Potash	
	Quantity mts.	Purchased Price Rs./mtl.	Quantity mts.	Purchased Price Rs./mtl.	Quantity mts.	Purchase Price Rs./mtl.
	Total Value Rs.	Total Value Rs.	Total Value Rs.	Total Value Rs.	Total Value Rs.	Total Value Rs.
April						
May						
June						
July						
August						
September						
October						
November						
December						
January						
February						
March						
Total						

IV) Fertilizers Marketed : (1972-73)

Type of fertilizer	Quantity (mts .)	Selling price (Rs./mtl.)	Total sale (Rs.)
--------------------	---------------------	--------------------------------	---------------------

A) Straight

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

B) Mixtures

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

V) Fertilizers sold on loan by the Society to Cultivators.

Sr. No. Name of fertilizer	Quantity sold on loan etc.	Total value of fertilizers sold on loan (Rs.)	Rate of Interest
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VI) Marketing cost of fertilizers per tonne :

Sr. No.	Item of Cost	Amount (₹.)
1	Purchase price	
2	Transport Cost	
3	Sales Tax	
4	Retail	
5	Storage Cost	
6	Loss during handling	
7	Other charges	
8	Total	
9	Selling price	
10	Margin	

VII) ARRIVALS FROM :

Fertilizers	Agency supply-	Month wise arrival (t/s.)											Total (t/s.)				
		Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.		March			

VIII) Questions :

1. Whether there is storage facility ? Yes / No.
If yes its capacity in tonnes -
Are stored fertilizers sufficient to meet the immediate need of cultivators ? Yes / No.
2. Does this society supply technical information regarding fertilizer application viz. Method of application, recommended doses, time of application, necessary cares before and after application of fertilizers etc. to its member cultivators? Yes, No.
3. What is your experience in marketing of fertilizers by your society ? Are sales increasing ? What about the demand and supply position ?
4. What methods do you adopt in increasing the sales of fertilizers ?
5. What are the difficulties of the society in marketing of fertilizers ?
6. What are your suggestions for increasing the use of fertilizers by the farmers in your area ?
7. Do you supply fertilizers to cultivators who are not members of your society ?
Yes / No.
If yes, what is the total quantity supplied ?
Fertilizers : - 1. Urea -
 2.
 3.

111) Details of land possessed (Area in hectares) :-

Survey No.	Cultivated Land		Land taken on lease		Cultivable area
	Area	Present value	Area	Present value	
	(ha.)	(Rs.)	(ha.)	(Rs.)	(ha.)

Features of Grazingland	Total grazing area		Present value
	Area	Land Rev.	
	(ha.)	(Rs.)	(Rs.)

IV) Irrigation facilities :

a) Irrigated area (in hectares)

No.	Item	1972-73	1973-74
1	Canal irrigated		
2	Well irrigated		
3	Other sources		
4	Perennially irrigated		
5	Perennially irrigated		

b) Type of water lifts :

No.	Means of Lifting	Number	Area under Command (in hectares)
1	Shot		
2	Oil engine		
3	Electric Motor		
4	Canal		
5	Lift irrigation project.		

V) Cropping pattern : 1972-73 / 1973-74

Sr. No.	Season	Crops	Area in hectares			Unirri-gated
			Canal	Well	Others	
1	Kharif					
2	Rabi					
3	Summer					
4	Perennial					

VI) Details about agricultural production during 1972-73.

Season	Name of crop	Area in hect.	Produ-ction (qtl.)	Price at harve-cting Rs./qtl.	Total income	Total expen-diture	Net returns Rs.
Kharif							
Rabi							
Summer							
Perennial							

Annual Income from Animals during 1972-73.

Milk & Milk products - Manures -

Animal sales -

Annual income from poultry birds during 1972-73.

Eggs and chicken - Manures -

Bird sales -

Income from services -

VII) Cropwise application of fertilizers (1971-73/1973-74)

Season	Crop	Area in hect	Name of fertilizer applied	Total amount of fertilizer applied (mts.)			
				1st dose	2nd dose	3rd dose	Total

Maize

Wheat

Sugarcane

Potato

VIII) Sources and Quantities of Fertilizers used during 1972-73 / 1973-74.

Sl. No. of Fertilizer	Source	Quantity obtained (kgs.)	Total value (Rs.)
1	Co-op. society/ Pvt. dealer/Sugar factory/ other.		
2	Co-op. society/ Pvt. dealer/Sugar factory/ others.		
3	Co-op. society/ Pvt. dealers/Sugar factory/ others.		
4	Co-op. society/ Pvt. dealers/Sugar factory/ others.		
5	Others		

IX) Demand for fertilizers with response to irrigation facilities : (1972-73).

Season	Name of crop	Area		Area and quantity of fertilizers applied Fertilizer qtls.
		Irrigated	Dry	

Rabi

Rabi

Kharif

Perennial

ii) Details of loans obtained by the farmer in 1972-73.

