A SPATIO - TEMPORAL ANALYSIS OF GROWTH AND INSTABILITY OF OILSEEDS IN INDIA : A DISTRICT LEVEL STUDY (1970-71 TO 1987-88)

Dissertation submitted to the Jawaharlal Nehru University in partial fulfillment of the requirements for the award of the Degree of

MASTER OF PHILOSOPHY

SATISH KUMAR

Centre for The Studies of Regional Development
School of Social Sciences
Jawaharlal Nehru University
New Delhi - 110067
1995

In the Loving Memory

of my Sister

Sushila Sharma

जवाहरलाल नेहरू विश्वविद्यालय
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067

21 July 1995

CERTIFICATE

Certified that dissertation entitled **A Spatio-temporal Analysis of Growth and Instability of Oilseeds in India : A District level study (1970-71 to 1987-88)** submitted by **Satish Kumar** is in partial fulfilment of the requirements for the award of the degree of Master of Philosophy of this University. The dissertation has not been submitted for any other degree of this University, or any other University and is his own work.

We recommend that this dissertation may be placed before the examiners for evaluation.

Prof. Atiya Habib Kidwai
(Chairperson)

Prof. M. H. Qureshi
(Supervisor)

GRAM : JAYENU TEL. : 667676, 667557 TELEX : 031-73167 JNU IN FAX : 91-011-6865886

CONTENTS

ACKNOWLEDGMENTS

Research of any kind warrants tremendous involvement at the psychological level. The study haunts you, goads you, comes heavy upon your back. And especially if one is a beginner, the initial interest that sparks-off the determination to embark upon the study becomes cumbersome mid-way. This is where one needs support from others. A bit of advice, a word of encouragement, a pat in the back prompts you back into action.

It was at such a turn in the course of my study that my supervisor Dr. M.H. Qureshi came to rescue me in a big way. When I feel, I was driving in to the guagmire of methodological intricacies during the analysis and interpretation of data, my supervisor literally led me by hand out of such a mess. I owe him an immense debt of gratitude, were if not for him my dissertation would not have seen the light of the day. Also my indebtness goes to Prof. G.K. Chadha, Prof. G.S. Bhalla, Prof. Atiya Habeeb and other faculty members.

My special thanks goes to my friends Sushil Kumar, D.K. Dube and technical Assistant Meena Dube. Finally I must confess that the affection my parents showered and the confidence they reposed on me impelled me to pursue my research with convincing zeal and enthusiasm.

I am also thankful to Welltech Computers, who in a short period of time completed my typing work.

The views expressed in this study, the conclusion drawn and any errors that may remain are attributable to me alone.

Satish Kumar

List of Tables

List of Maps

CHAPTER - I

INTRODUCTION

The oilseeds play an important role in the agricultural economy of the country. Edible oils form an important part of the human diet while the non-edible oils are the mainstay of industries like soaps, paints, varnishes, hairoils, lubricants, greases etc. The major edible oilseeds of India are groundnut, sesamum, rapeseed and mustard. The non-edible oilseeds consist of castor and linseed. These five major oilseeds cover almost Ninety-one percent of the total area under oilseeds in India and remaining nine percent is shared by safflower, Niger and Soyabean. Oilseeds as a whole account for 10.14 percent of the gross cropped area and contribute more than 5 percent to the Gross National Product. Andhra Pradesh, Karnataka, Tamilnadu, Gujarat, Maharashtra, Uttar Pradesh, Madhya Pradesh and Rajasthan together account for almost 86 percent of the total area under oilseeds. In 1990, an area of as much as 21.60 million hectares out of the current world's area of 123.40 million hectares under important oilseeds was from India alone[1]

It can be seen from the above table that India has a significant area under oilseeds in the world for safflower, Castor seed and groundnut.

---

1. Food and Agricultural Organisation of the United Nations (FAO) 1991, & Year book, 1990, Rome.

Table 1.1

Oilseed	Percentage of area of different oil seeds to the total area under that oilseed in the world.
Safflower	More than 65
Castor	53
Groundnut	40
Sesamum	37
Rapeseed	29
Linseed	26
Sunflower	7
Soyabean	4

While in case of sunflower and Soyabean we lag behind. India's share is more than 18 per cent in the world total area under oilseeds but its share in world output is less than 10 percent. One of the principal reasons for such a paradoxical situation is that the oilseed producing areas lie in the regions of scant rainfall[2]. As a result of adverse crop growing environment and the uncertainties associated with their production, the per hectare yield of oilseeds is 741 kgs. in India compared to the average yield of 1492 kgs. at the world level[3].

---

2. Rao V Ranga, what catapulted the vegetable oilseeds sector from out its Decade old Intertia? Two successive monsoons or wonder Technology " Journal of oilseeds Research, vol. 8, No.1 June 1991.

3. Food and Agriculture Organisation of the United Nations (FAO) 1991, FAO Production Year book, 1990, Rome.

Although India has the largest cultivated area under oilseeds in the world, the current consumption level of crucial nutrient such as oils and fats are below the minimum nutritional requirements[4]. India the daily availability of 14 gms. is far below the level of 21.7 gms before world war II and the minimum nutritional level of 18 gms[5] Despite the fact that India has the largest area under important oilseeds indigenous production has fallen short to requirements. The country has been a major importer of edible oils during the last decade. Its annual imports of edible oils averaged 1.30 million tonnes during 1980-81 to 1985-86 valued at Rs. 801.17 crores[6].

India has already attained self-sufficiency in food grains. Now policy makers are arguing to be self-sufficient in oilseeds. Because from 1967 to 1981 annual population growth rate averaged about 2.1 percent and per capita income rose at 3.5 percent but the edible oil production.

---

4) Ninan K.N. " Edible oilseeds Growth and Area Responses" Economic and Political Weekly Vol.24, No. 39, September 30, 1989.

5) Chhatrapati, A.C, "Trends in oilseeds Production" Research and Development strategies for oilseeds in India, ICAR, 1979, New Delhi.

6) Singh A.J. and Dhaliwal Sarbjit, "Production, Performance, Potentials and prospects for oilseeds in India" Indian Journal of Agricultural Economics, vol. 48, No.3, July, Sept. 1993.

(traditional and non-traditional sources)increased at the rate of 2.5 per cent annually, hence to fill up the gap the country has to invest a huge amount of money for importing the edible oils. Despite the efforts to increase oilseeds production, per capita availability of oilseeds has decreased from 42.79 gms in 1976 to 40.80 gms in 1988. Hence there is need to strength further research and efforts to increase the productions of oilseeds.

Table 1.2

Per Capita Availability of Oilseeds in Different Years.

Year	Total Population	Total Edible oil production 1000(tonnes)	Per Capita availability of oilseeds (in gms.)
1976	612024052 *	95585	42.79
1982	698102984 *	11287	44.30
1986	760462525 *	10148	36.56
1988	793701093 *	118215	40.80

*These figures have been interpolated by exponential growth rate method using the population figure available from census.

1.2 Strategies for increasing the production of oilseeds.

Oilseeds development programmes in the country were initiated in an organised manner with the establishment of the Indian Central Oilseeds Committee (ICOC) in 1947. The act creating ICOC provided a fund for the improvement and development of oilseeds production, processing and

marketing. The activities of ICOC included advisory service, financing, research for production enhancement and processing. From 1 April 1966, the ICOC was replaced by the Oilseed Development Council.

In 1962-63 a package programme was introduced to enhance the groundnut production in five states of Andhra Pradesh, Madhya Pradesh, Tamilnadu, Maharashtra and Uttar Pradesh. Main thrust of the package was use of improved seeds, fertilizers, plant protection, irrigation, demonstration and credit facilities. The programme aimed at covering an area of 1.8 lakh acres during the third five year plan and expected to result in additional production of 40 per cent in the areas covered by the project[7]

Integrated Oilseeds Development Scheme covered all the oilseeds growing states except, Assam during 1965-66. Nearly 80 lakh hectares were brought under the scheme. Both intensive and extensive measures were taken under the scheme. It is estimated that contribution was additional production of 8.69 lakh tonnes of groundnut and other oilseeds by extensive and intensive measures respectively[8].

---

7. RBI Report on currency and finance 1962 -63
8. RBI Report on currency and finance 1967-68.

In the year 1966-67, the centrally sponsored Export Promotion Programme and the state sponsored Package Programme and Integrated oilseed Development Scheme were continued.

During 1967-68 centrally sponsored export promotion programme which was initiated in Andhra Pradesh, Tamilnadu and Uttar Pradesh in 1966-67 embraced the states of Gujarat, Haryana, Punjab, Maharashtra in its fold[9]. The main features of the scheme were -(i) adoption of package approach over large areas in assured rainfall and irrigated zones (ii) assured timely supply of inputs, (iii) Extension of credit to farmers to cover cost of production, (iv) provision of 25 percent subsidies for plant protection, chemicals and equipments. For rapeseed and mustard a centrally sponsored scheme for Mass Plant Protection and demonstration of improved techniques of cultivation was sanctioned during 1970-71[10].

Another centrally sponsored intensive Oilseeds Development programme was started in 1974-75 in a few selected districts of the country. This programme was continued during 1976-77 in 29 districts of 10 states. The actual area covered under the programme in 1976-77 was

---

9. RBI Report on currency and finance 1967 - 68.
10. RBI Report on currency and finance, 1970-71.

higher (16.5 lakh hectares) than the target (15.2 lakh hectares).

