

**IMPACT OF PRICE HIKE OF FERTILIZERS
ON AGRICULTURE IN MAHARASHTRA STATE**

**FIRST PHASE REPORT ON
RABI SEASON (1991-92)**

C. S. GAJARAJAN

**AGRO-ECONOMIC RESEARCH CENTRE
GOKHALE INSTITUTE OF POLITICS AND ECONOMICS
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CHAPTER I
INTRODUCTION

1.1 Context and Importance of the Study

The present report, pertaining to the rabi crop season of 1991-92, forms the first of the two phase study, the second phase^{is} eventually planned to cover the ensuing kharif season of 1992-93. The entire study is being undertaken at the instance of the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India.

The present exercise has been necessitated in the context of recent hike in the fertiliser prices consequent to partial withdrawal of government subsidy. The importance of fertiliser as a vital input contributing to agricultural productivity is too well established needing any reiteration here. In order to increase the agricultural production the promotion of adequate and sustained fertiliser use had become inevitable. Given the resource situation of an average Indian farmer, the system of subsidy as an inducement strategically assumed crucial importance. Indeed, the policy of subsidy gradually achieved its objective of increasing the input levels in general and, largely contributed to HYV programmes in particular. The system of subsidy has rendered fertiliser price level to remain relatively stable for long spells and contributed to sustenance of self-reliance campaign especially in the matter of food-grains.

However, in the light of financial crunch faced by the country with mounting budget deficits, the government felt that the situation warranted a drastic action on the subsidy front. After a great deal of debate, the government eventually settled down to a considerable reduction in the level of subsidy. As a result, the fertiliser prices were hiked around the rabi sowing season of 1991 with the proviso that the unsold stocks in the market would be delivered to farmers at the pre-hike prices. Besides, the governments announced that a dual pricing system would be devised to provide some relief to needy weaker sections of the farming community.

Nevertheless, it is but natural on the part of the certain interests to entertain some apprehensions about the repercussions that are likely to take place as a consequence of this major policy change. As an immediate reaction, it is possible that many a farmer might compromise with lower level of fertiliser consumption or effect switch in cropping pattern or even resort to cut down on other necessary farm expenditure to offset the increased cost of fertiliser input. In the event of such a situation even five to ten per cent reduction in output, especially of the foodgrains, might seriously affect the economy. Any serious setback on the food front would be disastrous for the country at this juncture. Whatever may be the merits of arguments against the system of subsidy, the situation of lower consumption of vital inputs leading to lower production, which in turn leading to higher

prices might complicate the matter with its macro-economic repercussions all around. The apprehensions of the pro-subsidy lobby cannot easily be brushed aside.

The only satisfactory way to resolve the conflicting views is to assess the impact of increase in fertiliser prices on relevant aspects at the ground level. Furthermore, the government's intended measure to provide some relief to weaker farmers by means of dual price system, has added another dimension to the problem. Hence the importance of this empirically based study in more ways.

1.2 Objectives and Methodology

Broadly speaking, the study aims at inquiring into such aspects which may have bearing on formulation of pricing of fertiliser and related issues of the policy. The objectives as mentioned below will give a better perspective about the nature and importance of the present study. More specifically the three-fold objectives are:

- i) to examine the impact of increases in fertiliser prices on demand/consumption of fertilisers;
- ii) to study the impact of increase in fertiliser prices on cropping pattern; and
- iii) to study the working of dual fertiliser pricing system and in this context to identify the problems encountered in its working and to suggest corrective measures to streamline the working of the system.

In order to realise the aforesaid objectives, this

impact study is being approached by means of collection of both qualitative and quantitative information from primary as well as secondary sources. The primary data on changes in the cropping pattern, level of fertiliser consumption and related aspects consequent to price hike are collected through canvassing questionnaire-schedules among the sample farmers from different agro-climatic zones covering all the important crops in the state. The secondary and supportive data are gathered from the concerned departments and other agencies. The questionnaire-schedule is so designed as to elicit information on land utilisation and seasonwise cropping pattern, utilisation of cropwise inputs, disposal of farm produce, opinions of farmers on fertiliser availability, consumption, constraints, dual pricing etc. The field level data are being gathered in two visits. The first visit, at the end of the rabi season in January and February 1992, has covered relevant aspects mainly concerning the rabi season of 1991-92.

The coverage of the study is aimed at drawing sample farmers from all the nine agro-climatic zones so as to include all the major crops both in irrigated and unirrigated areas in the state. The sample frame presented below throws more light on coverage aspect.

1.3 Sample Frame

In view of the constraint of time at the disposal for this quick study, it was decided to make use of the sample design devised for the on-going cost of cultivation studies undertaken by the respective state agricultural universities. The constraints on availability of field staff, among other things, has influenced the decision to restrict the total sample size to 400. However, the sample design devised by the Mahatma Phule Agricultural University, Rahuri, for the cost of cultivation project under Central Government scheme, by itself could not provide the basis for the entire sub-sample as it has not covered two agro-climatic zones (II and IV) altogether and zones I and IX being represented in the sample by only a single tahsil each. This has arisen because the basis of sample is predetermined by a set of selected crops for coverage in the state. Thus, in the national context rice and wheat are not being considered as important crops in Maharashtra. The central scheme is covering 600 farmers, from 60 tahsils, the 12 selected crops being jowar, bajra and ragi as cereals, red, black and green grams as pulses, groundnut, sun flower and safflower as oilseeds and, sugarcane, cotton and onion as cash crops. The sample design takes into consideration the allotment of centres (villages) to different zones on the basis of area under the 12 selected crops. Each centre is to contribute ten

farmers distributed equally over five size holding groups after ~~ten~~^{the} farmers in the centre are arranged according to cultivated area and five groups formed so that each size group contains equal cultivated area. No two centres are to fall in the same tahsil in a zone.

Since the coverage envisaged for our study is to draw samples from all the agro-climatic zones so as to include all the important crops, we have obtained a sub-sample of 300 farmers from the 30 villages (centres) under the central scheme and 100 farmers from the similar ongoing scheme of the state government. The latter scheme, modelled on the sample design of the central government scheme, is undertaken by all the four agricultural universities located at different regions in Maharashtra. The consideration of the state government's scheme as a supplementary basis for our sample design has become necessary as the central scheme almost practically does not cover four of the nine agro-climatic zones and excludes rice and wheat crops. The state scheme for the cost of cultivation studies (1991-92 to 1993-94), on the other hand, virtually covers all the agro-climatic zones except the zone III (the ghat zone containing only three tahsils in the state). Besides, it covers greater number of crops from both kharif and rabi in addition to horticultural and perennial crops. One distinct feature of the state scheme is that it considers a cluster of one to three villages as a unit to draw the 10 farmers from the five size of holdings. In all

other respects, the basis and design of the sample frame is similar to the central scheme.

(Thus, in order to cover all the zones and important crops, the sub-sample for this study is composed of 300 farmers from 30 villages in 30 tahsils/blocks spread over across the six zones, from the sample design of the central scheme and supplemented by 100 farmers from 10 clusters of villages in 10 tahsils in four zones (three of which remained unrepresented in the central scheme).) The agro-climatic zonewise sample distribution is as given below.

Zone	Total no. of tahsils in the state	Total sample blocks central scheme	Tahsils selected from		Total tahsils selected as sub-sample
			Central scheme	State scheme	
I	10	1	1	1	2
II	35	-	-	2	2
III	3	1	1	-	1
IV	16	-	-	3	3
V	17	3	2	-	2
VI	60	19	13	-	13
VII	79	23	8	-	8
VIII	48	12	5	-	5
IX	33	1	-	4	4
All zones (state)	301	60	30	10	40

The main sample frame of the agricultural universities, under either scheme, has considered equal representation to each of the five size of holdings. Thus, from every selected village or cluster of villages the ten farmers selected at random are distributed as under:

-----		-----
	Size of holding (in hectares)	No. of sample
-----		-----
I	Upto - 1.00 (Marginal)	2
II	1.01 - 2.00 (Small)	2
III	2.01 - 4.00 (Semi-medium)	2
IV	4.01 - 6.00 (Medium)	2
V	6.01 and above (Large)	2
-----		-----
	All size groups	10
-----		-----

1.4 Limitations and Scope of the Study

Apart from the usual limitations inherent in the quick studies of this nature, the present phase of the study has been adversely placed in realising two of the objectives set forth. First and the foremost setback has arisen in the form of inadequacy of data as a result of act of nature, that is, the severe drought in Maharashtra which has seriously affected the rabi programme in most parts of the state. Since the season itself is not normal, obviously, the response in terms of coverage of rabi crops and levels of input use, wherever reported, are lukewarm and sub-normal. Secondly, the system of

providing some relief to marginal and small farmers in the form of fertiliser delivery at concessional rates, has not been operational, at least, during the stage of gathering primary data. Most of the responding farmers have not incurred higher cost as the old stocks were sold at pre-hike prices. The dual pricing system could not come into force to be effective during the rabi season of 1991-92. Hence lack of data about its working. Field level feed back on this aspect will be possible when the kharif round is completed in the second phase of the study. In the following is briefly mentioned the extent and severity of the current drought situation in Maharashtra State.

Drought Situation

Indeed, the widespread drought condition in Maharashtra has caused considerable damages to rabi season of 1991-92. It has been described, in the official circles, as the most severe are in the last two decades. The state government has declared 21,545 villages in 23 districts, across all the regions except the coastal belt, as the drought affected where the crop prospects would be less than 50 per cent of the normal. The areas affected account for 55 per cent of the total villages in the state. The unofficial sources put the figure of affected villages at around 35,000. The failure of the monsoons in the middle of the rabi season has contributed to this situation, l leading to the worst problem of shortage of even drinking water compounded by a fast depleting ground water table.

Scope of the Report

In view of the widespread and severe drought situation rendering rabi season programme abnormal, the present report in the first phase is unable to do full justice. It is limited to providing the background and some aspects of changes in the cropping pattern and consumption of fertiliser as revealed by the first round of field data for rabi season. The more comprehensive aspects covering supportive institutional arrangements, working of dual-price system and other issues will be covered in the final phase of the study after the kharif round in July-August

CHAPTER II**SOME ASPECTS OF AGRO-ECONOMICS PROFILE
AND FERTILISER SCENARIO**

The present chapter, by way of the background, deals with several aspects of the agricultural situation and consumption pattern of fertiliser in Maharashtra State in recent years. The available information, particularly the district level statistical data, may provide the necessary background for this study. The aspects covered broadly include the agro-climatic zones, rainfall, irrigation and area, production and yield of principal crops. The latter section, dealing with fertilisers, covers distribution of fertiliser materials, districtwise consumption of various fertiliser materials, seasonwise annual consumption during the last decade, seasonwise consumption of NPK and per hectare average consumption in 1989-90 and 1990-91. The sources of data utilised in this chapter are mainly obtained from Directorate of Agriculture, Maharashtra State and the Fertiliser Association of India, Western Region, Bombay.

A. Some Agro-Economic Aspects**2.0 Agro-climatic Zones**

The entire State of Maharashtra is delineated into nine distinct agro-climatic zones. The zones are based on the range of normal rainfall and principal soil fabric. The tahsil being

the basic indivisible unit area for the consideration, some of the districts fall into more than one zone. In point of fact, Kolhapur, Nasik and Satara are so diverse that four different zones cut across these districts. Similarly, Pune district shares three soil-climatic zones including 'scarcity zone' in which fall six of its 13 tahsils. Besides, there are four districts where only one of the tahsils in each of the districts belongs to a different zone. However, 11 of the 29 districts (excluding the urban district of Greater Bombay) do not fall under more than one zone each. This category, including the four coastal districts, belong to five zones that are characterised by varying ranges of assured rainfall to very high precipitations. The zone-wise soil features, range of normal rainfall, altitude, predominant cropping and districts and tahsils under the purview are presented in Table 2.1.