Sl. No.	Agency	Date when taken	Purpose	Total amt. (Rs.)	Rate of interest	Loan for fertili- sers (Rs.)	Remark
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iii) Questions :

1. Since when you have adopted the practice of applying fertilizers ? Year -
2. Do you feel that fertilizer application is profitable ?
Yes / No.
What is your experience in respect of different crops in this respect ?
Application to sugarcane - Highly profitable / moderate / Less
Application to foodgrains - Highly profitable / moderate / Less
Other
3. What are the difficulties in increasing the area under fertilizer application on your farm ?
a) Inadequate finance
b) Inadequate irrigation facilities
c) Not available at required time and in quantity
d) Others -
4. What are the probable reasons in your opinion regarding

the timely availability ?

- a) Inefficient market organization
- b) Inefficient management of co-op. societ.
- c) Others -

5. What is your opinion regarding prices of fertilizers ?

- a) Very High
- b) High
- c) Moderate
- d) Low

6. What is your opinion regarding fertilizers supplying agency ?

7. Do you know recommended doses of fertilizers by the department of Agriculture ?

Yes / No.

If yes do you follow these recommendations ?

Yes / No

If not following the recommendations then give reasons in respect of each crop -

8. Whether you prefer to apply manure or fertilizer or both ?

Manure / Fertilizer / both.

9. What is your agencies and fertilizerwise opinion regarding quality of fertilizers ?

- a) Co-op. Societies supply fertilizers in good quality.

- b) Pvt. Dealers supply fertilizers in good quality
- c) Govt. Factory supply fertilizers in good quality.
- d) Area is in good quality.
- e) Others

10. Do you know about balanced fertilization ?

Yes / No

If yes, do you follow it ?

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Table 5.1 (a) : Cropwise per hectare consumption of L, P and K on different sized holdings.
(quantity in kgs.)

Size groups and years	Crops	Jowar	Bajra	Wheat	Sugarcane	Groundnut	Cotton	Average
Small 1972-73	H	22.97	21.06	41.75	150.72	-	42.31	47.80
	P	11.16	9.19	10.43	60.05	16.69	11.11	19.67
	K	9.93	9.19	9.45	42.41	-	4.27	12.54
1973-74	H	25.04 (9.01)	47.17 (123.98)	52.04 (24.65)	140.50 (-11.48)	-	62.92 (48.71)	54.61 (14.25)
	P	18.44 (65.23)	23.52 (155.93)	12.13 (16.30)	65.81 (9.59)	20.97 (30.33)	27.08 (143.74)	27.99 (42.30)
	K	12.13 (22.16)	6.35 (-30.99)	9.39 (-0.63)	43.81 (3.30)	-	27.08 (534.19)	16.46 (31.26)
Medium 1972-73	H	17.05	16.98	56.31	138.19	-	93.83	53.73
	P	13.48	12.75	15.26	51.72	27.77	37.04	26.34
	K	13.48	12.75	13.61	43.64	-	37.04	20.09
1973-74	H	17.98 (5.45)	29.36 (72.91)	45.02 (-20.05)	150.32 (8.78)	2.90	92.58 (-1.33)	56.36 (4.89)
	P	14.68 (8.90)	9.68 (-24.08)	17.98 (17.82)	52.26 (1.04)	26.12 (-5.94)	12.36 (-66.63)	22.18 (-15.79)
	K	14.68 (8.90)	9.68 (-24.08)	12.48 (-6.59)	43.11 (-1.19)	-	12.36 (-66.63)	15.38 (-23.44)
Large 1972-73	H	22.12	35.17	44.55	183.37	-	-	47.47
	P	18.93	9.44	16.34	54.18	23.72	-	20.43
	K	18.93	9.44	11.76	29.30	-	-	11.51
1973-74	H	26.37 (19.21)	34.54 (-1.79)	51.90 (16.50)	185.60 (1.26)	-	-	49.75 (5.88)
	P	16.87 (-10.88)	21.94 (132.42)	13.70 (-16.16)	49.04 (-9.49)	23.08 (-2.70)	-	20.77 (1.66)
	K	16.87 (-10.88)	21.94 (132.42)	9.54 (-18.88)	26.71 (-8.84)	-	-	12.51 (8.69)
Overall 1972-73	H	20.71	24.40	47.54	160.09	-	45.38	49.67
	P	14.52	10.46	14.01	55.32	22.53	16.05	22.15
	K	14.11	10.46	11.61	38.45	-	13.77	14.71
1973-74	H	23.13 (11.69)	37.02 (51.72)	49.65 (4.44)	158.83 (-0.79)	0.97	51.83 (14.21)	53.57 (7.85)
	P	16.66 (14.74)	18.38 (75.72)	14.60 (4.21)	55.70 (0.69)	23.39 (3.82)	13.15 (-18.07)	23.65 (6.77)
	K	14.56 (3.19)	12.66 (21.03)	10.47 (9.82)	37.88 (0.99)	-	13.15 (-4.50)	14.78 (0.47)

(Figures in the bracket indicate percentage increase or decrease over 1972-73).