After 1980 herculean efforts were made for oilseeds production development. These can be mentioned as follows :

National Oilseeds and Vegetable Oil Development Board

National Oilseeds and Vegetable oil Development Board was constituted by an Act of Parliament in1983 in order to deal in a comprehensive and effective manner the widening supply and demand gap in the vegetable oil sector by having an integrated approach towards oilseeds production, Processing, Procurement, marketing, storage, prices and quality control. The Board continued to implement ongoing programmes, mainly diversification of rainfed/low irrigated area under wheat to rapeseed and mustard and programmes for popularization of rabi/summer groundnut cultivation in non-traditional areas. The scheme has been instrumental in diversification of areas to oilseeds by providing incentive for using scientific packages and Agronomic practices in raising the production of these crops[11].

National Oilseeds Development Project.

This project was launched in 1984-85 after reorienting and integrating the existing oilseeds development scheme and

---

11. RBI Report on currency and finance, 1987-88, vol.1 Economic Review

special projects with crop and location specific approach spread over 180 districts all over the country. The project provided the assistance for production and distribution of seed, distribution of input kits, plant protection measures, supply of improved farm implements, sprinkler irrigation sets for rabi/summer groundnut, production and distribution of rhizobium culture, soil testing etc. In addition the project also provided 100 per cent central assistance for production of breeder and foundation seed of oilseeds crops.

Technology Mission on Oilseeds :-

Govt. of India on Ist May 1986 appointed a Technology Mission on oilseeds which is being implemented as integrated policy on oilseeds. The mission had its immediate aim of producing 16 to 18 million tonnes of oilseeds by 1989-90 and raising the production to 26 million tonnes by the turn of this century from the current level of production of around 12 million tonnes. The mission has four pronged strategy namely:-

(i) to improve oilseeds crop technology.

(ii) to improve post harvest technology

(iii) to strengthen services to the farmers.

(iv) Price support, storage, processing and marketing[12]

---

12. RBI Report on Currency and Finance 1987-88.

The mission would give first priorities to crops like groundnut, rapeseed and mustard, Soyabean, Sunflower, Linseed, Sesamum and Niger seed in the given order. The mission will also give priority to non edible oilseeds crops to meet the requirements of industry.

Oilseeds Production Programme:

During 1990-91 National Oilseeds Development Project (NODP) and Oilseeds Production Thrust Project (OPTP) which were operated by the Technology Mission on oilseeds during the seventh plan were merged into a single scheme named as Oilseed Production Programme. The scheme provides for financial assistance to the states for almost all the basic key inputs. The pattern of assistance under this programme is 75:25 sharing between Government of India and state Government. The main emphasis of the project is increasing production and availability of seeds, distribution of seed minikits and plant protection chemicals. During 1991-92. OPP continued to be implemented covering all the nine major oilseeds with a financial provision of Rs. 60 crores as against 54 crores in 1990-91.

1.3 Review of Literature

Efforts for increasing the oilseeds production are not new in India. Recently the thrust has been increased and hence the literature is also coming up slowly in this field.

After 1980s. several articles appeared along with some books dealing with oilseed production. Here, an attempt has been made to review the pertinent material.

Chamola & Hasija (1981) report that production of rapeseed & mustered has increased from 1966-76 in Haryana, but its production and area fluctuated from 53 thousand to 137 thousand tonnes and 104300 to 211000 hectares respectively. The price & yield have caused significant improvement in the value of this crop in Haryana. They recommend multifaceted research such as agronomical, entomological, breeding & genetical & economic research to further enhance the production of rapeseed & mustard.

Mondal (1989), argues that India was self sufficient is edible oils till 1963-64. Afterwards the gap between production and consumption increased till 1973. Dependence on rainfall, poor input & lack of proper plant protection have been identified as some of the major problems the cultivation of oilseeds has faced. To overcome these problems, some advances have been made such as short duration crops (e.g. H48, TMV-2), use of fertilizers & insecticide & pesticides.

Singh & Satapathy (1981)

As a result of wide range of fluctuation noticed in the

prices of oilseeds consumers as well as producers face great difficulties because price fluctuation affects almost all categories of consumers and producers. Government has to invest hundreds of crores of rupees on import of edible oils to maintain smooth supply and control on price fluctuation, mainly because of shortage of edible oils. One of the interesting things is that oilseed production ensures better income than cereals , but the per cent contribution of oilseeds products fluctuated from 1970-71 to 1974-75. Increase in oilseed yield can ensure stability in the prices as well as its production. The authors suggested that increase in area under oilseed crops their yield can boost their production.

Sarup & Pandey (1983) observed that the yield rates of the major oilseed crops. Among different oilseed crops in the country, the yield level of groundnut is highest followed by rapeseed & mustard & castor seed. The yield rate of groundnut ranges from 444 kg/ha, in Rajasthan to 1444 kg/ha. in kerala in 1968-69. The situation, however, was changed during the year 1978-79; Madhya pradesh reported the lowest i.e. 649kg/ha. and Orissa the highest i.e. 1324 kg/ha. They concluded that the yield pattern of groundnut crop in different states has remained more or less unchanged & none of the states has shown significant increase in the

yield of groundnut crop during 1968-69 to 1978-79. The yield of rapeseed & mustard has also not shown any significant improvement. Which varied from 326 kg/ha. in West Bengal to 740 kg/ha. in J&K. The yield level of oilseeds noticed wide fluctuations during the study period due to adverse seasonal conditions.

Chhatrapati (1979) points out that higher oil prices in lean season clearly indicates insufficient availability of oilseed in the country. According to his estimates, yield of oilseed was 530 kg/ha. during, 1940S which than was declined to 466 kg/ha. in the first five year plan period and after 8% improvement in second plan again declined. The prime source of the growth of output has been attributed to increase in area instead of yield in the second half of 1950s. The growth in area even ceased to contribute since the second half of 1960s. The improved varieties of seeds made the production of foodgrains & cotton more remunerative than of oilseeds. Besides neglect of agricultural research can explain poor yield which has been supported by Acharya (1993), later on. The yield of mustard has improved by the spread effect of the use of irrigation and fertilizer on wheat, with which it was grown as mixed crop. This effect ceased to operate since 1976. He further, points out the feasibility of spread of Sesamum, safflower cultivation to

enhance oilseed production.

Das (1985) reported that between the post war and 1960s., India was more or less self-sufficient in oil production and emerged as single largest importer of oilseeds & oil during 1970s because of increasing gap between demand and supply. Poor yield and expansion of area under oilseed crops during 1970s have been two major reasons for sluggish oilseed production. The annual compound growth rate (under oilseed crops of area) worked out as 0.27% during the period 1967-68 to 1980-81, while it was 0.35% for foodgrains. The annual compound growth rate of productivities of oilseed crops was estimated relatively low i.e. 0.76% as compared to 1.74, 2.19 & 1.45 percent for foodgrains, fibers & all crops respectively for the period 1967-68 to 1980-81. Das (1985) concludes that the growth rate in the yield of oilseed is still worse.

Singh & Dhaliwal (1993) observed drastic improvement in oilseeds production in the recent period 1976-77 to 1990-91. Examining the impact of Technology Mission on the production performance of oilseeds over the period 1985-86 to 1992-93 they reported that sunflower recorded the maximum growth rate of 22.81%, followed by soyabean (16.38%), castor seed (12.11%), rapeseed & mustard (11.6%). Overall compound growth rate was estimated 9.16%. The rabi component recorded

higher growth rate (i.e. 9.98) as compared to Kharif i.e. 8.45 %. Among the all oilseeds the major incremented output is that of rapeseed & mustard (34.02%), followed by groundnut & soyabean.

Under the impact of Technology Mission, the highest increase (i.e. 78.2%) in area under oilseeds has been reported by Rajasthan which is followed by Karnataka (54.6%), A.P. (41.1%) & Haryana (40.3%). Tamilnadu, Punjab & U.P., however registered decline in area under oilseeds. While analysing demand & supply prospects, they have estimated total demand for oilseeds as 79.90 lakh tonnes in 2000 A.D., using NCAER formula (1962). Using the same formula they estimated 8.25 kg per year availability of edible oil for the year 2000-01 A.D.

They concluded that "acreage allocation decisions in respect of oilseed crops have been governed by their relative profitability vis-a-vis competing crops".

Acharya (1993) examined the impact of price policy and mechanization of agriculture on oilseeds & pulses during three phases : Pre Green revolution (GR), GR, post GR. He found that the introduction of Green Revolution in association with positive price policy for cereals specially rice and wheat has contributed substantial increase in food production during Green Revolution period. The adoption of

same measures for oilseeds has also brought significant qualitative & quantitative changes in oilseed production. Increase in prices and yield has resulted in 90.7% increase in nine oilseeds production over a period of 1980-81 to 1991-92.

While dealing with qualitative changes he found that growth of yield of mustard was more than that of wheat & rice during 1980s. Secondly, share of rabi oilseed production (which is relatively more reliable as compared to kharif) improved substantially. Thirdly, the production of oilseed noticed considerable improvement in area & yield in the states such as Rajasthan & M.P. where cereals crops were relatively less advantageous in terms of net profit. Fourthly, cost of production of mustard has not increased in real terms during the last decade in the states which noticed incremental output of oilseeds.