Among the nine agro-climatic zones, the high altitude Chat zone (Zone 3) with 3000-5000 MM rainfall covers only three out of 301 rural tahsils in the State. The other relatively smaller zones, each covering less than 20 tahsils, are Very High Rainfall zones (No.1 and 4) and Transition-B (No.5). The largest zone, in terms of number of tahsils under its purview, is zone 7 with assured rainfall (700-900 MM), characterised by medium black calcareous soils of varying depth and dominated by kharif crops. This zone covers 79

Table 2.1 : Different Agroclimatic Zones of Maharashtra State

Sr. No. (1)	Title of the zone (2)	Rainfall in MM (3)	Altitude above MSL/Feet (4)	Soils (5)	Predominant cropping (6)	District with tahsils (7)
1.	Very high rainfall zone with lateritic soils	2,500 to 3,000	Variable	Laterites and Lateritic	Paddy, Nagli and Hill millets like Wari, Sawa etc.	1. Ratnagiri 2. Kolhapur, Chandgad
2.	Very high rainfall zone with lateritic soils	2,250 to 3,000	Variable mostly less than 1,000	Non-lateritic loams of brown to red colour formed from trap rock (Basalt of the augite variety)	Paddy, Nagli and Hill millets like Wari, Sawa etc.	1. Greater Bombay 2. Thane 3. Raigad 4. Washik-Igatpuri
3.	Ghat zone	3,000 to 5,000	Altitude between about 5,000 towards west to 2,000 towards eastern side.	Most forest land and varkas soils	Varkas loams growing inferior hill millets like Wari, Sawa etc.	1. Satara-Mahabaleshwar 2. Kolhapur-Bavda, Radhanagari
4.	Transition-A with red to reddish brown soils	1,250 to 3,000	Less than 2,000	Mainly red to brown soils with varying depth and texture	Paddy and Nagli	1. Washik-Surgana, Peint 2. Pune-Khed, Maval, Mulshi Velhe, Bhor 3. Satara-Jaoli, Patan 4. Kolhapur-Shahuwadi, Panhala, Karveer, Kagal, Bhudargad, Ajra, Gadhinglaj
5.	Transition-B with greyish black soil	700 to 1,250	Less than 2,000	Predominantly greyish black soils of varying texture	Kharif crops like Bajri, Groundnut, Cotton, Jawar, Paddy etc.	1. Washik-Kalwan, Dindori, Sinnar, 2. Dhule-Akrani, Akkalkuwa, Taloda, Wandurbar, Wawapur 3. Ahmednagar-Akola 4. Pune-Junnar, Ambegaon, Poona City 5. Satara-Wai, Satara, Karad 6. Sangli-Shirala 7. Kolhapur-Hatkanangale, Shirol
6.	Scarcity zone	500 to 700	Less than 2,000	Medium black calcareous soils formed from trap with varying depth and texture	Kharif (excluding paddy) cum-rabi crops mainly depending upon soil depth and textural class)	1. Washik-Baglan, Malegaon, Chander, Wandgaon, Washik, Wiphad, Yeola 2. Dhule-Shahada, Shindkheda, Sakri, Dhulia 3. Jalgaon-Amalner

Contd...

Table 2.1 : (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
						4. Ahmednagar-All tahsils except Akola 5. Pune-Sirur, Haveli, Dhond, Purandar, Baramati, Indapur 6. Satara-Khandala, Phaltan, Koregaon, Khatav, Man 7. Sangli- All tahsils except Shirala 8. Sholapur-Karmala, Barshi, Madha, Malshiras, Pandharpur, Mohol, Sangola, Mangalwada 9. Aurangabad-Vaijapur, Gangapur, Paithan 10. Bhir-Majalgaon, Patoda, Ashti 11. Osmanabad-Paranda, Bhoom, Kallam
7.	Assured rainfall zone with mainly kharif cropping	700 to 900	Less than 2,000	Medium black Calcareous soils formed from trap with varying depths & texture	Mainly kharif crops but mostly excluding paddy	1. Dhule-Shirpur 2. Jalgaon-All tahsils except Amalner 3. Sholapur-Sholapur(North), Sholapur(South), Akkalkot 4. Aurangabad-All tahsils except Vaijapur, Gangapur, Paithan 5. Parbhani-Partur, Jintoor, Pathari, Gangakhed 6. Bhir-Georai, Bhir, Kaij, Ambejogai 7. Wanded-Mukhed, Degloor 8. Osmanabad-Ahmedpur, Osmanabad, Latur, Tuljapur, Udgir, Aush, Omerga, Wilanga 9. Akola-All tahsils except Washim 10. Amravati-Melghat, Achalpur, Daryapur, Amravati 11. Buldhana
8.	Moderate to moderately high rainfall zone with soils formed from trap	900 to 1,250	Less than 2,000	Brown to dark Calcareous soils formed from trap with varying depth from moderate to deep	Kharif crops of all types and rabi crops on deeper soils	1. Parbhani-Hingoli, Kalamnuri, Parbhani, Basmath 2. Wanded-Kinwat, Hadgaon, Wanded, Bhakar, Kandhar, Billoli 3. Akola-Washim 4. Amravati-Morshi, Chandur

Contd...

Table 2.1 : (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
9.	High rainfall zone with soils formed from mixed rocks	1,250 to 1,700	Less than 2,000	Yellowish brown to red soils of mixed percentage	Kharif crops with paddy as the predominant crop and jowar, wheat, tillakh, linseed as rabi crops	5. Yavatmal 6. Wardha 7. Nagpur-Katol, Saoner, Ramtek, Nagpur 8. Chandrapur-Warora, Rajura 1. Nagpur-Umer 2. Bhandara 3. Chandrapur-Bramhapuri, Gadchiroli, Chanda, Sironcha

tahsils from 13 districts, mostly from northern and eastern parts of the state (Khandesh Marathwada and Vidarbha regions). It is followed by 'Scarcity Zone' (No.6) having normal rainfall of 500-700 MM, enveloping 60 tahsils in eleven districts from southern and western parts in main. The remaining zones are characterised by high rainfall (2 and 9) and moderate rainfall (No.8) and these mainly cover coastal, eastern Vidarbha and northern Marathwada and western Vidarbha districts respectively. Zones 2 and 9 cover around 30 tahsils each and zone 9 covers 48 tahsils.

2.2 Rainfall

The districtwise average annual rainfall and the precipitations recorded for each of the five year period beginning from 1985-86 reveals the erratic nature affecting the agriculture in the state. Actually, in 12 out of 29 rural districts, the annual rainfall is in excess of the average of the district only during one of the five years. This includes the four coastal districts (excluding Bombay) generally known for very high monsoon conditions. The other eight come under the purview of most of the agro-climatic zones in western Maharashtra, Marathwada and Vidarbha regions. In the case of remaining districts, eight have received excess over the average in two years and another eight in three years. It is only the Akola district which shows better than average in four out of five years. However,

Wasik district is deficient in four years and equalled the average in just one year without recording any excess over the average rainfall.

In all, only in seven districts good rainfall, that is, above average for the respective district is recorded continuously during the last three years (1987-88, 1988-89 and 1989-90). These are interspersed in all the regions other than the coastal Maharashtra. In the case of other eight districts which have received better than average rains in two out of five years only three have done so just in the last two years of the period under consideration. This erratic, uneven and unpredictable nature of precipitation in most areas of the state has a bearing on underground water table and reservoir capacity ^{of} irrigation projects and not to speak of uncertainty of dryland farming. The relevant details on rainfall are presented in Table 2.2.

2.3 Irrigation

In the matter of irrigation Maharashtra has to go a long way. The percentage of gross irrigated area to total cropped area is just 12 per cent (1987-88 position). However, at the disaggregated level two thirds of the total number of districts in the state have lesser proportions of irrigated area than that of the state. Among those exceeding the state's average, mention may be made of Bhandara, Kolhapur, Ahmednagar, Wasik, Pune, Sangli, Satara and Jalgaon districts. It is in these districts, sugarcane, irrigated

RAINFALL 18
MAHARASHTRA

Table 2.2

(Millimeter)

District	Average	1985-86	1986-87	1987-88	1988-89	1989-90
Gr.Bombay	2514	2424	1239	1267	1058	2112
Thane	2422	1693	1716	1634	2457	1855
Raigad	3162	2555	1970	2058	3237	2827
Ratnagiri	3446		2457	3211	3875	3278
Sindhudurg	3285	3365	1661	2831	3266	6045
Nasik	942	362	670	802	942	875
Dhule	534	NA.	420	575	850	745
Jalgaon	694	535	597	738	681	774
Ahmednagar	502	419	381	506	697	647
Pune	997	630	780	888	1010	806
Solapur	536	469	448	782	734	697
Satara	1264	709	1191	1390	1171	999
Sangli	522	473	394	673	628	536
Kolhapur	1899	806	1383	1766	1911	1683
Aurangabad	704		527	743	772	813
Jalna	707	579	532	717	1013	696
Parbhani	846	774	712	977	1385	1034
Beed	665	484	472	714	995	1744
Nanded	1172	493	702	761	1599	1275
Osmanabad	770		456	788	970	901
Latur	923	597	459	773	1196	928
Buldhana	709	554	561	856	1064	808
Akola	769	791	804	712	1278	782
Amravati	858	805	823	424	1062	678
Yeotmal	966	983	823	697	1190	868
Wardha	981	968	1079	681	1082	827
Nagpur	1051	1354	832	724	1014	705
Bhandara	1329	1145	1570	716	1203	1023
Gadchiroli	1370		1720	1272	1445	1272
Chandrapur	1281	1117	1434	821	1163	923

N.A. = Not Available

Source = Directorate of Agriculture, Maharashtra

Rice and some horticultural crops are relatively more prominent. About 61 per cent of the total irrigated area is served by underground water source by means of dug wells and tube wells. Ahmednagar, Beed, Nasik, Jalgaon, Pune and Solapur are some of the districts with most parts falling under 'scarcity zone' known for well irrigation. These six districts together account for 52 per cent share of the total area irrigated by wells in the state.

The pattern of cropwise irrigated area at the disaggregated level of districts reveals that wheat, rabi jowar, kharif rice, sugarcane, gram, bajra and cotton are the important crops that account for three-fourths of the gross irrigated area. Apart from the monsoon grown rice in the coastal and other high rainfall zones, the irrigated rice is mostly concentrated in eastern parts of Vidarbha region (Nagpur, Bhandara, Chandrapur and Gadchiroli). In all other districts wheat in rabi season is grown in varying extent though it is not a major cereal crop in the state. Rabi jowar is mainly confined to Ahmednagar, Pune, Solapur and Beed districts of scarcity zone. Most of the irrigated bajra and gram are cultivated in Jalgaon, Nasik, Ahmednagar, Pune, Solapur and Aurangabad (only gram) districts. Sugarcane, the prominent irrigated cash crop is dominant in Kolhapur, Ahmednagar, Solapur, Satara, Pune, Nasik and Sangli irrigation tracts and these together account for

71.3 per cent of total area under sugarcane in the state. The irrigated cotton belt is mainly limited to Jalgaon, Dhule and five of the eight Marathwada districts. The districtwise data on sourcewise irrigated area and cropwise irrigated area are presented in Tables 2.3 and 2.4 respectively.

2.4 Area, Production and Yield of Principal Crops

The available data on districtwise area, production and per hectare average yield of principal crops for the year 1989-90 are presented in Table 2.5. It may be mentioned that the data are inclusive of both irrigated and unirrigated areas and both the crop seasons excepting for kharif and rabi jowar and kharif groundnut.

Among other things, the table reveals that some traditional crops of the districts in terms of large extent of area under particular crops are not invariably accompanied by yield rates higher than the average for the state. For instance, the per hectare yield of rice is higher than that of the state only in rice growing coastal districts and Kolhapur but not so in the rice bowl of eastern region comprising Bhandara, Chandrapur and Gadchiroli districts. On the other hand, Sangli and Satara, traditionally not known for rice production, have shown much higher productivity with considerably smaller extent of area under rice. Similar pattern may be observed in respect of some other principal crops as well.