Table 5.1(b) : Size groupwise irrigated area fertilized of different crops.

(Area in hectares)

Crops	SMALL		MEDIUM				LARGE		OVERALL							
	1972-73	1973-74	1972-73	1973-74	1972-73	1973-74	1972-73	1973-74	1972-73	1973-74						
	Irrigated area	Irrigated Area fertilized	Irrigated Area	Irrigated Area fertilized	Irrigated Area	Irrigated Area fertilized	Irrigated Area	Irrigated Area fertilized	Irrigated Area	Irrigated Area fertilized	Irrigated Area	Irrigated Area fertilized	Irrigated Area	Irrigated Area fertilized	Irrigated Area	Irrigated Area fertilized
Jowar	12.96	10.94	10.14	8.69	22.43	15.26	16.68	14.65	12.54	12.54	10.52	10.52	15.98	12.91	12.45	11.29
		(84.41)		(85.70)		(68.03)		(87.83)		(100.00)		(100.00)		(80.79)		(90.68)
Bajara	16.92	12.68	19.16	17.55	17.25	13.96	16.77	14.97	6.88	6.88	8.09	8.09	13.68	11.17	14.67	13.54
		(74.94)		(91.60)		(80.93)		(89.27)		(100.00)		(100.00)		(81.65)		(92.30)
Wheat	16.44	15.43	15.56	15.56	12.12	12.12	10.91	10.91	10.52	10.52	11.53	11.53	13.03	12.69	12.67	12.67
		(93.86)		(100.00)		(100.00)		(100.00)		(100.00)		(100.00)		(97.39)		(100.00)
S. Cane	26.76	26.76	30.16	30.16	22.06	22.06	24.47	24.07	12.54	12.54	12.54	12.54	20.45	20.45	22.39	22.26
		(100.00)		(100.00)		(100.00)		(98.37)		(100.00)		(100.00)		(100.00)		(99.42)
G. nut	3.48	2.23	2.67	2.67	6.48	6.48	6.89	6.89	12.14	10.93	12.13	10.51	7.37	6.55	7.23	6.69
		(64.08)		(100.00)		(100.00)		(100.00)		(90.03)		(86.64)		(88.87)		(92.53)
Cotton	1.17	1.17	0.60	0.60	0.81	0.81	1.82	1.82	-	-	-	-	0.66	0.66	0.81	0.81
		(100.00)		(100.00)		(100.00)		(100.00)						(100.00)		(100.00)
Total	77.73	69.21	78.29	75.23	81.15	70.69	77.54	73.31	54.62	53.51	54.81	53.19	71.17	64.44	70.21	66.24
		(89.04)		(96.09)		(87.11)		(94.54)		(97.78)		(97.04)		(90.54)		(94.35)

(Figures in the bracket indicate percentage irrigated area fertilized to total irrigated area respectively).

Table 6.1 : Monthwise arrivals and values of straight, complex and mixed fertilizers in sample societies during 1972-73.

(Quantity in quintals)
(Value in Rupees).