The author further pointed out that "the expansion of area under oilseeds has occurred mainly through an increase in the cropped area & yield as also though displacement of low yielding coarse cereals. A watch has to be kept on price structurs to ensure that areas under cereal crops could not shift away where yield is high. He admitted that the country can maintain self sufficiency in both oilseeds & cereals through accelerating growth of yield of both groups of crops.

Kaushik (1993) pointed out that oilseed production has registered a phenomenal increase during the past few years as a result of Technology Mission on oilseeds , But the percentage of area under oilseeds still depends on rainfall. Consequently, oilseeds production fluctuates from year to year. He has examined the trends of growth & instability of oilseeds production over three periods namely 1968-69, 1979-80, 1991-92. During period one i.e. 1968-69 to 1979-80 the production of oilseeds in general and mustard in particular increased mainly because of increase in area rather than yield, while in wheat and food grains production increase in yield has contributed much more than area. During the second phase i.e. 1980-81 to 1990-91, however, increase in oilseed production was contributed much by increase in yield rather than area, which is the result of Technology Mission on oilseeds on the one hand and the favourable prices on the other.

The magnitude of fluctuations depends on the nature of crop production technology, its sensitivity to weather, economic environment, availability of material inputs & many other factors. The magnitude of fluctuations in oilseeds is reported to be the highest while in case of food grains specially in wheat it is the lowest. The cultivation of oilseeds on unirrigated lands and dependence on rain are two

major responsible factors for higher instability in oilseed production.

Gandhi (1984), observed a deficit of 1-2 million tonnes of edible oils. He reports 6.88 kg.per annum per capita availability of edible oils in India as against 14 kg/annum recommended by Indian council of Medical Research. To meet this standard country needs additional 5 million tonnes of edible oil. Immediate concern to increase the supply of edible oil should be the proper utilization of available technology, prices & management.

The low increase in oilseed production has been due to various contraints such as dependence on rainfall, lack of input resources with small & marginal farmers,seasonal variations and wide fluctuations in oilseed prices and lack of efforts on research front. About 90% of the total area under oilseed crops is rainfed and yield of these areas are as low as 60% of those grown in irrigated areas. Suggesting the great potential of oilseeds production, Gandhi (1984), recommended that concrete efforts should be made to increases output of oilseeds, higher support prices for the farmers, and improving oil extraction efficiencies and the marketing system.

Jayaswal (1988), recommended that cultivation of oilseed crops on fallow land in rabi & kharif seasons, supply of necessary inputs, cultivation of palm & coconut in coastal regions and harnessing all the minor oilseeds sources are certain direct measures to boost oilseed production. However the role of technological research can not be denied in attaining higher level of oilseed production.

Bhatnagar et.al. (1985), pointed out that the oilseed production has remained almost neglected under Integrated-cropping system and IRDP. Under various schemes, there are wide scope to provide proper place for oil seed production such as under IRDP subsidies are made available to the farmers for purchasing inputs required for oilseeds cultivation. It has been emphasized that women, whose bigger proportion is engaged in agricultural sector, may be trained for oilseed cultivation under DWCRA programme. The major reasons for the failure of these programmes has been due to the paucity of funds with smaller and marginal farmers to adopt new technology,

(ii) lack of training for the category of beneficiaries under various schemes &

(iii) lack of coordination between the programmes formulated for agricultural and rural development despite the fact that

agricultural development is one of the most integral component of rural development.

Singh & Das (1985) reported that per capita daily consumption of fat is 15 gms. visible & (5 gms.) invisible fats as against average requirement of 40-50 gms/day due to the fact that demand of oil has been outpacing supply. The dependence of oilseeds cultivation on rainfall, poor management, lack of weed control, poor resources for dryland farming, lack of inputs are constraints in increasing the oilseed production. Besides, technological (including susceptability of oilseed crops to pests & diseases, lack of efficient cropping system), socio-economic & policy constraints have been major barriers to boost production & yield of oilseeds. The authors suggested that the adoption of area specific approach and new technologies can increase the yield of oilseeds by atleast two folds. Moreover, bolder and unconventional approaches are needed to meet general and specific constraints.

Despite sizeable production and acreage of oilseeds these crops have not received due attention they deserved in the past. Consequently, the overall demand usually outpaces the supply level and yield oilseeds is relatively low Rai, further suggested that adoption of effective production

technology and extension of area could bring a quantum jump in the production and yield of the major oilseed crops.

Chauhan (1985) pointed out that special measures have been taken into consideration under the 20 point programme during the Sixth Plan (1980-85) to bridge the gap between supply & demand of vegetable oils. This gap has persisted since a long time because of various constraints including environmental, technological, socio-economic and infrastructural. Certain measures including improvement in seed quality, expansion of area under oilseeds crops in general and in rabi season particular, subsidy on inputs, price support etc. are taken to boost oilseeds production. Taking into consideration the example of concentrated area approach for qroundnut in Gujarat & soyabean in Madhya Pradesh, production and yield of oilseeds can be improved considerably to meet further challenges.

Rai (1989), concluded that the utilization of better seeds, optimum fertilizer doses , timely planting, providing protective irrigation, plant protection measures and introduction of hybrid in irrigated areas could be quite helpful in increasing yield of oilseed crops. The quality of seeds plays a key role in higher yield. Rai suggested quite bright scope of growing summer groundnut in Orissa, Bihar &

U.P. as well as inter-cropping of groundnut with arhar, maize, sorghum, in 6:6 ratio. He further argues that if potato & mustered inter-cropping is followed in potato growing areas of U.P., M.P. Haryana, Rajasthan & Bihar, West Bengal & Assam, an additional 4 lakh tonnes of mustered can be produced.

Ramanamurthy (1991), argued that strengthening oilseed research & development programmes, creation of oilseed grower's co-operatives, formation of a national oilseed & vegetable oil board & involvement of private sector in research & development of oilseeds has created a trust for increasing oilseeds productions during the last 18 years. Consequently per capita availability of edible oilseeds increased from 3.0 kgs. in 1970 to 5.5 kg in 1984. During 1970-71 to 1986-87 there has been significant increase in the production and area under oilseed crops, but year to year fluctuations in production is a major concern today. The author reported low production and fluctuations in oilseed production as result of the rainfed nature of oilseed cultivation, inadequate use of chemical and microbial fertilizer & other inputs. He noticed the absence of rain at crucial stage of crop growth, before maturity, as a major cause of significant loss in yield. The author stressed the need for development of low cost technology.

Because of expensive nature of available new technology only 30-40 % of the total technology has been utilized by the farmers. Moreover, new variety of early maturing oilseeds can be developed, cultivation of which can be supported by large number of areas such as Malnad of Karnataka , northern Telangana of Andhra pradesh extending into Maharashtra.

Singh (1991), The adoption of new dryland locations & crop specific technology, replacing some inefficient crops with oilseed crops and their introduction in non-traditional areas and seasons can increase oilseed production, the recommends intensive cropping in areas of higher rainfall (i.e. more than 800 mm annually), and introduction of efficient inter-cropping system in the areas which receive annual rainfall from 600-800mm. He has suggested inter-cropping system for almost all the regions for rainy as well as for post rainy season. Moreover, substitution of traditional crops by oilseed crops ensures better yield e.g. in case of Indore the yield of green gram is only 11.8q/ha as compared to the yield of soyabean i.e. 33 q/ha.

Gangwar & Rai (1991), have observed an improvement in the yield and price risk in oilseed during the period 1980-81 to 1985-86 as compared to 1970-71 to 1985-86. Similar situation prevailed in most of the oil seeds growing states except AP

& Tamilnadu. During the same period the coefficient of variation for acreage at national level has declined from 9.12% to 6.22% indicating reduction in acreage fluctuation. They report that the area effect on oilseed production was higher than that of yield effect throughout the country except Tamilnadu & Andhra pradesh. In these states, yield effect has dominated area effect on oilseed production. The authors are quite apprehensive about the wide gap between supply and demand of edible oils in near future despite improvement in supply situation in the recent past.

Ghosh (1982), Pointed out that Weeds cause two type of losses- direct and indirect in oilseeds cultivation. Losses caused by weeds range from 23 to 70 per cent in oilseeds production. Therefore, timely weeds control through cultural and chemical practices can improve yield as well as quality of oilseeds.

Singh & Sinha (1979), have estimated demand for vegetable oil including demand for human consummation & soaps & other industrial uses as 4630 & 5931 thousands tonnes for the year 1982-83 and 1987-88 respectively. They have used 25th round cross sectional NSS data on consumption expenditure to estimate the demand for oil for human consumption, while estimation of demand for oil for soap & industrial uses has

been taken from the study group of the former Minister of Commerce, civil supply & co-operation as well as the Draft Five year plan 1978-83. They further stress the need to incorporate estimation of production path of oilseeds which is being influenced by the total area under crops, the area allocation to and share of oilseeds & the yield per unit of land.

Mariwala (1991) noticed large scale inter-personal disparities in the distribution of cultivable land. About 10-15% of the households control more than 2/3 of the total cultivable land. This elite group has enormous economic power and under its socio-economic & political influence ensure that benefits meant for all are converted into gains for few. Mariwala delimits the role of government to provide infrastructure, policy, legislative framework and market intervention for oilseed production. The role of voluntary agencies, which has been neglected so far, can work as an intervening link between government and private households to extend the benefit of new technology and other schemes to the farmers. Moreover, private corporate sector can take up large chunk of waste land and harness it for productive use for oilseed crops.