**Table 2.3 : SOURCEWISE IRRIGATED AREA
MAHARASHTRA
1984-85**

21

District	(hundred hectares)		
	Surface Irrigated area	Well irrigated area	Gross Irrigated area
Thane	43	11	54
Raigad	86	24	110
Ratnagiri	26	9	35
Sindhudurg	150	22	172
Nasik	331	1218	1549
Dhule	144	757	901
Jalgaon	78	1141	1219
Ahmednagar	859	1994	2853
Pune	1031	1099	2130
Solapur	345	1055	1400
Satara	591	850	1441
Sangli	382	599	981
Kolhapur	482	178	660
Aurangabad	171	631	802
Jalna	207	548	755
Parbhani	438	380	818
Beed	384	1335	1719
Nanded	296	169	465
Osmanabad	219	722	941
Latur	88	315	403
Buldhana	28	298	326
Akola	66	216	282
Amravati	11	486	497
Yeotmal	132	164	296
Wardha	56	185	241
Nagpur	291	376	667
Bhandara	1372	117	1489
Chandrapur	776	28	804
Gadchiroli	398	34	432
MAHARASHTRA	9481	14961	24442

Source: Directorate of Agriculture, Maharashtra.

Table 2.4 : CROPWISE IRRIGATED AREA
MAHARASHTRA
1988-89

22

(hundred hectares)

district	Kharif Jowar	Kharif Rice	Wheat	Rabi Jowar	Bajra	Gram	Sugar -cane	Cotton	Summer Ground nut
Ahmednagar	-	-	-	-	-	-	-	-	-
Bhandara	-	-	-	-	-	-	-	-	-
Chandrapur	-	-	-	-	-	-	-	-	-
Dhule	31	29	483	43	119	238	248	3	16
Haveri	3	15	231	54	-	83	121	52	3
Jalgaon	18	26	294	43	-	263	86	107	-
Maharashtra	18	7	448	904	221	178	366	4	18
Pune	19	21	312	644	113	118	277	2	27
Solapur	12	15	287	577	46	66	317	26	11
Satara	36	154	182	414	23	43	291	11	10
Sangli	44	38	116	230	22	30	190	9	8
Kolhapur	-	26	128	-	1	15	553	-	-
Aurangabad	1	2	262	448	6	158	144	73	1
Jalna	5	2	163	132	1	56	75	61	1
Parbhani	2	119	331	8	-	56	69	63	-
Beed	7	2	204	553	10	47	92	58	35
Nanded	-	35	146	2	-	22	73	22	-
Osmanabad	1	5	127	445	-	51	118	-	4
Latur	-	-	168	55	-	35	56	-	-
Buldhana	-	26	177	-	-	49	12	21	-
Akola	-	-	130	-	-	13	3	9	1
Amravati	-	-	186	-	-	24	9	10	1
Yeotmal	-	-	114	-	-	14	33	4	-
Wardha	-	-	125	-	-	13	1	-	-
Nagpur	-	188	215	-	-	46	3	-	-
Bhandara	-	1442	67	-	-	1	6	-	-
Chandrapur	-	826	31	-	-	-	-	-	-
Gadchiroli	-	426	6	-	-	-	-	-	-
Maharashtra	197	3404	4933	4552	562	1619	3143	535	136

Source: Directorate of Agriculture, Maharashtra

Kharif jowar has fared well in its traditional areas of Jalgaon, Buldhana, Akola, Amravati and Yavatmal but not so well by ending up with less than state average in other traditional districts such as Dhule, Sangli, Parbhani, Beed, Latur and Nagpur. Among traditional rabi jowar areas of Ahmednagar, Pune and Solapur the yield rates are considerably below the state average in contrast to non-traditional areas like Kolhapur and Jalgaon. The case of bajra crop is no different in its traditional districts of Ahmednagar, Satara and Beed. In regard to total foodgrains only 12 districts have yield rates higher than the average for the state. Cotton has not fared so well in its traditional areas such as, Parbhani, Jalna, Buldhana, Akola, Amravati and Yavatmal districts, where the average yield is below that of the state. It is only the sugarcane crop that has reasonably performed well in its traditional belts in Nasik, Ahmednagar, Pune, Sangli and Kolhapur with yield rates higher than the state average.

Among the districts which record yield rates of several crops at much higher levels than those of the state, mention may be made of Kolhapur, Jalgaon, Sangli, Satara, Wanded, Ahmednagar and Nasik. Incidentally, these are the districts which have recorded per hectare consumption of N, P2O5 and K2O fertilisers at higher quantities than the average for the state during the year 1989-90.

Table 2.5 : DISTRICTWISE AREA, PRODUCTION & YIELD OF
PRINCIPAL CROPS
MAHARASHTRA
1989-90

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A = Area in hundred hectares
P = Production in hundred tonnes

Y = Yield per hectare in kilograms

District	Rice (Total)			Wheat			Kharif Jowar		
	A	P	Y	A	P	Y	A	P	Y
Thane	1515	2835	1871	1	1	529	-	-	-
Raigad	1508	2992	1984	-	-	-	-	-	-
Ratnagiri	776	1770	2281	-	-	-	-	-	-
Sindhudurg	792	1839	2322	-	-	-	-	-	-
Nasik	388	391	1008	825	891	1080	255	369	1447
Dhule	266	255	959	334	322	964	1026	1403	1367
Jalgaon	57	62	1088	328	490	1494	2210	4164	1884
Ahmednagar	63	98	1556	772	898	1163	107	179	1673
Pune	604	856	1417	499	629	1260	204	263	1289
Solapur	47	56	1192	449	463	1031	60	49	817
Satara	418	906	2168	260	351	1350	972	1773	1824
Sangli	169	365	2160	223	245	1099	1425	1928	1353
Kolhapur	1011	2347	2321	87	121	1391	425	955	2247
Aurangabad	28	27	964	397	404	1018	515	763	1482
Jalna	24	15	625	371	350	943	681	894	1313
Parbhani	252	238	944	504	588	1167	2218	2154	1017
Beed	71	60	845	331	294	888	1185	1089	919
Nanded	308	328	1065	252	269	1067	2477	3869	1562
Osmanabad	121	111	917	258	269	1043	1050	973	927
Latur	248	220	887	227	273	1203	2018	2876	1425
Buldhana	40	19	475	275	329	1196	2099	4355	2075
Akola	73	38	521	285	253	888	2841	5473	1926
Amravati	140	73	521	301	328	1090	1859	3462	1862
Yeotmal	83	54	651	176	225	1278	2254	4091	1815
Wardha	48	39	813	228	248	1088	865	1461	1689
Nagpur	381	426	1118	503	486	966	1108	1523	1375
Bhandara	3073	3760	1224	247	138	559	6	4	615
Chandrapur	1346	1584	1177	265	188	709	362	470	1298
Gadchiroli	1345	1424	1059	21	18	857	-	-	-
Maharashtra	15195	23188	1526	8419	9071	1077	28122	44546	1584

(Contd..)

Table 2.5 DISTRICTWISE AREA, PRODUCTION AND YIELD OF PRINCIPAL CROPS

MAHARASHTRA 25
1989-90

A = Area in hundred hectares
P = Production in hundred tonnes

Y = Yield per hectare in kilograms

District	Rabi Jowar			Bajra			Tur		
	A	P	Y	A	P	Y	A	P	Y
Thane	-	-	-	-	-	-	44	38	865
Raigad	-	-	-	-	-	-	18	16	865
Ratnagiri	-	-	-	-	-	-	6	5	865
Sindhudurg	-	-	-	-	-	-	-	-	-
Nasik	504	243	482	3633	2425	668	65	56	865
Dhule	681	561	824	1481	1394	941	165	120	729
Jalgaon	665	798	1200	1279	1279	1000	202	197	976
Ahmednagar	5703	2596	455	3191	1770	555	155	73	469
Pune	5198	2802	539	2137	1444	676	30	14	480
Solapur	7425	3601	485	273	115	421	370	142	385
Satara	1518	1328	875	1166	616	528	89	37	413
Sangli	1313	970	739	932	193	207	128	53	413
Kolhapur	55	70	1267	1	1	548	54	22	413
Aurangabad	2478	1824	736	1932	1217	630	456	173	378
Jalna	1555	1147	738	798	431	540	391	254	649
Parbhani	1872	1326	708	123	62	504	705	564	800
Beed	2681	1812	676	1572	769	489	485	274	565
Nanded	371	258	695	8	5	603	457	415	908
Osmanabad	1860	1297	697	114	67	588	820	497	606
Latur	388	311	802	114	56	491	686	389	568
Buldhana	11	5	459	135	68	504	515	521	1013
Akola	-	-	-	58	35	603	774	753	972
Amravati	-	-	-	46	19	413	786	693	882
Yeotmal	8	4	459	123	74	603	839	760	906
Wardha	3	1	459	10	4	376	459	459	1000
Nagpur	403	235	582	1	1	376	529	372	704
Bhandara	141	45	318	-	-	-	83	60	718
Chandrapur	1081	484	447	-	-	-	198	150	757
Gadchiroli	242	93	383	-	-	-	13	9	718
Maharashtra	36156	21811	603	19127	12045	630	9522	7116	747

(Contd..)

Table 2.5 DISTRICTWISE AREA, PRODUCTION AND YIELD OF
PRINCIPAL CROPS

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MAHARASHTRA
1989-90

A = Area in hundred hectares

P = Production in hundred tonnes

Y = Yield per hectare in kilograms

District	Gram			Total Pulses			Total Foodgrains		
	A	P	Y	A	P	Y	A	P	Y
Thane	33	14	423	200	113	565	2049	3236	1579
Raigad	25	11	423	136	56	412	1950	3285	1684
Ratnagiri	-	-	-	69	30	434	414	2363	1671
Sindhudurg	-	-	-	49	18	367	962	1986	2064
Nasik	468	235	502	1108	520	469	7450	5523	741
Dhule	254	136	535	1499	933	622	5751	5281	918
Jalgaon	459	311	677	1978	1195	604	6527	7997	1454
Ahmednagar	321	185	576	862	412	478	10837	6073	560
Pune	360	227	630	809	443	548	9691	6642	865
Solapur	316	202	689	1156	502	434	9547	4995	523
Satara	135	67	496	743	309	416	5297	5546	1047
Sangli	225	123	547	871	403	463	5035	4277	849
Kolhapur	98	56	571	312	128	410	2306	4248	1842
Aurangabad	468	271	579	1793	813	453	7250	5132	708
Jalna	124	61	492	1574	683	434	5043	3551	705
Parbhani	381	203	583	2522	1118	443	7425	5512	742
Beed	228	110	482	1249	570	456	7147	4644	650
Nanded	155	69	445	1365	732	537	4807	5479	1140
Osmanabad	372	197	529	1616	821	508	5160	3635	704
Latur	285	124	435	1741	767	441	4808	4566	950
Buldhana	208	114	548	1866	1271	681	4448	6063	1363
Akola	283	107	378	2639	1518	575	5912	7330	1240
Amravati	273	138	505	1820	1017	559	4214	4936	1171
Yeotmal	115	52	452	1725	1049	608	4372	5500	1258
Wardha	154	88	571	697	587	842	1853	2342	1264
Nagpur	278	130	468	962	572	595	3360	3244	965
Bhandara	126	55	436	542	264	487	4036	4233	1049
Chandrapur	91	45	492	706	360	510	3784	3106	821
Gadchiroli	37	15	392	286	141	493	1915	1693	884
Maharashtra	6272	3346	534	32895	17345	527	144350	132418	917

(Contd..)