Month	Straight Fertilizers						Complex Fertilizers				Mixed Fertilizers				Total N, P, K kgs			Total Value Rs.
	Urea		Superphosphate		Others		Sulphate		Others		15:15:15		Others		N	P	K	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value				
April	142.50	13408.11	50.00	2250.00	-	-	268.50	23391.00	-	-	90.00	6300.00	-	-	11932.50	5277.50	4677.50	43914.75
May	-	-	80.00	3520.00	-	-	-	-	70.00	7700.00	200.00	14190.00	-	-	4400.00	3580.00	1000.00	28410.00
June	166.50	15759.23	190.00	83200.00	-	-	56.50	4859.00	85.00	9350.00	490.00	37955.00	-	-	17556.50	8037.50	3297.50	74100.35
July	361.00	34358.28	100.00	4200.00	80.00	4600.00	260.00	22850.00	-	-	660.00	48280.00	-	-	30406.00	8900.00	12160.00	111631.00
Aug.	200.00	18692.00	100.00	4345.00	-	-	170.00	14620.00	100.00	11013.00	470.00	38032.80	-	-	20800.00	8500.00	4900.00	81882.30
Sept.	190.00	18132.00	95.00	4145.00	-	-	50.00	5520.00	40.00	4160.00	260.00	19682.00	100.00	13300.00	1780.00	7320.00	2800.00	63919.00
Oct.	30.00	2940.00	205.00	8885.00	-	-	190.00	17920.00	17.50	2362.50	500.00	36192.00	20.00	1840.00	12380.00	9290.00	5650.00	70139.50
Nov.	-	-	-	-	80.00	5200.00	180.00	17145.00	20.00	2150.00	1000.00	72840.00	-	-	20180.00	8100.00	7700.00	97335.00
Dec.	-	-	120.00	4860.00	-	-	520.00	46810.00	40.00	4300.00	880.00	63872.00	-	-	21640.00	14920.00	12200.00	119842.00
Jan.	30.00	3693.00	30.00	1350.00	-	-	420.00	37380.00	-	-	577.00	48200.00	-	-	16335.00	9665.00	9185.00	87623.00
Feb.	240.00	22716.00	-	-	-	-	243.50	20955.00	-	-	520.00	39130.00	-	-	22492.50	6252.00	6252.00	79741.00
March	-	-	30.00	1350.00	-	-	334.00	29564.00	-	-	440.00	34242.00	-	-	11610.00	7690.00	7210.00	68156.00
Total	1350.00	129908.62	1000.00	43205.00	160.00	9800.00	2702.50	241024.00	372.50	41035.50	6087.00	451915.00	120.00	15140.00	206872.50	97521.50	76232.00	920693.90
Average	372.00	25981.72	200.00	8641.00	32.00	1960.00	540.50	48204.80	74.10	8207.10	1217.40	90383.00	24.00	3028.00	41374.50	19504.30	15246.40	184138.78

Table 6.2 : Monthwise disposal and values of straight, complex and mixed fertilizers by sample societies during 1972-73.

(Quantity in quintals)
(Value in Rupees).

Month	Straight Fertilizers			Complex Fertilizers				Mixed fertilizers				Total N, P, K kgs			Total
	Urea	Superphosphate	Others	Suphala	Others	15:5:5	Others	N	P	K					
	Qty. : Value	Qty. : Value	Qty. : Value	Qty. : Value	Qty. : Value	Qty. : Value	Qty. : Value								
Apr.	10.00 985.30	25.00 1232.50	40.00 2480.00	150.00 13593.00	- -	100.00 7309.00	- -	4210.00	3150.00	2750.00	23119.80				
May	15.00 1477.95	35.00 1690.50	10.00 620.00	93.00 8427.66	10.00 1140.00	210.00 15548.40	- -	5435.00	3205.00	3443.00	28284.51				
June	284.00 28161.44	280.00 13431.60	20.00 1240.00	256.50 22956.75	60.00 6840.00	550.00 44302.50	- -	26351.00	12277.50	6597.00	115692.29				
July	361.00 35995.31	175.00 8102.50	10.00 620.00	360.00 32911.20	75.00 8850.00	710.00 54130.40	- -	34156.00	13230.00	11430.00	142169.41				
Aug.	150.00 14845.50	75.00 381.25	80.00 5560.00	160.00 14320.00	58.00 6295.00	500.00 37750.00	- -	17900.00	7200.00	5820.00	76411.75				
Sept.	210.00 20987.40	120.00 5751.60	- -	170.00 16235.00	75.00 8342.50	460.00 36243.40	100.00 13700.00	23410.00	11070.00	6020.00	102499.90				
Oct.	50.00 5125.50	200.00 9528.00	- -	195.00 19074.90	25.00 3215.00	590.00 44527.30	15.00 1440.00	14800.00	9800.00	6720.00	83530.70				
Nov.	5.00 512.55	10.00 475.40	- -	275.00 27156.25	17.50 2017.50	1000.00 75930.00	- -	21785.00	9635.00	9125.00	116265.65				
Dec.	5.00 512.55	100.00 4480.00	- -	520.00 48630.00	20.00 2230.00	890.00 66589.60	- -	21570.00	14200.00	12200.00	127058.50				
Jan.	30.00 3828.30	40.00 1972.00	- -	420.00 38850.00	10.00 1115.00	577.00 46965.11	- -	16495.00	11865.00	9185.00	92750.41				
Feb.	150.00 14874.00	30.00 1479.00	- -	243.50 21807.86	15.00 1672.50	520.00 40736.80	- -	18892.50	7032.00	6252.00	80870.16				
March	50.00 4997.00	23.50 1158.55	- -	311.00 28615.11	- -	405.00 32768.55	- -	13040.00	7066.00	6690.00	67539.21				
Total	1320.00 132302.80	1113.50 52883.90	160.00 10520.00	3154.00 292578.13	362.50 41135.50	6502.00 502821.06	115.00 15140.00	217245.00	109751.00	85004.50	1058889.29				
Average	264.00 26460.56	222.70 10576.78	32.00 2104.00	630.80 58515.62	72.50 8227.10	1300.40 100564.21	23.00 3028.00	43551.00	21950.20	17000.90	211177.85				