Shetty & Rao (1991), argued that after the introduction of

green revolution oilseed production has more or less stagnated at lower level as compared to the non-oilseed crops mainly because of the following reasons (i) poor infrastructure for extension & input delivery systems which are required to sustain growth in yield & extension in area (ii) unremunerative prices of oilseeds, (iii) non-availability of improved seeds at reasonable prices (iv) operation of the middlemen in oilseed trade and, (v) the absence of co-operative sector in oilseeds like that of sugar & dairy.

The argued that expansion of area under oilseeds is possible only if the production of oilseeds is remunerative. Otherwise improvement in yield through the adoption of new technologies using better variety of seeds, & sequential cropping with other crops may boost oilseed production. Moreover, efforts should be made to develop better seeds, drought tolerant , high oil yielding & rasistant to pest and capable of getting into farmer's crop rotation. Similarly extension of irrigation to oilseed crops will improve yield of oilseeds under irrigation are twice as under rainfed conditions. In the last they concluded that to boost and attain self sufficiency in oilseeds production, greater emphasis should be laid on technological & price factors which are the two most important variables influencing

oilseeds production in the country.

1.4 Objective of the Study :

Present study attempts to explore the nature of growth and instability for the three oilseeds- groundnut, rapeseed and mustard, sesamum at the district level for all the states of India except Jammu and Kashmir, Arunachal Pradesh, Sikkim, Manipur, Mizoram, Tripura, Nagaland and Goa. The main Objectives of the study are as follows :

(1) To examine the growth pattern of area, production and yield of the three oilseeds.

(2) To study the level of instability of production, area and yield.

(3) To study the role of irrigation, fertilizer consumption and prices on the oilseed production.

1.5 DATABASE

Whole of the study is based on secondary data, which have been collected from the following sources.

(1) For the production, area and yield of groundnut, rapeseed and mustard, Sesamum, several issues (Appendix - 1) of "Agricultural Situation in India" published by Directorate of Economics and Statistics, Department of Agriculture and cooperation, New Delhi, have been used.

(2) Various issues (Appendix - 1) of "Fertilizer Statistics

in India" published by The Fertilizer Association of India, have been used for the fertilizer consumption in different districts.

(3) For prices of the three crops - groundnut, sesamum, rapeseed and mustard, several issues of "Farm-Harvest prices of Principal crops in India"(Appendix -1) published by Directorate of Economics and Statistics, Department of Agriculture and Cooperation, New Delhi, have been used.

(4) For area under irrigation of these crops several issues of "Agricultural Statistics in India - vol. II" (Appendix - 1) published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, New Delhi have been used.

1.6 Methodology

In the present study following statistical techniques have been used:

Compound growth rates of area, production and yield have been calculated using the formulae-

$pt = Po\ (1 + r/100)t$

To measure the instability in area, production and yield coefficient of variation has been worked out using the following formulae:-

$C.V. = S.D/\ Mean \times 100$

To measures the role of various variables like irrigation, fertilizer consumption and agricultural prices multiple correlation and regression analysis has been used.

1.7 Scope of the Study :

The present study spreads over a time period of 1970-71 to 1987-1988 taking triennium averages. The study takes into consideration only three oilseeds namely groundnut, Sesamum, Rapeseed and Mustard. Year 1970-71 has been taken as the base year and all the districts which were created after 1970 have been adjusted to the districts of 1970.

1.8 Study Area :

Groundnut was grown in 241 districts (Appendix-2) which constituted 68 percent districts of the country in 1970-71. 298 districts (Appendix-2) accounting for the eighty four per cent districts of the country grew sesamum in 1970-71. Rapeseed & Mustard was grown in 70 per cent districts (250) (Appendix-2) of the country in 1970-71.

1.9 Organisation of the Study :

The entire study is divided in six chapters.

Chapter one presents the introduction of the present study.

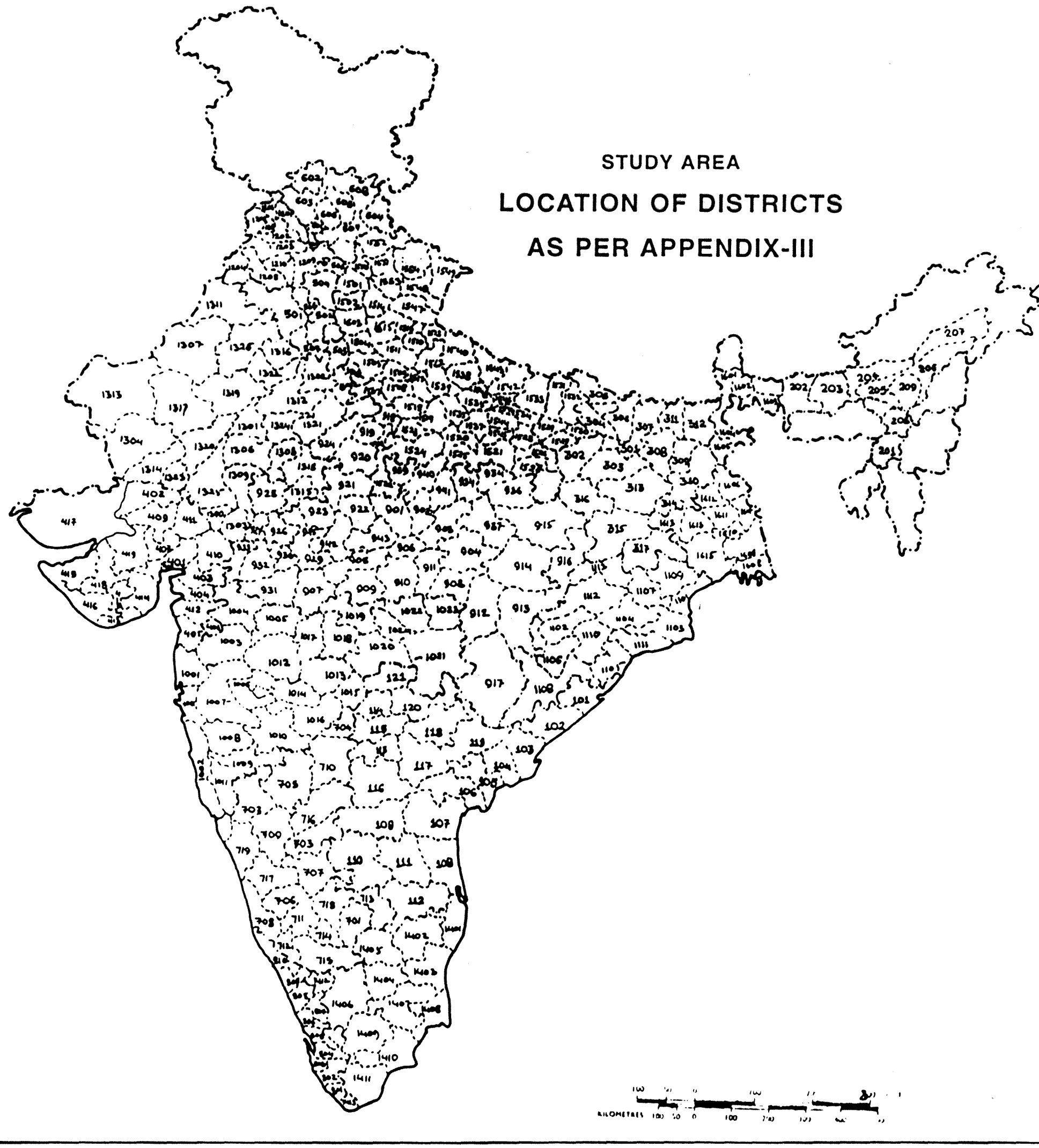
Chapter two concerns with the geographical personality of the study area.

Chapter three discusses the patterns of growth in area,

STUDY AREA

LOCATION OF DISTRICTS

AS PER APPENDIX-III



production and yield of the groundnut, rapeseed and mustard and sesamum.

Fourth chapter describes the instability in area production and yield of groundnut, rapeseed and mustard and sesamum.

Fifth chapter deals with the role of irrigation, fertilizer consumption and Oilseed prices in the area and yield of the groundnut, rapeseed and mustard, and sesamum.

Sixth chapter deals with the summary and conclusions of the study .

References

1. Acharya S S, "Oilseeds and pulses-price policy and production performance", Indian Journal of Agricultural economics, Vol. 48, No. 3, July-Sept. 1993.

2. Bhatnagar et al, "Increasing oilseed production through rural development programmes- A case for extension and transfer of technology", Oilseed production : constraints and opportunities, oxford and I.B.H. publishing Co. New Delhi 1985.

3. Chamola S.D. and Hasija R.C.,"Oilseeds production", Yojana 1-15 April 1981.

4. Chauhan S.S., "Constraints and opportunities of oilseed production in India- An overview, oilseed production : constraints and opportunities, oxford & IBH publishing Co., New Delhi 1985.

5. Chhatrapati A.C., "Trends in oilseeds production", Research and Development strategies for oilseed production in India", publication and Information division ICAR, New Delhi, 1979.

6. Das Prafulla K., "The trends in oilseeds production and utilization in India", Oilseeds production : constraints and opportunities, oxford & IBH Publishing Co. New Delhi 1985.