Table 2.5 :

DISTRICTWISE AREA, PRODUCTION AND YIELD OF
PRINCIPAL CROPS

MAHARASHTRA

1989-90

27

A = Area in hundred hectares

P = Production in hundred tonnes

Y = Yield per hectare in Kilogram

District	Groundnut (Kharif)			Cotton (lint)			Sugarcane (Cane)		
	A	P	Y	A	P*	Y	A	P	Y@
Thane	2	2	832	-	-	-	-	-	-
Raigad	1	1	832	-	-	-	-	-	-
Ratnagiri	1	1	832	-	-	-	-	-	-
Sindhudurg	14	12	832	-	-	-	-	-	-
Nasik	499	415	832	5	6	195.4	284	28970	102.00
Dhule	838	562	671	645	586	154.5	136	8584	63.12
Jalgaon	463	409	883	1651	1970	202.9	104	8704	83.69
Ahmednagar	132	115	873	12	20	283.3	449	43807	97.56
Pune	441	660	1496	1	2	296.7	319	31327	98.20
Solapur	99	67	673	17	26	260.0	366	31757	86.77
Satara	718	992	1381	8	17	358.8	328	28789	87.77
Sangli	441	445	1009	12	23	325.8	217	22221	102.40
Kolhapur	693	1091	1574	1	1	165.5	578	53893	93.24
Aurangabad	130	79	611	599	684	194.1	224	19401	86.61
Jalna	71	50	710	1241	916	125.5	132	13094	99.20
Parbhani	87	58	663	2510	1936	131.1	81	6588	81.33
Beed	189	125	662	289	273	160.6	142	10389	73.16
Nanded	57	45	797	2213	2240	172.1	107	8118	75.87
Osmanabad	163	130	799	-	-	-	181	11577	63.96
Latur	302	183	607	207	174	142.9	95	6601	69.48
Buldhana	137	97	711	2558	2037	135.4	18	1316	73.11
Akola	65	29	439	3588	2588	122.6	3	208	69.33
Amravati	331	242	732	3629	2796	131.0	9	710	78.89
Yeotmal	85	44	523	4417	2976	114.5	45	3127	69.40
Wardha	178	133	746	1489	1785	203.8	1	69	69.48
Nagpur	249	196	767	656	518	134.2	3	208	69.48
Bhandara	3	2	770	-	-	-	8	556	69.48
Chandrapur	1	1	770	607	540	151.2	1	69	69.48
Gadchiroli	-	-	-	-	-	-	-	-	-
Maharashtra	6390	6186	968	26355	22114	142.6	3831	340083	88.77

* Production in 100 bales of 170 kg. each @ Yield in tonnes/hectares

Source: Directorate of Agriculture, Maharashtra.

B. Fertiliser Scenario

2.5 Distribution of Fertiliser Materials

At the statelevel, the pattern of distribution of various fertiliser materials, during the years 1988-89, 1989-90 and 1990-91, reveals that except for Am. sulphate all the major types of materials have recorded continuous increase from year to year. In terms of quantity the progressive increase is very impressive in respect of urea, DAP (18-46-0), nitrophosphate (15-15-15), single superphosphate, muriate of potash and some NPK mixtures of varying proportions. In regard to the total quantity of the 15 types of materials distributed, it may be seen that in 1989-90, it increased by 25.3 per cent over the previous year and in 1990-91 the similar increase represented 15.7 per cent. The details are presented in Table 2.6.

2.6 Districtwise Consumption

The data on districtwise consumption of the more important fertiliser materials (12 items) for the year 1990-91, compiled by Lead Fertiliser Supplier for Maharashtra, are presented in Table 2.7. At the outset it may be seen that in most cases the consumption figures at the aggregate level are in broad agreement with those of distribution for the year 1990-91 as mentioned in the preceding table. Taking into consideration the high consumption items like urea, single super phosphate, DAP, muriate of potash and NPK mixtures (15:15:15 and 20:20:20), we can identify the more

Table 2.6 : Distribution of Fertiliser Materials in Maharashtra State

Materials	(In tonnes)		
	1988-89	1989-90	1990-91*
Ammonium sulphate (20.6% N)	53041	25483	44395
Urea (46% N)	941277	1203535	1388609
Calcium ammonium nitrate (25%, 26% N)	3796	1662	8677
Ammonium chloride (25% N)	-	430	224
N.P.K. (10-26-26)	85382	99370	105510
N.P.K. (12-32-16)	916	80	-
Diammonium phosphate (18-46-0)	205283	331110	314750
Nitrophosphate (15-15-15)	187473	202250	221730
N.P.K. (20.7-20.7-0)	175017	201630	209477
Urea ammonium phosphate	-	-	-
Single superphosphate (16% P 205)	330600	405530	557100
N.P.K. (19-19-19)	70290	77910	91377
N.P.K. (23-23-0)	-	-	4726
Muriate of potash (60% K 20)	123448	176580	205066
Sulphate of potash (50% K 20)	4500	6299	7683
	2181023	2731869	3159324

* Provisional

Source 9

Table 2.7 : DISTRICTWISE, MATERIALWISE CONSUMPTION OF FERTILISERS

MAHARASHTRA

30 1990-91

(April-March)

(Tonnes)

District	Urea	A.S.	D.A.P.	S.S.P.	M.O.P	S.O.P.
Thane	14894	2728	657	3996	2310	60
Raigad	17715	27	1209	8776	3375	-
Ratnagiri	9706	408	330	708	173	-
Sindhudurg	5544	611	1053	2253	615	-
Nasik	69578	1744	8544	31478	4621	3980
Dhule	47413	2591	8857	16234	4772	-
Jalgaon	120477	5374	27025	66082	35960	-
Ahmednagar	88052	1247	17271	36987	8895	160
Pune	70226	2651	14276	20675	8253	545
Solapur	60673	434	11423	30704	7516	867
Satara	49317	1394	10760	9608	6362	100
Sangli	59437	4785	19125	18940	16688	3251
Kolhapur	99417	4880	20453	41681	25685	11
Aurangabad	43510	514	5290	18979	6225	18
Jalna	29403	454	6596	16539	1395	-
Parbhani	38190	1058	10571	24922	3781	18
Beed	26148	381	10914	10910	1849	-
Nanded	87121	1402	24062	35209	19760	-
Osmanabad	11153	356	3335	6288	1159	59
Latur	28767	5307	12236	28945	3788	121
Buldhana	40050	1342	11310	12123	2890	-
Akola	44640	1153	9337	13051	4085	-
Amravati	42303	1820	22612	14756	8274	-
Yeotmal	38728	689	12815	13057	6448	-
Wardha	34690	373	9868	8546	6715	-
Nagpur	28787	759	19685	14283	3661	-
Bhandara	30364	592	7276	16968	2892	-
Chandrapur	19755	826	5235	4436	1891	-
Gadchiroli	7014	47	631	2273	765	-
MAHARASHTRA	1263073	45947	312756	529407	200803	9190

(Contd).....

Table 2.7c. DISTRICTWISE, MATERIALWISE CONSUMPTION OF FERTILISERS.

MAHARASHTRA

1990-91

31

(April-March)

(Tonnes)

District	C.A.N.	15-15-15	20-20-20	19-19-19	10-26-26	23-23-0	17-17-17
Thane	-	4247	567	745	-	-	-
Raigad	-	1536	115	1333	20	-	-
Ratnagiri	-	3652	270	1365	50	-	-
Sindhudurg	-	2251	170	1755	30	-	-
Nasik	935	13841	11189	5559	12317	635	-
Dhule	969	13874	6119	1326	10077	158	-
Jalgaon	2346	12146	19109	3800	13215	577	755
Ahmednagar	122	23627	20345	8495	16183	238	1303
Pune	304	14516	11562	9001	9100	83	2620
Solapur	115	10211	5624	11012	7469	25	-
Satara	1007	15580	12874	8772	6195	10	-
Sangli	587	12880	3461	13122	7526	103	-
Kolhapur	70	15897	1258	11724	11034	10	-
Aurangabad	-	10952	9232	2904	2852	-	-
Jalna	60	7251	7456	1766	2439	64	-
Parbhani	10	5150	4267	1110	3203	-	-
Beed	-	5062	5219	1645	3606	-	-
Nanded	70	7550	6191	3203	2473	-	-
Osmanabad	-	1702	1861	2461	2530	-	-
Latur	20	4844	4562	2257	3611	10	-
Buldhana	134	4197	23876	1155	4393	845	-
Akola	539	1998	18007	200	4428	37	-
Amravati	388	1473	7352	294	4135	185	-
Yeotmal	78	2350	398	55	3677	105	-
Wardha	-	2217	5410	70	1767	32	-
Nagpur	109	579	3915	160	4924	36	-
Bhandara	92	813	4492	-	2892	12	-
Chandrapur	142	220	2615	-	279	-	-
Gadchiroli	-	10	734	-	383	-	-
MAHARASHTRA	8097	200626	198250	95291	140808	3165	4678

Note: Consumption of AM/CHL in Pune 170 & Solapur 20 Tonnes.

Source: Lead Fertiliser Supplier for Maharashtra

important districts in terms of relatively larger consumption. These are Kolhapur, Jalgaon, Ahmednagar, Nashik, Pune, Satara, Sangli and Sholapur in Western Maharashtra, Wanded and Parbhani in Marathwada and Auravati and Nagpur in Vidarbha among the 29 districts (excluding Bombay) in Maharashtra. Although these districts cut across most of the distinct agro-climatic zones including the scarcity zone, actually it is their irrigation belts and more importantly the dominant commercial crop pattern that have contributed to relatively higher consumption of fertiliser. Specifically mention may be made of sugarcane in some non-coastal districts of Western Maharashtra, banana in Jalgaon and Parbhani, onion and grapes in Nashik and citrus and cotton in Auravati and Nagpur.

The pattern of seasonwise annual consumption during the last decade (1981-82 through to 1990-91) reveals generally an increasing trend over the years both in respect of kharif and rabi seasons. Kharif being the main crop season, the progressive trend is clearly seen right from the year 1984-85. The kharif consumption in 1990 has touched the level of 794.4 thousand tonnes of NPK, recording a positive growth of 10.9 per cent over that of kharif 1989. Similarly in rabi 1990-91, NPK consumption recorded a positive growth of 12.1 per cent over the previous rabi season. The nutrients consumption analysis shows that in kharif K increased by 26.3 per cent, followed by N 10 per cent and P 4.9 per cent. Similarly for rabi season, consumption of P increased by 13.9 per cent,

followed by K 12.4 per cent and N 11.0 per cent over the previous corresponding season. The data presented in Table 2.8 give the relevant details.

The overall fertiliser consumption in the state during 1990-91 (both seasons) is of the order of 1317.3 thousand tonnes of NPK, recording a positive growth of 11.4 per cent over the previous year. With regard to nutrientwise consumption, it may be seen that a positive growth is achieved to the extent of 19.9 per cent in K 20, followed by 10.5 per cent in N and 8.9 per cent in P 205 over the previous year. The increase may be attributed to good rainfall, enough availability of irrigation water, increased area mainly under sugarcane, timely availability of fertilisers etc.

The seasonwise pattern of consumption of N P 205 and K 20, at the disaggregated level of districts for the years 1989-90 and 1990-91 may be seen in data presented in Tables 2.9 and 2.10 respectively. Unlike the aggregate pattern of the state, the level of consumption in 1990-91 declined from that of the level in the corresponding season of the previous year in several districts across the many agro-climatic zones. Considering the NPK nutrients together, consumption level of kharif 1990 has shown decline over that of 1989 in respect of 10 out of 29 districts. These districts are Thane, Raigad, Ratnagiri, Dhule, Jalgaon, Satara, Osmanabad, Yavatmal, Chandrapur and Gadchiroli. Similarly for rabi season, this

Table 2.8 : Seasonwise Consumption of Fertiliser Maharashtra

Year	('000 tonnes)							
	I Kharif				II Rabi			
	N	P	K	Total	N	P	K	Total
1981-82	183.0	69.0	50.0	302.0	141.2	49.1	36.2	226.5
1982-83	138.4	63.8	45.9	248.1	153.0	59.3	45.0	257.3
1983-84	264.3	90.8	60.3	415.4	133.3	54.6	38.7	226.6
1984-85	235.0	78.7	52.4	366.1	124.1	50.5	40.5	215.1
1985-86	288.6	108.2	75.5	472.3	122.0	43.2	31.7	196.9
1986-87	293.4	116.2	67.8	477.4	105.0	43.6	31.0	179.6
1987-88	309.3	115.5	68.6	493.4	141.9	62.6	42.4	246.9
1988-89	349.2	139.4	74.2	562.8	184.0	95.1	49.8	328.9
1989-90	429.9	187.0	98.9	715.2	251.2	138.5	76.6	466.3
1990-91	473.3	196.8	124.3	794.4	279.0	157.8	86.1	522.9

Source : Directorate of Agriculture, Maharashtra

Table 2.9 :

**DISTRICTWISE CONSUMPTION OF N, P205 & K20
MAHARASHTRA
1989-90
(Apr-Mar)**

(tonnes)

District	Kharif 1989			Rabi 1989-90			Total			Total NPK
	N	P205	K20	N	P205	K20	N	P205	K20	
Thane	7477	2477	1302	4379	3864	1149	11856	6341	2451	20648
Raigad	7187	545	197	3869	2477	1064	11056	3022	1261	15338
Ratnagiri	5148	1200	848	163	54	43	5311	1254	891	7457
Sindhudurg	3017	1154	707	387	190	100	3404	1344	807	5555
Nasik	19960	9380	5695	13907	8445	4439	33867	17825	10134	61826
Dhule	21521	10507	5440	7390	4324	2208	28911	14831	7648	51390
Jalgaon	54167	18692	15882	26612	15058	10213	80779	33750	26095	140624
Ahmednagar	22900	8518	5152	25766	12658	5131	48666	21176	10283	80125
Pune	15780	7359	3664	19691	7989	5252	35471	15348	8916	59735
Solapur	17441	8386	3985	14629	7701	4532	32070	16087	8517	56674
Satara	23783	8457	4944	12162	5725	4282	35945	14182	9226	59353
Sangli	9175	5316	5113	15151	7936	4614	24326	13252	9727	47305
Kolhapur	21874	9814	10542	20552	13004	13907	42426	22818	24449	89693
Aurangabad	13362	4403	1370	9621	4198	3983	22983	8601	5353	36937
Jalna	7888	4558	1499	4824	2978	1240	12712	7536	2739	22987
Parbhani	11298	4004	1595	5297	3512	1121	16595	7516	2716	26827
Beed	8698	3344	1589	5022	2515	560	13720	5859	2149	21728
Nanded	26910	10474	6904	14501	7660	5272	41411	18134	12176	71721
Osmanabad	5137	3866	1401	1172	1733	195	6309	5599	1596	13504
Latur	10792	6463	1681	4593	2371	383	15385	8834	2064	26283
Buldhana	18628	8365	1993	7739	3149	779	26367	11514	2772	40653
Akola	18515	6884	2073	5948	3966	701	24463	10850	2774	38087
Amravati	13575	8074	2318	7297	5583	1897	20872	13657	4215	38744
Yeotmal	19534	10552	4381	5143	3495	1052	24677	14047	5433	44157
Wardha	12184	5801	2234	7022	4614	2233	19206	10415	4467	34088
Nagpur	10556	6368	2072	4412	2520	129	14968	8888	2201	26057
Bhandara	9339	4921	1562	2204	373	70	11543	5294	1632	18469
Chandrapur	9349	5004	2024	1264	194	22	10613	5198	2046	17857
Gadchiroli	4762	2099	736	472	222	5	5234	2321	741	8296
Maharashtra	429957	186985	98903	251189	138508	76576	681146	325493	175479	1182118

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Source: Directorate of Agriculture, Maharashtra.

Table 2.10 : DISTRICTWISE CONSUMPTION OF N, P205 & K20

MAHARASHTRA

1990-91
(Apr-Mar)

36

(Tonnes)

District	Kharif 1990			Rabi 1990-91			Total			Total NPK
	N	P205	K20	N	P205	K20	N	P205	K20	
Thane	5461	1070	1146	2963	763	1048	8424	1833	2194	12451
Raigad	4639	610	808	4242	1862	1706	8881	2472	2514	13867
Ratnagiri	4854	1031	818	620	108	106	5474	1139	914	7527
Sindhudurg	3122	1245	834	452	313	214	3574	1558	1048	6180
Jasik	24651	9955	5796	16234	7731	5221	40885	17686	11017	69588
Dhule	21067	7999	4899	7714	4885	2918	28781	12884	7817	49482
Jalgaon	44489	17310	17806	25436	15757	9878	69925	33067	27684	130676
Ahmednagar	28424	13961	8719	26597	13613	6282	55021	27574	15001	97596
Pune	21439	7090	6171	21673	11815	5741	43112	18905	11912	73929
Solapur	19026	9656	5472	16564	7207	5020	35590	16863	10492	62945
Satara	18662	7697	4746	13700	6982	4734	32362	14679	9480	56521
Sangli	18501	9522	8268	19309	9404	9687	37810	18926	17955	74691
Kolhapur	34496	13715	13041	21910	10097	9856	56406	23812	22897	103115
Aurangabad	16386	5151	4297	9013	5101	2382	25399	10252	6679	42330
Jalna	11606	5366	1275	6388	3878	1619	1799	9244	2894	30132
Parbhani	15448	6476	2731	6400	5044	1354	21848	11520	4085	37453
Beed	10820	4211	2052	5727	5608	1075	16547	9819	3127	29493
Nanded	32173	10368	9130	15767	9956	5110	47940	20324	14240	82504
Osmanabad	3691	2189	1221	3462	2105	884	7153	4294	2105	13552
Latur	12006	7228	2582	6959	6041	1844	18965	13269	4426	36660
Buldhana	18945	9205	2726	8081	4898	999	27026	14103	3725	44854
Akola	19185	6165	2779	7793	5317	1161	26978	11482	3940	42400
Amravati	19004	9988	4674	7201	5639	1642	26205	15627	6316	48148
Yeotmal	16008	5899	3572	5110	3508	1616	21118	9407	5188	35713
Wardha	14625	6060	3413	4797	1741	1421	19422	7801	4834	32057
Nagpur	12152	9979	2878	6218	3550	717	18370	13529	3595	35494
Bhandara	11814	4737	1559	4921	3100	1050	16735	7837	2609	27181
Chandrapur	7932	2490	725	2887	1257	515	10819	3747	1240	15806
Gadchiroli	2663	402	201	873	499	359	3536	901	560	4997
Maharashtra	473290	196776	124339	279010	157778	86160	752300	354554	210499	1317353

Source: Districtwise Break-up worked out by LFS of the State

decline is observed in Thane, Jalgaon, Kolhapur, Aurangabad, Amravati and Wardha districts.

2.7 Per Hectare Average Consumption

Another way of looking at the matter is to see the per hectare consumption pattern. The average consumption of N, P 205 and K 20 per hectare is worked out on the basis of gross sown area. In order to obtain a general idea, this exercise is done irrespective of crops, seasons and irrigated or un-irrigated nature of farming. The relevant data for the years 1989-90 and 1990-91 are presented in Table 2.11.

At the aggregate level, the increase in the average level of consumption works out to 8.4 kg per hectare over the previous year (1989-90). The increase is seen in all the three types of nutrients, N increased by 4.5 kg, P 205 by 1.8 kg and K 20 by 2.0 kg per hectare. The degree of change in the level of consumption is uneven at the disaggregated level and in some cases it is even negative. It is almost static or marginally increasing or decreasing by less than one kilogram in three districts, namely, Satnagiri, Satara and Osmanabad. The decline in per hectare level in 1990-91 over that of 1989-90 is somewhat considerable in Thane, Raigad, Dhule, Yavatmal, Wardha, Chandrapur and Gadchiroli districts. Incidentally, these districts are not known for high cost irrigated crops like sugarcane. At the other extreme, nine districts have recorded over 25 per cent increase in the level and these are Sangli, Kolhapur, Pune, Parbhani, Beed, Latur, Nagpur, Bhandara and Amravati.

Table 2.11: DISTRICTWISE CONSUMPTION OF N, P205 & K20 PER HECTARE

MAHARASHTRA **38**
1989-90 & 1990-91

(Kilograms)

District	1989-90 (Apr-Mar)				1990-91 (Apr-Mar)			
	N	P205	K20	Total	N	P205	K20	Total
Thane	41.0	21.9	8.5	71.3	28.9	6.3	7.5	42.7
Raigad	51.4	14.1	5.9	71.4	42.4	11.8	12.0	66.2
Ratnagiri	22.0	5.2	3.7	30.9	21.8	4.5	3.6	30.0
Sindhudurg	28.1	11.1	6.7	45.9	28.7	12.5	8.4	49.5
Nasik	35.0	18.4	10.5	64.0	42.0	18.2	11.3	71.5
Dhule	36.9	18.9	9.7	65.5	36.7	16.4	10.0	63.1
Jalgaon	83.0	34.7	26.8	144.5	81.0	38.3	32.0	151.5
Ahmednagar	37.8	16.4	8.0	62.2	42.2	21.1	11.5	74.8
Pune	30.9	13.4	7.8	52.1	38.3	16.8	10.6	65.8
Solapur	26.5	13.3	7.0	46.8	28.8	13.6	8.5	50.9
Satara	49.3	19.4	12.6	81.4	47.4	21.5	13.9	82.8
Sangli	38.0	20.7	15.2	74.0	61.0	30.6	29.0	120.7
Kolhapur	92.6	49.8	53.4	195.8	141.7	59.8	57.5	259.1
Aurangabad	29.8	11.1	6.9	47.9	32.8	13.2	8.6	54.7
Jalna	20.4	12.1	4.4	36.8	26.8	13.7	4.3	44.8
Parbhani	15.2	6.9	2.5	24.5	22.4	11.8	4.2	38.4
Beed	15.5	6.6	2.4	24.5	21.4	12.7	4.0	38.1
Nanded	51.4	22.5	15.1	89.0	61.8	26.2	18.4	106.4
Osmanabad	9.7	8.6	2.5	20.9	11.0	6.6	3.2	20.8
Latur	22.7	13.1	3.1	38.8	29.7	20.8	6.9	57.5
Buldhana	34.2	14.9	3.6	52.7	35.5	18.5	4.9	59.0
Akola	28.1	12.4	3.2	43.7	31.9	13.5	4.6	50.1
Amravati	27.2	17.8	5.5	50.5	34.9	20.8	8.4	64.2
Yeotmal	28.2	16.0	6.2	50.4	23.8	10.6	5.9	40.2
Wardha	41.3	22.4	9.6	73.3	43.6	17.5	10.8	72.0
Nagpur	24.6	14.6	3.6	42.9	31.9	23.5	6.2	61.7
Bhandara	25.0	11.5	3.5	40.0	34.2	16.0	5.3	55.5
Chandrapur	20.2	9.9	3.9	33.9	20.5	7.1	2.3	30.0
Gadchiroli	24.4	10.8	3.5	38.8	16.4	4.2	2.6	23.1
Maharashtra	33.8	16.2	8.7	58.7	38.3	18.0	10.7	67.1

Note: Worked out on the basis of Gross sown area given in Table No.5.1

In particular, the per hectare consumption during 1990-91 shows Kolhapur at the top with 259 kg followed by Jalgaon, Sangli and Nanded each with over 100 kg level. Among the very low consumption districts, Osmanabad and Gadchiroli get the dubious distinction of recording less than 25 kg per hectare.

CHAPTER III

PERFORMANCE OF THE SAMPLE FARMERS

This concluding chapter incorporates the results of the first phase of the survey, that is, performance of the sample farmers in regard to rabi season of 1991-92. The scope of the chapter is broadly limited to land use pattern and, changes in the rabi cropping pattern and the levels of consumption of fertilizers with the reasons thereof. The analyses of field data are based on both agro-climatic zones and size of operational holding groups with due regard to main crops and crop groups. The data are drawn from 400 sample farmers, equally distributed among five size holding groups, belonging to 40 blocks/tahsils, in 19 districts spreadover all the nine agro-climatic zones in the state.