7. Gandhi N.K., "A strategy for oilseeds production", Yojana, June 1-15, 1984.

8. Gangwar A.C. and Rai K.N., "Retrospect and prospect of edible oilseeds in India", National seminar on strategies for making India self-reliant in vegetable oils, Indian society of Oilseed Research, Directorate of Oilseeds Research, ICAR, Hyderabad 1991.

9. Jayaswal Himanshu,"Achieving higher Oilseeds and Pulses production". Yojana, January 1-15, 1988.

10. Kaushik Krishan Kant, "Growth and Instability of Oilseeds production", Indian Journal of Agricultural economics Vol. 48, No. 3, July-Sept. 1993.

11. Mariwala H.V., "Role of Public, Private and Co-operative sector in oilseeds production", National seminar on strategies for making India self-reliant in vegetable oils. Indian society of Oilseed Research, Directorate of Oilseeds Research ICAR, Hyderabad, 1991.

12. Mondal N.N., "Recent Advances in production of oilseeds". farmer and parliament, January 1989.

13. Rai B., "New perspectives in Increasing Oilseeds production", farmer and parliament, March 1989.

14. Ramanamurthy G.V., "Oilseeds production : perspectives and Policies", National Seminar on strategies for making India self-reliant in vegetable oils, Indian

society of oilseed Research Directorate of Oilseed Research ICAR, Hyderabad, 1991.

15. Shanti Sarup and Pandey R.K., "Productivity Trends of major Oilseeds", Yojana, 16-31, December, 1983.

16. Shetty S. Vasudeva and Rao V.L. Narshimha, "Role of Public, Private and Co-operative Sectors in oilseeds production", National seminar on strategies for making India self-reliant in vegetable oils, Indian society of oilseed Research, Directorate of Oilseeds Research ICAR, Hyderabad, 1991.

17. Singh A.J. and Dhaliwal sarbjit, "Production performance, potentials and prospectus for oilseeds in India", Indian Journal of Agricultural Economics Vol. 48, No. 3, July-Sept 1993.

18. Singh R.P. and Das S.K., "Constraints and Opportunities of Oilseeds Production in India with particular Reference to Dryland Situation", Oilseed Production : Constraints and opportunities, oxford & IBH Publishing Co. New Delhi, 1985.

19. Singh S.P., :Ways to Increase Oilseeds Production from Drylands", National Seminar an strategies for making India self-reliant in vegetable oils," Indian society of oilseed Research, Directorate of Oilseeds Research ICAR, Hyderabad, 1991.

CHAPTER II

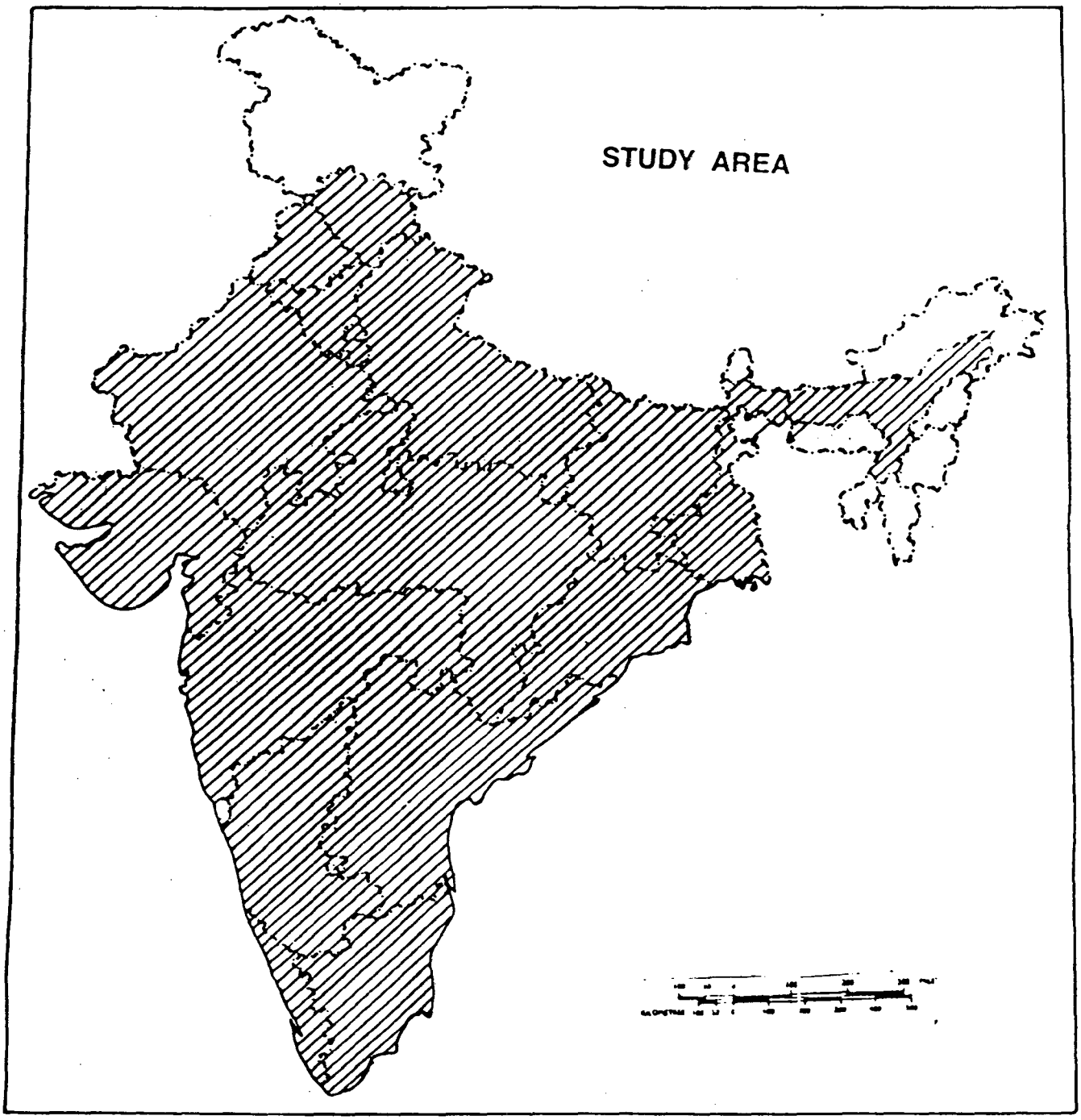
Geographical Personality of The Study Area

India lies completely in Northern hemisphere and extends between 37° 17′53" and 8° 4′ 28". Northern latitude, its most westerly point lies in longitude of 68° 7′33" in Saurashtra and eastern most point lies in the longitude of 97° 24′ 47" East in Arunachal Pradesh. India accounts for the 2.2 per cent of total world population resides in the country. The country is of vast size and measures about 3214 Kms from north to south and about 2933 Kms from east to west. Tropic of cancer passes through its centre.

India is a land of diversities. Physiographic diversities including the mighty Himalayas great fertile Indo-Gangetic plains and coastal regions climatically the precipitation in Mausimgram is highest in the world while the western region of Rajasthan experience very low rainfall. Again temperature extremities are found in Leh and Rajasthan. Besides physical diversities social and cultural diversities are also prominent.

2.1 Physiography :

Physiographically India can be divided in following parts


STUDY AREA

1. The Himalayas
2. Great Plains
3. Central Highlands
4. Deccan Plateau
5. Coastal regions

1. The Himalayas :

The Himalayas have been one of the dominant features of India. They are the youngest and the highest folded mountain of the earth. They run in an east-west direction along the entire northern boundary of India for 2400 kms. They are 240 to 500 kms. broad and cover about 500000 sq. km. Himalayas have great significance for India. Climatically it isolates the interior of Asia from the influence of warms air from the south and protects India from the cold blizzards of Siberia. Secondly it is birth place of perennial rivers of India. Thirdly it helps in causing monsoonal rainfall in India.

2. Great Plains :

Great plains extend from Ganga Delta and the Brahmputra valley in the east to semi-arid plains of Rajasthan in the west. These plains are one of the recent formations and occupy an area of 652000 km^2 and are filled with Alluvium of varying thickness most of these great plains are composed of alluvium deposited during the middle pleistocene and recent

geological times. The older alluvium, known as bhangar forms invariably higher ground in the interflue areas and the newer alluvium, called khadar in U.P.

The arid plains of Rajasthan extend over 640 kms from North-east to south-west with an average width of 300 kms from west to east and are drained by the only living river, the Luni. Punjab plain is flat and has an elevation between 200 and 240 metres above sea-level. A considerable part of Ganga plain is occupied by the state of U.P, Bihar and West Bengal. The plain lying between Ganga and Yamuna rivers is termed Ganga-Yamuna doab.

3. Peninsular Plateau :

Peninsular plateau is the oldest shield in Indian peninsula. It extends into Rajasthan on the west and has a kind of outlier in the Assam plateau in the east and is bordered by western ghats in the west and Eastern ghats in east. north-west part of the region is significant for cotton production and other parts are important for coffee, rubber and tea plantation.