3.1 Land Use Pattern

The agro-climatic zone-wise pattern of land utilization reveals that nearly 21 per cent area of the land holdings of the sample farmers, at the aggregate level, remains non-cropped area. It is composed of 12.8 per cent of uncultivable fallow and 8 per cent of cultivable fallow. The proportion of fallow lands is rather high among the sample farmers in the very high rainfall and high altitude

ghat zones (I and III). As a result, the zone III farmers report net cropped area being only 39 per cent of their total, followed by those of zone I with 50 per cent. On the other hand, farmers in zone II (high rainfall coastal belt) report as high as 94 per cent of their total area of holdings being net cropped area. The proportion of irrigated area to total net cropped area of sample farmers is rather higher than that of general situation obtained in the state. Consideration of irrigated crops in general and rabi crops in particular in the original sample design has resulted in larger proportion of irrigated area being 40.5 per cent at the aggregate level. This is especially remarkable in the sample of zone IX (72.8 per cent) which covers rice growing area in high rainfall zone of Vidarbha and zone VI with nearly half of the net cultivated area under irrigation as it comprises considerable proportion of sugarcane in Western Maharashtra.

Despite higher proportion of irrigated area in several zones, the area under double cropping is rather low at 13.8 per cent (proportion of double cropped area in gross cropped area) at the aggregate sample level. This may be ascribed to availability of water mostly in the form of protective irrigation. Besides, the assured irrigation facility, wherever available, is preferably utilised for semi-perennial and perennial crops like sugarcane and orchards. This is

especially so in many parts of zones VI and VII and hence lower crop intensity. The pattern of agro-climatic zone-wise land utilisation may be seen in Table 3.1.

The utilisation of land resource by the sample farmers according to size group of their operational holdings, irrespective of agro-climatic zones, reveals the following pattern. The proportion of area under both types of fallows is lower among the smaller holdings and it increases with the corresponding increase in the size group of holding. The proportion of area under irrigation in the net cropped area is generally higher at 50-55 per cent in the smaller holdings; 44-46 per cent in the medium size holdings and quite low at 30.7 per cent in the case of large holdings. Similar is the pattern in regard to the proportion of double cropped area which is relatively higher among the smaller holdings and it declines as the size of holding increases. Thus, in the matter of utilisation of land the smaller holdings are relatively more resourceful in maximising their limited resources.⁶ The relevant data according to size of holding groups are presented in Table 3.2.

3.2 Cropping Pattern

At the outset, it may be said that Maharashtra State as a whole is not very prominent in rabi cropping. With the irrigable area being under 15 per cent of the net cropped

Table 3.1 : Zone-wise Land Utilisation (1991-92)

Agro climatic zones	Total area	Uncultivable fallow	Cultivable fallow	Net cropped area		Total area	Double cropped area total	Gross cropped area total	% of irrigated to net area	% of DCA to GCA	No. of sample farmers
				Irrigated	Unirrigated						
1	54.39 (100.0)	23.68 (43.5)	3.47 (6.4)	6.90	20.34	27.24 (50.1)	1.14	28.38	25.3	4.0	20
2	30.52 (100.0)	1.96 (6.4)	-	-	28.56	28.56 (93.6)	-	28.56	-	-	20
3	35.27 (100.0)	11.84 (33.6)	9.65 (27.4)	5.69	8.09	13.78 (39.0)	1.88	15.66	43.2	12.0	10
4	75.97 (100.0)	7.29 (9.6)	5.78 (7.6)	26.58	36.32	62.90 (82.8)	9.65	72.55	42.3	13.3	30
5	56.36 (100.0)	17.41 (31.0)	1.69 (3.0)	11.72	25.46	37.18 (66.0)	10.28	47.46	31.5	21.7	20
6	432.75 (100.0)	54.71 (12.6)	40.15 (9.3)	166.71	171.18	337.89 (78.1)	58.69	396.58	49.3	14.8	130
7	274.54 (100.0)	25.02 (9.1)	7.53 (2.7)	55.04	186.95	241.99 (88.2)	19.17	261.16	22.7	7.3	80
8	164.25 (100.0)	16.40 (10.0)	8.81 (5.4)	48.50	90.54	139.04 (84.6)	23.48	162.52	34.9	14.4	50
9	149.80 (100.0)	4.46 (3.0)	24.38 (16.3)	88.04	32.92	120.96 (80.7)	37.70	158.66	72.8	23.8	40
Total	1273.85 (100.0)	162.85 (12.8)	101.46 (8.0)	409.18	600.36	1009.54 (79.2)	161.99	1171.53	40.5	13.8	400

N.B. : Figures in parentheses refer to percentages.

Table 3.2 : Land Utilisation According to Size of Holdings - 1991-92

Size holding	Total area	Uncultivable fallow	Cultivable fallow	Wet cultivated area			Double cropped area	Gross cropped area	% of irrigated to total net area
				Irrigated	Unirrigated	Total			
Marginal	56.93 (100.00)	3.40 (5.97)	1.05 (1.85)	28.71 (50.43)	23.77 (41.75)	52.48 (92.18)	19.09 (26.67)	71.57	54.7
Small	114.63 (100.00)	11.13 (9.70)	3.26 (2.85)	53.38 (46.57)	46.86 (40.88)	100.24 (87.45)	21.02 (17.33)	121.26	53.3
Semi-medium	203.75 (100.00)	20.27 (9.95)	11.50 (5.65)	75.30 (36.95)	96.68 (47.45)	171.98 (84.40)	27.76 (13.90)	199.74	43.8
Medium	356.62 (100.00)	49.00 (13.74)	33.21 (9.31)	125.96 (35.32)	148.45 (41.63)	274.41 (76.95)	40.77 (12.94)	315.18	45.9
Large	541.92 (100.00)	79.05 (14.58)	52.44 (9.68)	125.83 (23.22)	284.60 (52.52)	410.43 (75.74)	53.35 (11.50)	463.78	30.7
Total	1273.85 (100.00)	162.85 (12.79)	101.46 (7.96)	409.18 (32.12)	600.36 (47.13)	1009.54 (79.25)	161.99 (13.83)	1171.53	40.5

N.B. : Figures in parentheses refer to percentages.

area and greater proportion of annual precipitations being confined to June-September period, it is the kharif season that is very dominant. Nevertheless, rabi sowing is resorted to in irrigated patches and the areas that receive adequate rainfall in the latter part of the year. Even in the irrigable farms much depends upon the quantum of water available for rabi cropping and the situation is largely conditioned by total rainfall.

In the case of sample farms comprising a fairly high proportion of irrigated area (40 per cent) the rabi sowing during 1991-92 is confined to 34.5 per cent of the total net cropped area at the aggregate level. However, the pattern of rabi cropping is not uniform across the agro-climatic zones. While the zone-2 (coastal area) does not report any rabi crop at all, the zones 1, 3, 4 and 5, have actually less than 10 hectares each under rabi crops. The area under various crops during rabi season is somewhat considerable in zones 7, 8 and 9 (assured and medium to high rainfall areas) and fairly high (58 per cent of net cropped area) among the sample holdings mostly in the irrigated blocks in zone 6. In all, 348.25 hectares out of 1009.54 hectares of net cropped area of the sample is devoted to various crops during the rabi season of 1991-92.

Although the number of crops enumerated is over 20, in terms of area it is just half a dozen individual crops that dominate the pattern to the extent of 84 per cent of

the total cropped area during rabi season. These are jowar - 36%, wheat - 18.6%, red gram - 4.2%, gram 4.8%, sugarcane - 12.7% and sunflower 7.1%. Jowar is dominant in scarcity zone (zone 6) and medium rainfall zone (zone 7). Though wheat, a pure rabi crop, is reported in almost all zones, the substantial proportions of area are found in zones 6 and 8. The pulses are mostly confined to zones 9 and 6 in that order. In the case of sugarcane, the zone 6 with 75 per cent and zone 7 with 25 per cent are dominant. Among oilseed crops, sunflower is confined to zones 6, 7 and 8 and soyabean and safflower in zones 8 and 9. Among the other crops, more than half of the area under vegetables (mostly onion) is in zone 6 and fruits mainly seen in zone 8. Thus rabi cropping is not very substantial in terms of area and it is mainly confined to zones 6 and 7, which together account for 71 per cent of the total rabi area of the sample farmers. The details of area under rabi crops according to agro-climatic zones are presented in Table 3.3.

The pattern of rabi cropping according to size of holding groups yields the following observations. The area devoted to rabi crops, in terms of proportion to net cropped area, is relatively higher among the marginal and small farm groups than medium and large holdings. The two smaller groups report 42-54 per cent net cropped area under rabi, the two medium groups around 33 per cent each and the large

Table 3.3 : Agro-climatic zonewise Area under Crops During the Rabi Season of 1991-92

(Area in hectares)

Crops	Zones									Total
	1	2	3	4	5	6	7	8	9	
Cereals										
Jowar	-	-	-	-	-	95.09 (48.96)	26.95 (50.62)	3.80 (9.25)	-	125.84 (36.13)
Wheat	0.30 (22.39)	-	0.10 (2.21)	2.54 (32.94)	5.18 (68.34)	31.27 (16.10)	5.32 (9.99)	14.81 (36.05)	5.17 (13.40)	64.69 (18.58)
Others	0.02 (1.49)	-	0.10 (2.21)	-	-	0.66 (0.34)	-	-	-	0.78 (0.22)
Total cereals	0.32 (23.88)	-	0.20 (4.42)	2.54 (32.94)	5.18 (68.34)	127.02 (65.40)	32.27 (60.61)	18.61 (45.30)	5.17 (13.40)	191.31 (54.93)
Pulses										
Tur	0.40 (29.85)	-	-	-	-	-	-	-	14.05 (36.44)	14.45 (4.15)
Other pulses	0.27 (20.15)	-	0.60 (13.27)	0.60 (7.78)	2.40 (31.66)	10.26 (5.28)	1.40 (2.63)	-	5.15 (13.36)	20.68 (5.94)
Total pulses	0.67 (50.00)	-	0.60 (13.27)	0.60 (7.78)	2.40 (31.66)	10.26 (5.28)	1.40 (2.63)	-	19.20 (49.80)	35.13 (10.09)
Sugarcane	0.20 (14.93)	-	3.27 (72.35)	1.25 (16.21)	-	28.70 (14.78)	10.92 (20.51)	-	-	44.34 (12.73)
Oil seeds										
Sunflower	-	-	-	-	-	14.83 (7.64)	5.35 (10.05)	4.50 (10.95)	-	24.68 (7.09)
Other oil seeds	0.02 (1.49)	-	0.45 (9.96)	1.12 (14.53)	-	-	-	7.97 (19.40)	14.19 (36.80)	23.75 (6.81)
Total oil seeds	0.02 (1.49)	-	0.45 (9.96)	1.12 (14.53)	-	14.83 (7.64)	5.35 (10.05)	12.47 (30.35)	14.19 (36.80)	48.43 (13.90)
Vegetables	0.13 (9.70)	-	-	2.20 (28.54)	-	8.71 (4.48)	-	0.20 (0.49)	-	11.24 (3.23)
Fruits	-	-	-	-	-	4.20 (2.16)	3.30 (6.20)	9.80 (23.86)	-	17.30 (4.98)
Miscellaneous	-	-	-	-	-	0.50 (0.26)	-	-	-	0.50 (0.14)
Total cropped area	1.34 (100.00)	-	4.52 (100.00)	7.71 (100.00)	7.58 (100.00)	194.22 (100.00)	53.24 (100.00)	41.08 (100.00)	38.56 (100.00)	348.25 (100.00)
Percentage of rabi cropped area to net cropped area	4.92	-	32.80	12.26	20.39	57.48	22.00	29.55	31.88	34.50

N.B. : Figures in parentheses refer to percentages.

group shows about 31 per cent. While the cereals (jowar and wheat) dominate cropping pattern to the tune of 55 per cent of the total area under rabi crops, the smaller holdings show less than 50 per cent of area under cereals as against more than 56 per cent shown by medium and large holdings. On the other hand, the smaller holdings have relatively larger proportion of their area under sugarcane than is the case with the medium and large holdings. The pattern is rather mixed in the case of pulses and oilseed crops. Though the two higher holding groups (IV & V) have slight edge over other groups in regard to oilseed crops especially sunflower and soyabean. The details of area under crops during the rabi season of 1991-92 by size of operational holding groups are presented in Table 3.4.