4. Central highlands :

This physiographic region lies between the great plains and the Deccan plateau. About half of M.P, one third of Rajasthan and a small portion of U.P. lies in this zone. Major part of this division is under forests. To the north

of the Narmada valley, extends the Malwa plateau which is bordered by the Aravalli Hills to the west and north-west. Towards the North-eastern corner of Malwa plateau are the Bundi hills. Like other plateaus in south, Malwa plateau is largely broken in the neighbourhood of rivers or where if approaches to Ganga Valley.

5. Coastal plains :

Deccan plateau is surrounded by low lying coastal plains to the west and the east known as western and eastern coasts respectively. Eastern coastal plain may be divided into two sections, upper and lower. Lower section consists of deltas of rivers while upper section mostly consists of plains lying in the upper reaches of the rivers. The western coastal plain extends north to south along the Arabian sea. The southern section of this plain is characterized by' surf-beaten', small and shallow lagoons.

2.2<u>Drainage System</u> :

The entire subcontinent is drained by numerous rivers which generally fall in two broad groups, viz, the rivers of Himalayan origin and those flowing in the peninsula. Major river basins are as follows :

1. Sindhu System :

This system includes the basin of Indus and Jhelum Sutlej doab, River indus drains an area of about 117844 Km^2.

Its main tributaries are Jhelum, Chenab, Ravi, Beas and Sutlej.

2. Ganga System :

This river system represents three major rivers - The Ganga, the Yamuna and the Brahmputra along with their major and minor tributaries. This system comprises some important doabs like Ganga-Yamuna, Ganga-Ghaghra and Ganga-Gomati, which are very fertile. Rivers joining the Ganga system from the south (central highlands) are important for harnessing their water. The Brahmputra rising from the Himalayas, flows through Tibet, India and Bangladesh. In Indian territory 250000 sq. km drainage area of this river lies.

3. Mahanadi System :

This system consists of Mahanadi, Brahmani-Batarni and Subarnrekha basins. It drains the total catchment area of 132090 km.

4. Godavari System :

This system consists of upper Godavari basin, Penganga-Wainganga basin and lower Godavari basin. River Godavari has a total catchment area of 313389 km.

5. Krishna System :

This system includes the major river basins of Krishna, Bhima and Tungbhadra.

6. Cauveri System :

This system includes Cauveri basin and Vaigai-Tambraparni basin. It drains an area of about 80290 km.

7. Narmada - Tapti System :

This system includes the basins of Narmada and Tapti and their tributaries. This system drains 157930 km.

2.3Soils :

In India several types of soils are found. Some zones are typical for some soils and well defined belts of particular soils are found.

Soils of Indo-Gangetic basin :

Indo-Gangatic basin is studded with alluvial soil deposited by the perennial rivers of Himalayas. These soils are very fertile. The physical properties of alluvial soils are generally determined by climatic conditions. The soils in Indo-Gangetic basin are fine-grained, rich in potash but poor in phosphorus. According to the time of deposition, composition and properties the soils of Indo-Gangetic basin may be divided in khadar and Bhangar. Deposition of finer and newer soils may be classed as Khadar. This is a local term and mainly occurs in places like new river beds. Bhangar soil is the older edition of Khadar. It is composed of coarser grains and found in higher elevation than Khadar.

Soils of Deserts :

In the deserts of Rajasthan mainly arid or desert soils are found. Due to high evaporation rate and lack of vegetation, salt content is quite high and humus content is very low. But due to less leaching, mineral accumulation is very high.

Soils of Deccan Plateau :

In Deccan plateau mainly black or regur soils are found. These soils are generally clayey, deep and impermeable. Chemically the black soils consist of lime, iron, magnesium and aluminium. Besides the black soils, red and laterite soils are also found in Deccan region. Red soils are generally shallow and their pH value ranges from 6.6 to 8.0.

Soils of coastal Regions :

In coastal areas mainly alluvial soils are found. besides the alluvial soils, peaty and bog soils are also observed in coastal regions.

2.4 Climate :

India is perhaps the only country in the world where such a wide variation of climates occur in close proximity. Almost every type of climate is prevailing in India simultaneously. Extreme dryness on one end, high precipitation on the other and scoarching, sultry heat in

one extremity, while moist dampness in the other region.

Precipitation :

Extremities in precipitation can be observed in India in the Mausimgram which experiences more than 1000 cms. and western Rajasthan where precipitations is below 20 cms. Benevolent activities of monsoon and particular geographical locations are highly beneficial for annual Indian water budget. The highest annual rainfall occurs along the west coast, sub-Himalayan areas in north east and the hills of Meghalaya. The isohyet of 100 cms rainfall runs southwards from Gujarat coast roughly parallel to western Ghats upto Kanya kumari. The rainfall over the peninsular regions lying east to this line drops to 60 cms. The east coast of Tamilnadu gets a rainfall of above 100 cms. In Northern region southern parts of Jammu and Kashmir, Himachal Pradesh and Northern U.P. rainfall is 100 cms. The rainfall over parts of Punjab, Haryana, northern and western Rajasthan, Kutch and Kathiawar region of Gujarat is below 60 cms.

Temperature :

Due to proximity to Tropical region, south India experiences highest temperature averages. Temperature varies very little in this region. In north both extremities of temperature are found. In hot season mercury touches around 50 C while in cold season it reaches below 10 C. In the

extreme north, temperature touches zero and some times becomes winter chilly and severe. In northern parts of India from March to May the temperature gradually goes up but from June onwards due to the outburst of south-west monsoon, moderating effect of rainfall brings down the temperature considerably.

In central region temperature varies between 20° C and 40° C in winter and hot season respectively. Coastal areas experience moderate temperature due to the ocean effect. No clear cut defined winter season is observed in these areas.

Humidity :

In North-Western India, evaporation is greater than precipitation. This region is often classed as a water- deficit zone. Humidity obviously increases in rainy season. For the remaining part of the year, a dry condition prevails in the region. In southern region humidity is moderate but some water-deficits zones are observed here. Interior parts of Andhra Pradesh, Maharashtra and Karnataka form a belt of water-deficit.

Central region has a high humidity than the northern region.

Coastal regions enjoys high humidity either because of rainfall or due to proximity to the water-bodies.

Winter is the driest period through out the country, though in early summer, in some parts, humidity is even greater than the rainy season.

CHAPTER III

PATTERN OF GROWTH IN PRODUCTION,AREA AND YIELD OF OILSEEDS

This chapter deals with the evaluation of growth pattern of production, area and yield of three oilseed crops namely groundnut, rapeseed and mustard and sesamum. The entire study is divided is three periods; 1971-81, 1981-86 and 1971-86.

Annual growth rate has also been calculated for 1971-86. Triennium averages have been taken for calculating the growth rate in these three periods.

To study the growth pattern of groundnut 241 districts of India have been selected. These districts are classified in six categories on the basis of their production growth rate.

250 districts are selected for rapeseed and mustard. These districts are divided in five categories depending on their production growth rate.

TABLE 3.1 Different oilseeds and Geographical spread in 1970-71

Oilseed Type	No. of districts where grown	% to total districts of India
Groundnut	241	67.88
Rapeseed & Mustard	250	70.42
Sesamum	248	83.94

Total No. of districts in India in 1970 = 355

Sesamum was grown in 298 districts in India during 1970-71. Hence, these 298 districts are selected and categorized in five depending on their production growth for further analysis.

Groundnut :

Groundnut was grown in 241 districts in 1970-71 accounting for 68 per cent districts of the country. Groundnut growing districts have been classified in six categories depending upon their production performance.

3.1 Pattern of Growth of Production, Area and Yield during 1971-1981.

Ist category:-

This category includes those districts which have a production growth rate of 30 per cent and above. Only a small proportion, 2.5 per cent, of the groundnut growing districts lie in this category.

Jodhpur district of Rajasthan, Durg, Narsimhpur of M.P, Jhansi and Mirzapur districts of U.P. fall in this category.

All the districts in this category except Jodhpur registered positive growth in area but negative growth in yield.

IInd category :-

Those districts which registered production growth rate between 15 to 30 per cent lie in this category.

Though the districts registering such a growth pattern are spread in the states of Rajasthan, U.P., Bihar and M.P, there is no contiguous pattern of districts in one or more states in this category. In Rajasthan Ganganagar, Muzaffarnagar, Hamirpur and Ajamgarh in U.P and Hazaribagh districts of Bihar lie in this category. Two districts of Orissa also lie in this category. All the districts in this category registered higher growth in area than the yield and more over six districts recorded negative rate in yield.

TABLE 3.2

Growth pattern for groundnut production during 1971-81.