3.3 Impact on Cropping Pattern

In order to assess the impact of increase in fertilizer prices on cropping pattern, we have made a comparison of the rabi cropping pattern of 1991-92 with that of 1990-91. It is done in regard to both agro-climatic zonewise and size groupwise of the sample farmers. The relevant details are presented in Tables 3.5 and 3.6 respectively.

Apparently, there is no change in the cropping pattern between the two rabi seasons. In most cases, whatever the changes recorded in area under crops are too insignificant to merit any serious consideration. The area

Table 3.4 : Size of holdingwise Area under Crops : Kabi Season of 1991-92

		(Area in hectares)					
Crops		Size holding					Total
		1	2	3	4	5	
Cereals	Jowar	6.71 (23.81)	12.64 (29.87)	22.29 (40.22)	31.49 (32.97)	52.71 (41.56)	125.84 (36.13)
	wheat	5.94 (21.09)	7.71 (18.22)	9.91 (17.88)	22.00 (23.04)	19.13 (15.08)	64.69 (18.58)
	Others	0.16 (0.57)	0.12 (0.28)	-	0.40 (0.42)	0.10 (0.08)	0.78 (0.22)
	Total cereals	12.81 (45.47)	20.47 (48.37)	32.20 (58.10)	53.89 (56.43)	71.94 (56.72)	191.31 (54.93)
Pulses	Tur	1.42 (5.04)	1.26 (2.98)	4.79 (8.64)	4.60 (4.82)	2.38 (1.88)	14.45 (4.15)
	Other pulses	3.17 (11.25)	2.63 (6.21)	1.65 (2.98)	4.95 (5.18)	8.28 (6.53)	20.68 (5.94)
	Total pulses	4.59 (16.29)	3.89 (9.17)	6.44 (11.62)	9.55 (10.00)	10.66 (8.41)	35.13 (10.09)
Sugarcane	5.74 (20.39)	7.76 (18.34)	5.54 (10.00)	8.40 (8.80)	16.90 (13.31)	44.34 (12.73)	
Oil seeds	Sunflower	1.05 (3.73)	3.07 (7.26)	2.06 (3.72)	5.40 (5.65)	13.10 (10.33)	24.68 (7.09)
	Other oil seeds	0.99 (3.51)	2.82 (6.66)	2.34 (4.22)	9.71 (10.17)	7.89 (6.22)	23.75 (6.81)
	Total oil seeds	2.04 (7.24)	5.89 (13.92)	4.40 (7.94)	15.11 (15.82)	20.99 (16.55)	48.43 (13.90)
Vegetables	1.84 (6.53)	1.76 (4.16)	3.19 (5.76)	2.55 (2.67)	1.90 (1.50)	11.24 (3.23)	
Fruits	1.11 (3.94)	2.19 (5.17)	3.65 (6.58)	6.00 (6.28)	4.35 (3.43)	17.30 (4.98)	
Miscellaneous	0.04 (0.14)	0.36 (0.85)	-	-	0.10 (0.08)	0.50 (0.14)	
Total cropped area		28.17 (100.00)	42.32 (100.00)	55.42 (100.00)	95.50 (100.00)	126.84 (100.00)	348.25 (100.00)

W.B. : Figures in parentheses indicate percentages.

Table 3.5 : Agro-climatic Zone-wise Change in the Rabi Cropping Pattern between 1990-91 and 1991-92

Crops		(Area in hectares)									
		Zones									
		1		2		3		4		5	
		1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92
Cereals	Jowar	-	-	-	-	-	-	-	-	-	-
	Wheat	0.30 (26.09)	0.30 (22.39)	-	-	-	0.10 (2.21)	5.70 (68.26)	2.54 (32.94)	3.99 (67.63)	5.18 (68.34)
	Others	-	0.02 (1.49)	-	-	-	0.10 (2.21)	-	-	-	-
	Total cereals	0.30 (26.09)	0.31 (23.88)	-	-	-	0.20 (4.42)	5.70 (68.26)	2.54 (32.94)	3.99 (67.63)	5.18 (68.34)
Pulses	Tur	-	0.40 (29.85)	-	-	-	-	-	-	-	-
	Other pulses	0.85 (73.91)	0.27 (20.15)	-	-	-	0.60 (13.27)	-	0.60 (7.78)	1.91 (32.37)	2.40 (31.66)
	Total pulses	0.85 (73.91)	0.67 (50.00)	-	-	-	0.60 (13.27)	-	0.60 (7.78)	1.91 (32.37)	2.40 (31.66)
Sugarcane	-	0.20 (14.93)	-	-	1.05 (80.77)	3.27 (72.35)	-	1.25 (16.21)	-	-	
Oil seeds	Sunflower	-	-	-	-	-	-	-	-	-	-
	Other oil seeds	-	0.02 (1.49)	-	-	0.25 (19.23)	0.45 (9.96)	0.35 (4.20)	1.12 (14.53)	-	-
	Total oil seeds	-	0.02 (1.49)	-	-	0.25 (19.23)	0.45 (9.96)	0.35 (4.20)	1.12 (14.53)	-	-
Vegetables	-	0.13 (9.70)	-	-	-	-	2.30 (27.54)	2.20 (28.54)	-	-	
Fruits	-	-	-	-	-	-	-	-	-	-	
Miscellaneous	-	-	-	-	-	-	-	-	-	-	
Total cropped area	1.15 (100.00)	1.34 (100.00)	-	-	1.30 (100.00)	4.52 (100.00)	8.35 (100.00)	7.71 (100.00)	5.90 (100.00)	7.58 (100.00)	

Contd...

Table 3.5 : (Continued)

(Area in hectares)

Crops	Zones									
	6		7		8		9		Total	
	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92
Cereals										
Jowar	102.06 (49.59)	95.09 (48.96)	17.34 (30.96)	26.95 (50.62)	4.40 (9.52)	3.80 (9.25)	-	-	123.80 (34.47)	125.84 (36.13)
Wheat	28.62 (13.91)	31.27 (16.10)	5.30 (9.46)	5.32 (9.99)	18.81 (40.69)	14.81 (36.05)	4.19 (12.19)	5.17 (13.40)	66.91 (18.64)	64.69 (18.58)
Others	1.98 (0.96)	0.66 (0.34)	-	-	-	-	-	-	1.98 (0.55)	0.78 (0.22)
Total cereals	132.66 (64.46)	127.02 (65.40)	22.64 (40.42)	32.27 (60.61)	23.21 (50.21)	18.61 (45.30)	4.19 (12.19)	5.17 (13.40)	192.69 (53.66)	191.31 (54.93)
Pulses										
Tur	-	-	-	-	-	-	-	14.05 (36.44)	-	14.45 (4.15)
Other pulses	13.49 (6.56)	10.26 (5.28)	4.53 (8.09)	1.40 (2.63)	1.60 (3.46)	-	15.83 (46.04)	5.15 (13.36)	38.21 (10.65)	20.68 (5.94)
Total pulses	13.49 (6.56)	10.26 (5.28)	4.53 (8.09)	1.40 (2.63)	1.60 (3.46)	-	15.83 (46.04)	19.20 (49.80)	38.21 (10.65)	35.13 (10.09)
Sugarcane	29.56 (14.36)	28.70 (14.78)	11.02 (19.67)	10.92 (20.51)	-	-	-	-	41.63 (11.59)	44.34 (12.73)
Oil seeds										
Sunflower	14.97 (7.27)	14.83 (7.64)	14.98 (26.75)	5.35 (10.05)	6.90 (14.92)	4.50 (10.95)	-	-	36.85 (10.26)	24.68 (7.09)
Other oil seeds	2.33 (1.15)	-	-	-	4.22 (9.13)	7.97 (19.40)	14.36 (41.77)	14.19 (36.80)	21.51 (5.99)	25.75 (8.81)
Total oil seeds	17.30 (8.40)	14.83 (7.64)	14.98 (26.75)	5.35 (10.05)	11.12 (24.05)	12.47 (30.35)	14.36 (41.77)	14.19 (36.80)	58.36 (16.25)	48.43 (13.90)
Vegetables	7.97 (3.88)	8.71 (4.48)	-	-	-	0.20 (0.49)	-	-	10.27 (2.86)	11.24 (3.23)
Fruits	4.15 (2.02)	4.20 (2.16)	2.84 (5.07)	3.30 (6.20)	10.30 (22.28)	9.80 (23.86)	-	-	17.29 (4.81)	17.30 (4.98)
Miscellaneous	0.66 (0.32)	0.50 (0.26)	-	-	-	-	-	-	0.66 (0.18)	0.50 (0.14)
Total cropped area	205.79 (100.00)	194.22 (100.00)	56.01 (100.00)	53.24 (100.00)	46.23 (100.00)	41.08 (100.00)	34.38 (100.00)	38.56 (100.00)	359.11 (100.00)	348.25 (100.00)

N.B. : Figures in parentheses indicate percentages.

Table 3.6 : Size of Holdingwise Change in the Rabi Cropping Pattern between 1990-91 and 1991-92

(Area in hectares)

Crops		Size group										Total	
		1		2		3		4		5		1990-91	1991-92
		1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92
Cereals	Jowar	6.66 (28.97)	6.71 (23.71)	8.90 (24.03)	12.64 (29.87)	18.54 (31.84)	22.29 (40.22)	34.07 (32.04)	31.49 (32.97)	55.63 (41.35)	52.71 (41.56)	123.80 (34.47)	125.84 (36.13)
	wheat	3.91 (17.00)	5.94 (21.09)	4.65 (12.55)	7.71 (18.22)	10.15 (17.43)	9.91 (17.88)	24.34 (22.89)	22.00 (23.04)	23.86 (17.74)	19.13 (15.08)	66.91 (18.64)	64.69 (18.58)
	Others	0.05 (0.22)	0.16 (0.57)	0.83 (2.24)	0.12 (0.28)	0.25 (0.44)	-	0.65 (0.61)	0.40 (0.42)	0.20 (0.15)	0.10 (0.08)	1.98 (0.55)	0.78 (0.22)
	Total cereals	10.62 (46.19)	12.81 (45.47)	14.38 (38.82)	20.47 (48.37)	28.94 (49.71)	32.20 (58.10)	59.06 (55.54)	53.89 (56.43)	79.69 (59.24)	71.94 (56.72)	192.69 (53.66)	191.31 (54.93)
Pulses	Tur	-	1.42 (5.04)	-	1.26 (2.98)	-	4.79 (8.64)	-	4.60 (4.82)	-	2.38 (1.88)	-	14.45 (4.15)
	Other pulses	2.89 (12.57)	3.17 (11.25)	5.33 (14.39)	2.63 (6.21)	7.80 (13.40)	1.65 (2.98)	8.17 (7.68)	4.95 (5.18)	14.02 (10.42)	8.28 (6.53)	38.21 (10.65)	20.68 (5.94)
	Total pulses	2.89 (12.57)	4.59 (16.29)	5.33 (14.39)	3.89 (9.19)	7.80 (13.40)	6.44 (11.62)	8.17 (7.68)	9.55 (10.00)	14.02 (10.42)	10.66 (8.41)	38.21 (10.65)	35.13 (10.09)
Sugarcane	3.81 (16.57)	5.74 (20.39)	5.83 (15.74)	7.76 (18.34)	4.58 (7.97)	5.54 (10.00)	9.10 (8.56)	8.40 (8.80)	18.31 (13.61)	16.90 (13.31)	41.63 (11.59)	44.34 (12.73)	
Oil seeds	Sunflower	2.01 (8.74)	1.05 (3.73)	4.70 (12.69)	3.07 (7.26)	7.25 (12.45)	2.06 (3.72)	14.29 (13.44)	5.40 (5.65)	8.60 (6.39)	13.10 (10.33)	36.85 (10.26)	24.68 (7.09)
	Other oil seeds	1.04 (4.52)	0.99 (3.51)	2.51 (6.78)	2.82 (6.66)	3.50 (6.01)	2.34 (4.22)	6.97 (6.55)	9.71 (10.17)	7.49 (5.57)	7.89 (6.22)	21.51 (5.99)	23.75 (6.81)
	Total oil seeds	3.05 (13.26)	2.04 (7.24)	7.21 (19.47)	5.89 (13.92)	10.75 (18.46)	4.40 (7.94)	21.26 (19.99)	15.11 (15.82)	16.09 (11.96)	20.99 (16.55)	58.36 (16.25)	48.43 (13.90)
Vegetables	1.51 (6.57)	1.84 (6.53)	1.70 (4.59)	1.76 (4.16)	2.00 (3.44)	3.19 (5.76)	2.05 (1.93)	2.55 (2.67)	3.01 (2.24)	1.70 (1.50)	10.27 (2.86)	11.24 (3.23)	
Fruits	1.11 (4.84)	1.11 (3.94)	2.13 (5.75)	2.19 (5.17)	4.15 (7.12)	3.65 (6.58)	6.60 (6.21)	6.00 (6.28)	3.30 (2.45)	4.35 (3.43)	17.29 (4.81)	17.30 (4.98)	
Miscellaneous	-	0.04 (0.14)	0.46 (1.24)	0.36 (0.85)	-	-	0.10 (0.09)	-	0.10 (0.08)	0.10 (0.08)	0.66 (0.18)	0.50 (0.14)	
Total cropped area		22.99 (100.00)	28.17 (100.00)	37.04 (100.00)	42.32 (100.00)	58.22 (100.00)	55.42 (100.00)	106.34 (100.00)	95.50 (100.00)	134.52 (100.00)	126.84 (100.00)	357.11 (100.00)	348.25 (100.00)