Category	Growth in production	No. of districts	% of the groundnut growing district
I	30 and above	6	2.49
II	15 to 30	10	4.15
III	0 to 15	96	39.83
IV	(-15)to (-0)	118	48.96
V	(-30)to(-15)	10	4.15
VI	-30 & below	1	0.41
	Total	241	100

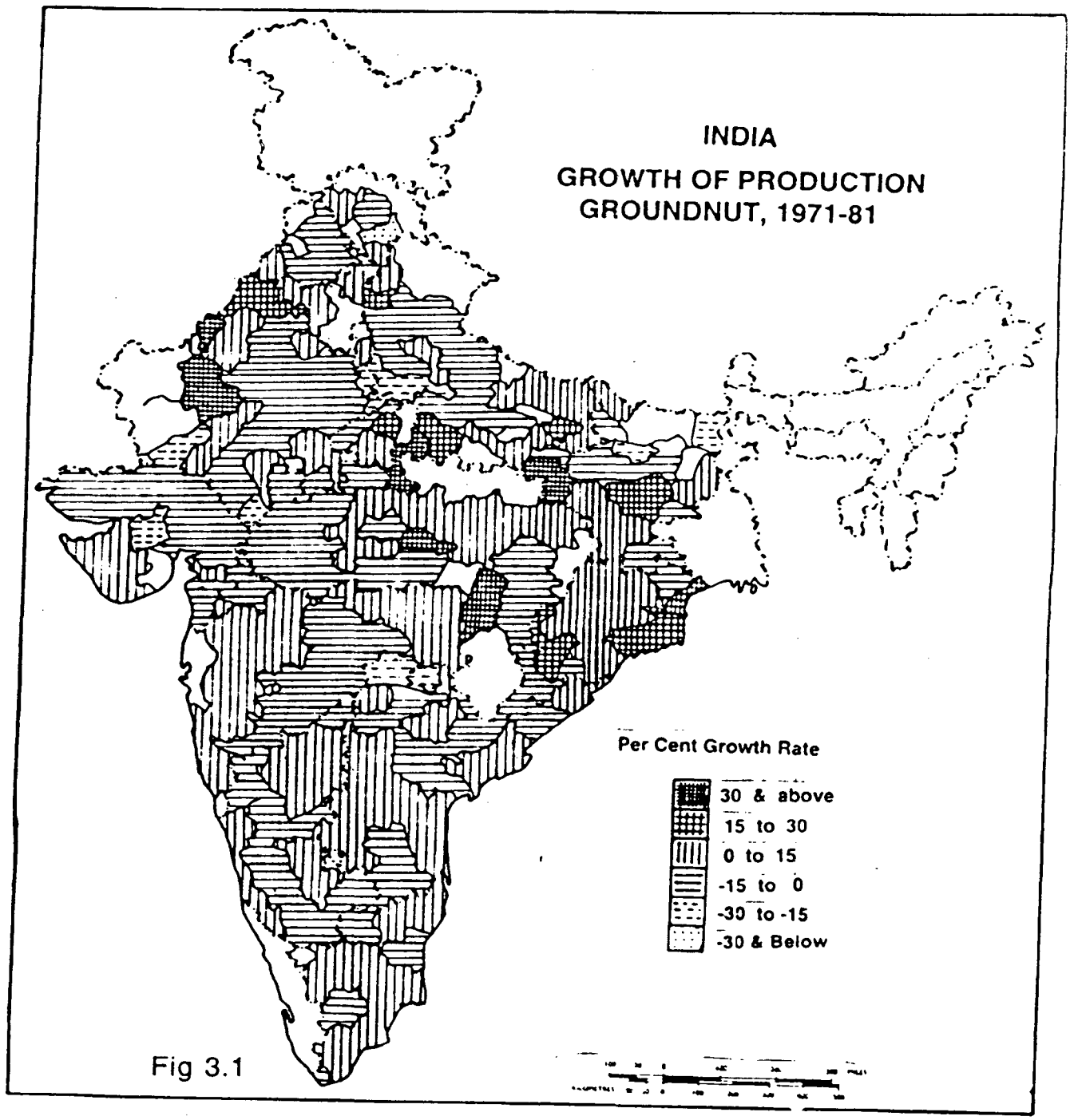

INDIA
GROWTH OF PRODUCTION
GROUNDNUT, 1971-81
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-30 to -15
-30 & Below

Fig 3.1

IIIrd category :

Production growth rate from zero to 15 per cent demarcates the boundary of this category. ninety districts which account for 40 per cent of the groundnut growing districts in the country lie here.

This type of growth pattern is observed throughout India in specific clusters. In North India, Ferozpur of Punjab, Hisar of Haryana and Jhunjhunnu district of Rajasthan form a small narrow belt. A cluster of districts in this category is observed in U.P in the districts of Barabanki, Gonda, Basti, Gorakhpur, Deoria and Balia. Another cluster is observed in M.P comprising the districts of Damoh, Sagar, Vidisha, Sehore and Hoshangabad. A continuous belt starting from Palamau district of Bihar extends in Orissa and comprises the almost districts of Orissa (fig 3.1).

In western India coastal districts of Gujarat form a cluster. Maharashtra presents two well defined clusters of such growth pattern - one in its western part and another in eastern part.

In south India five districts of Karnataka and six

districts of Andhra Pradesh form a cluster. Coastal districts of Tamilnadu also experienced the growth pattern of this category.

As a conclusion it can be said that a large number of districts of this category lies in western and southern india. 52 per cent districts in this category registered higher growth in area than the yield of which nearly 20% registered negative growth in yield. 40% districts has higher yield growth than the area growth .

IVth Category :

Districts which registered negative production growth rate between 15 and 0 per cent constitute this category. This is the most important categories in terms of number of districts. Out of the total as many as 119 districts which account for 49 per cent of the groundnut growing districts of country lie in this category.

As shown in map this type of growth pattern is observed in a more or less continuous belt which starts from Bijnor and Nainital districts of U.P, interrupted by Gurgaon and Bharatpur districts of other categories, travels through the districts of Rajasthan, Gujarat, M.P, Maharashtra, Karnataka and reach to the South Arcot district of Tamilnadu.

A cluster of districts which is also part of the above mentioned belt can be observed in western and north central

U.P., Saran, Shahbad, Gaya and Monghyr districts of Bihar also lie in this category. Bilaspur, Raipur of M.P and Koraput district of Orissa form another belt of this growth pattern.

As a conclusion it can be said that this growth pattern is concentrated in the districts which lie in the west of 80 degree east longitude. This kind of growth pattern can be explained in other way i.e. it lies in the drylands of country. Only 10 per cent districts registered higher growth in area than the yield and 37% recorded higher growth in yield than the area.52% districts have negative growth in all production, area and yield.

Vth Category :

This category includes those districts which registered a negative production growth rate between 30 to 15 per cent. Only 10 districts which is 4 per cent of the groundnut growing districts are under this category.

Agra, Mathura and Mainpuri of U.P, Jalore, Banswara and Bharatpur of Rajasthan, Patna and Purnea districts of Bihar lie in this category. Two other districts are Surendernagar of Gujarat and Adilabad of Andhra Pradesh.

As a conclusion it can be said that this kind of growth pattern is widely dispersed. 30% districts in this category experienced higher positive growth of yield and negative in

area. Remaining districts have negative growth in production, area and yield.

VIth Category :

Only one district namely Simla registered a negative growth rate in production below 30 per cent.

3.2 Pattern of Growth of production, area and yield during 1981-86

For calculating the growth rate during this period triennium averages of 1980-81 -1982-83 and 1985-86 -1987-88. have been taken into consideration.

Ist category :

Only 3 per cent (8) of the groundnut growing districts of country lie in this category.

Kangra district of Himachal Pradesh, Ganganagar of Rajasthan, Surat and Gandhinagar of Gujarat, Purnea of Bihar and Coorg district of karnataka fall under this category. All the districts in this category registered higher growth in area than the yield.

IInd Category :

31 districts accounting for 13 per cent of the groundnut growing districts in India registered growth rate between 15 to 30 %.

Districts registering such kind of growth are observed

all over India. Hisar in Haryana, Saran in U.P and Allahabad districts of U.P lie in this category. In M.P cluster of districts having this growth pattern is observed in Gwalior, Morena, Shivpuri and Guna. Four districts of Orissa also lie in this category.

Sholapur of Maharashtra and Bijapur and Gulbarga districts of Karnataka form a cluster. Again a small cluster of this growth pattern is observed is Mandya, Tumkur, Kolar, Banglore districts of Karnataka. 80% districts in this category registered higher growth of area than the yield (fig. 3.2).

IIIrd Category :

This category is important among other growth categories of groundnut producing districts in the country in terms of number of districts. 85 districts which constitute 35 per cent of the groundnut growing districts lie in this category.

While scrutinizing the map then it was found that this kind of growth pattern is concentrated in southern states and Orissa. In northern India three districts of Punjab, 10 districts of U.P and seven districts of Rajasthan lie in this category. Guna, Vidisha and Sagar districts of M.P also lie in this category.

A continuous belt of this type of growth pattern is

observed and in three districts of M.P and eight districts of Orissa. A more regular belt is observed in four districts of Maharashtra, which extends in the districts of Karnataka, Andhra Pradesh and Tamilnadu. Besides this another cluster of this growth pattern is observed in seven northern districts of Andhra Pradesh. 47 per cent districts in this category registered higher area growth than the yield and 41% have experienced higher growth in yield than the area. However, 12% districts have recorded zero growth in production and yield.

TABLE 3.3

Growth pattern for groundnut production during 1981-86.

Category	Growth in production	No. of districts	% of the groundnut growing district
I	30 and above	8	3.32
II	15 to 30	31	12.86
III	0 to 15	85	35.7
IV	(-15)to (-0)	71	29.47
V	(-30)to(-15)	35	14.52
VI	-30 & below	11	4.56
	Total	241	100

IVth Category :

This category ranks second after IIIrd category in terms of number of districts. 30 per cent of the groundnut producing districts of the country lie in this category of negative growth rate.