N.B. : Figures in Parentheses refer to percentages.

under crops in the preceding rabi season (1990-91) is substantial only in zone 6 and not inconsiderable in zones 7, 8 and 9. However, in zones 1 and 3 the total area under rabi crops is very meagre, below two hectares each; in zones 4 and 5, it is well below 10 hectares and in zone 2 virtually no rabi is reported. We may conveniently ignore these five zones as of no consequence at all.

At the aggregate level of the sample, the total area under rabi in 1991-92 has declined by only to the extent of 10.86 hectares over the previous rabi season, representing a mere three per cent change. In the agro-climatic zones that matter the decline in the area, though very marginal, is seen in respect of zones 6, 7 and 8 and other way round in the zone 9. In terms of area under specific crops the significant change may be observed in the case of red gram (tur). This crop, conspicuous by its absence in all the nine zones in the previous season, has now made its appearance, but almost entirely in zone 9 and, that too mainly at the expense of other pulse crops. Similarly, a decrease to the extent of a little under 10 hectares in the case of sunflower in zone 7 and a decrease of seven hectares in jowar area in zone 6 may also be noted. In all other cases, the changes are only to the extent of two or three hectares either way with relative proportions remaining least affected.

By and large, the above pattern is similar from the point of view of size holding groups of the sample farmers as well (Table 3.6). In point of fact, the marginal and small farm groups show slight increase in their total rabi area by about five hectares each and it is mainly claimed by cereals, sugarcane and red gram. In the case of semi-medium (size group 3) holdings slight increase in the rabi area may be noted in respect of jowar, red gram and sugarcane. However, total area under rabi for the group has declined by about three hectares with the decrease in other pulses and oilseed crops. Similarly, the medium and large (size groups 4 and 5) holdings, too, have recorded area decrease by 8-10 hectares. The slight decrease may be noted in respect of cereals, other pulses and sugarcane. Besides, there is decrease in the area under sunflower only in the case of medium group. The crops showing some increase in area in respect of these two size groups are red gram and other oilseeds and, sunflower only in the case of large holding group.

Reasons for Change in the Cropping Pattern

When asked to state reasons for the change in the rabi cropping pattern, both in regard to choice of the crop and area planted, most of the concerned informants have come out with one or two standard reasons. The most predominant reason stated, in all the agro-climatic

regions by all the size holding groups, refers to the prevailing crop rotation practice peculiar to local soil-climatic conditions. This is followed by inadequate rainfall and reduced irrigation facility as the stated reasons especially in the case of those who have opted for some reduction in the rabi area and switching crops in favour of cereals and crops requiring less water. A few farmers switching over to sunflower in Jalgaon Bhandara and some smaller farmers slightly increasing the area under sugarcane in Kolhapur and Ahmednagar districts have done so for the reason of favourable market conditions and hence better returns.

Apparently, the increase in fertiliser prices as a reason has not been a factor influencing the farmers' decision about the choice of the rabi crops in 1991-92. It is borne by the fact that virtually no significant change in the cropping pattern has taken place. It is only in some cases where the shrinkage in area has taken place it is ascribed to failure of monsoon and inadequacy in the irrigation facility. This is well substantiated by the prevailing drought situation in Maharashtra. It may also be noted that many farmers have had the advantage of lifting the fertilisers from the dealers' stocks at the pre-budget rates so as not to be affected by the hike.

3.4 Impact on Fertiliser Consumption

In this concluding section an attempt is made to assess the change in the levels of fertiliser consumption in respect of major rabi crops of 1991. The consumption level of the previous (1990) rabi season is taken as 'normal' to provide the basis for the cropwise comparison. However, not all the zones and crops are considered here for want of meaningfully sufficient number of observations. In point of fact, in zones 1, 3 and 5 less than 10 farmers each, in zone 4 only 20 farmers and in zone 2 none of the sample are found reporting rabi crops. The number of observations for individual rabi crops in all these zones is too insignificant to merit cropwise analysis. In the case of zone 9 although 25 sample farmers report rabi cropping, none of them has used fertilisers as a matter of tradition. In view of this situation, the following results are based on data obtained from the reporting samples in zones 6, 7 and 8. Even here, not all the crops are amenable for want of sufficient number of observations or considerable extent of area under the given crop. Besides, the difficulty in separately obtaining the N.P.K. components has compelled us to lump all kinds of fertiliser inputs together. In the data presented in relevant tables the fertiliser inputs under 'normal' (previous rabi) and 'actual' (current rabi) are calculated on average per hectare basis and expressed in terms of physical quantity (kgs) and money value (Rs.).

The main crops adequately amenable to analysis are jowar, wheat, sugarcane and sunflower, which figure in more than one zone and gram and onion mostly relevant only in zone 6. The data on crop by crop changes in fertiliser input levels in the various size of holding groups are presented in Table 3.7.

Jowar

It is substantially reported by all the size groups in zone 6, with the total area being nearly 100 hectares, and only by two and three size groups in zone 7 and zone 8 with total area less than eight and four hectares respectively. However, there is no change in the level of fertiliser inputs between rabi 1990 and current rabi in respect of any of the five size holding groups in zone 6. The per hectare input in terms of value also remaining same between the two points proves that the price hike is not effective in the sense that the old rates prevailed at the time of purchase. The situation is same in respect of jowar crop in zone 8 as well. It is only in zone 7, per hectare consumption has declined by 50 per cent in the smallest size group even though there is no change in the price of the fertiliser purchased.

Wheat

This is essentially a rabi crop and fairly substantially reported in zones 6 and 8. There is no change at all in respect of quantity consumed and the price level

Table 3.7 : Cropwise and Zonewise Per Hectare Consumption of Fertiliser According to Size of Holding Groups During the Rabi Seasons of 1990 and 1991

Size group	Year	(Quantity in kg.) (Value in Rs.)																					
		Jowar						Wheat						Sugarcane				Sunflower					
		Zone 6		Zone 7		Zone 8		Zone 6		Zone 7		Zone 8		Zone 6		Zone 7		Zone 6		Zone 7		Zone 8	
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
1	1990	88.6	254	63.7	242	-	-	167.3	478	333.3	1240	196.0	610	577.5	1470	1043.5	3023	250.0	1050	-	-	250.0	650
	1991	88.6	254	31.8	121	-	-	147.1	417	333.3	1240	196.0	610	531.9	1211	1043.5	3023	125.0	525	-	-	250.0	650
2	1990	84.8	236	-	-	-	-	292.9	880	250.0	822	186.9	536	843.4	2295	649.3	1680	-	-	-	-	142.8	444
	1991	84.8	236	-	-	-	-	238.4	728	250.0	822	186.9	536	795.2	2126	562.8	1480	-	-	-	-	142.8	444
3	1990	86.6	233	-	-	250.0	900	323.6	1032	229.9	674	166.7	578	911.8	2210	955.9	2623	104.2	396	90.9	254	-	-
	1991	86.6	233	-	-	250.0	900	323.6	1032	229.9	674	166.7	578	911.8	2210	882.3	2403	104.2	396	90.9	254	-	-
4	1990	27.6	59	31.2	91	166.7	539	200.4	646	750.0	2500	127.3	383	492.2	1503	1500.0	3000	140.6	541	227.3	689	-	-
	1991	27.6	59	31.2	91	166.7	539	198.4	628	750.0	2500	127.3	383	492.2	1503	1500.0	3000	140.6	541	227.3	689	-	-
5	1990	24.0	69	-	-	141.8	537	195.9	534	250.0	835	140.6	483	510.6	1273	200.0	437	105.3	372	93.7	275	175.0	564
	1991	24.0	69	-	-	141.8	537	150.5	405	250.0	835	140.6	483	510.6	1273	200.0	437	63.1	227	93.7	275	175.0	564
Total	1990	46.2	124	37.6	120	161.2	559	220.0	662	274.9	916	150.2	482	610.5	1608	602.7	1511	120.7	448	153.0	456	163.5	506
	1991	46.2	124	31.4	97	161.2	559	197.2	596	274.9	916	150.2	482	598.2	1554	573.1	1436	96.0	362	153.0	456	163.5	506

between the two points of time in respect of reporting farmers in zones 7 and 8. However, in zone 6, we find some decrease in the level of consumption in the current rabi to the tune of 10.4 per cent over the normal at the aggregate level. The decrement in the quantity consumed at the disaggregated level is 12 per cent in size group 1, 18.6 per cent in size group 2, just one per cent in size group 4 and 23 per cent in size group 5. There is no change in respect of size group 3 (semi-medium). Since the money values per unit remains the same, the lower consumption is not due to any hike in the price of fertiliser.

Sugarcane

It is only in zones 6 and 7 we find some area under this crop during the rabi season. The change in the consumption level is manifest only in the form of decrement in the current season and it is observed in respect of size groups I (by 7.9 per cent) and II (by 5.7 per cent) in zone 6 and size group II (by 13.3 per cent) and size group III (by 7.7 per cent) in zone 7. The decrement in the consumption, however, is not caused by the hike in the price.

Other Crops

In the case of sunflower the decrement in the level of fertiliser consumption may be noticed only in zone 6 and that too in respect of size groups I and V to the extent of 50 per cent and 40 per cent respectively. The rabi gram in

zone 6 records decrease in the level of consumption by 50 per cent in size group I and by 15 per cent in size group V. It may also be mentioned that in the case of miscellaneous crop group such as, onion, other oilseeds and horticultural crops, no change in the levels of consumption is observed and hence its exclusion from the tables.

Reasons for Lower Consumption

Apart from the inadequacy of water input for rabi cropping the other reasons that are adduced for lower level of fertiliser consumption mainly revolved around financial crunch faced by the reporting farmers. These are shortage of own funds and lack of credit support.

(In sum, it may be surmised that the hike in fertiliser prices has had no direct impact on fertiliser consumption during the current rabi season since the existing stocks were to be sold at the rates prevailing before the government order. That there has not been any significant fall in the consumption is also supported by the provisional figures compiled by the State Government which indicate that shortfall in the current rabi consumption is only by 4.2 per cent over that of the previous year in the entire Maharashtra State.)