Though, this kind of growth pattern is found all over India, but invariably it lies in northern and western India. One district each of Haryana, Punjab and H.P lies in this category. Nagaur, Ajmer, Jaipur, Udaipur, Sirohi and Swai-Madhopur districts of Rajasthan form a cluster of this growth pattern. Eight districts of north-central U.P lie in this category. Gaya, Hazaribagh, Ranchi and Singhbhum districts of Bihar forms a continuous belt.

A more regular concentration of this kind of growth pattern is observed in the districts of Gujarat and Maharashtra and south -western M.P. Seven districts of M.P and eight districts of Maharashtra form a continuous belt (fig. 3.2).

In south India four districts of Andhra Pradesh, three districts of Tamilnadu, Two of Karnataka and one district of Kerala lie in this category.

As a conclusion it can be said that the majority of districts in this category lie in central and western india. Seven per cent districts in this category have higher growth in area than the yield. 55% recorded higher growth in yield than the area. Nearly 38% districts have recorded negative

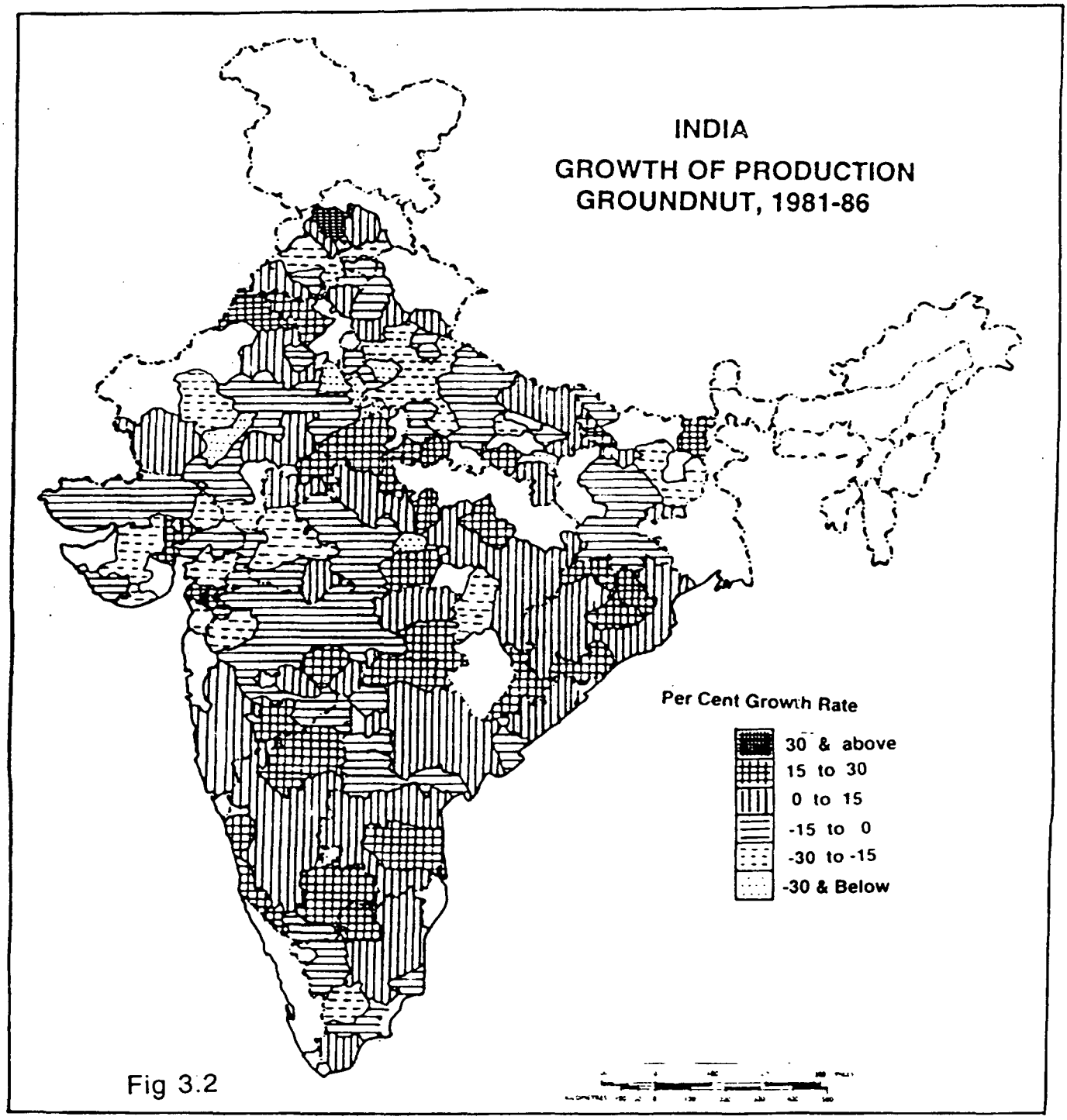

INDIA
GROWTH OF PRODUCTION
GROUNDNUT, 1981-86
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-30 to -15
-30 & Below

Fig 3.2

growth in production, area and yield.

Vth Category :

This category accounts for nearly 15 per cent (35) of the groundnut growing districts in the country.

This kind of negative growth of production between 30 and 15 per cent is largely confined in Northern and western India particularly in U.P. and Gujarat. Eight districts of U.P. and seven districts of Gujarat lie in this category. Jodhpur, Dungarpur, Banswara of Rajasthan and Ratlam, Ujjain, Dhar, Indore, Dewas and Durg district of M.P also lies in this category. Two districts of Bihar namely Monghyr and Santhal- Pargana also registered the growth pattern of this category.

In south India, Madurai district of Tamilnadu lies in this category. 60 per cent districts recorded higher growth in yield than area in this category. 37% districts recorded negative growth in all production, area and yield.

VIth Category :

Only five per cent of the groundnut producing districts of the country lie in this category.

One district each of Punjab and H.P, three districts each of U.P and Rajasthan lie in this category. Ahmedabad and Jamnagar districts of Gujarat were also observed in this category. Nearly 50 per cent districts recorded higher

growth in yield than the area and remaining districts experienced negative growth in production, area and yield.

3.3 Pattern of Growth of Production, Area and Yield during 1971 to 1986:

For calculating growth rate during this period triennium averages of 1970-71 - 1972-73 and 1985-86 -1987-88 have been taken into consideration. Annual growth rate is also calculated for this time period.

Ist category :

Merely three districts which account for one per cent of the groundnut growing districts lie in this category. These districts are Ganganagar of Rajasthan and Jhansi of M.P and Hamirpur of U.P. Jhansi and Hamirpur districts registered positive growth in both area and yield. While the district of Ganganagar experienced positive growth rate in area but negative in yield. All the districts in this category recorded higher growth in area than the yield. Annual growth rate in production ranges from 1.96% to 2.71% in this category.

IInd category :

Nearly five per cent (11) of the groundnut growing districts fall under this category. Kangra district of H.P, Mainpuri of U.P, Gwalior and Durg of M.P, Keonjhar, Cuttack and Kalahandi district of Orissa lie in this category.

Annual growth rate in production for this category ranges from 1.05 to 1.91 per cent. All districts like Ist category registered higher growth in area than the yield.

IIIrd Category :

One hundred and nine districts accounting for 45 per cent of the groundnut producing districts in the country fall under this category.

If we look on the distribution map of growth rate during this period then we find that though this kind of growth rate is observed all over the area under study but it is more pronounced in U.P, M.P, Orissa, Maharashtra, Karnataka and Andhra pradesh. A small belt of this category can be observed in the districts of Ferozpur of Punjab, Hisar, Gurgaon of Haryana and Churu and Jhunjhunnu of Rajasthan. Another cluster observed in Bahraich, Gonda, Basti, Gorakhpur, Deoria, Faizabad, Azamgarh, Balia, Jaunpur and Gorakhpur districts of U.P.

Four districts of Rajasthan and six districts of M.P form a continuous belt of this growth category. This belt continues in the districts of Seoni and Chindwara of M.P, Nagpur, Bhandara, Wardha and Chanda of Maharashtra, Karimnagar, Warangal, Khammam, East Godavari, West Godavari and Krishna of Andhra Pradesh (fig. 3.3).

A larger cluster is discerned in the contiguous

districts of M.P, Bihar and Orissa. Three districts of each of M.P and Bihar and Seven districts of Orissa constitute this cluster.

The largest concentration of this growth category is observed in a continuous form in the districts of Maharashtra, Karnataka, Andhra Pradesh and Tamilnadu. There are 34 districts in this belt. Maharashtra contributes six, Karnataka fifteen, Andhra Pradesh six, Tamilnadu seven to this belt.

Nearly 55 per cent districts in this category experienced higher growth in area than the yield. 39% districts have higher growth in yield than the area. Nearly five percent districts have zero growth in production and yield. Annual growth rate in production lies between zero and 0.92 per cent in this category.

TABLE 3.4

Growth pattern for groundnut production during 1971-86

Category	Growth in production	No. of districts	% of the groundnut growing district
I	30 and above	3	1.25
II	15-30	11	4.56
III	0-15	109	45.23
IV	(-15)to(-0)	98	40.66
V	(-30)- (-15)	19	7.88
VI	-30 & below	1	0.42
	Total	241	100

IVth Category :

This category includes 41 per cent (98) of the groundnut producing districts which registered negative growth rate between 0 to 15 per cent.

The districts of Ludhiana, Sangrur, Bhatinda, Patiala of Punjab and Ambala of Haryana form a small cluster of this growth category. In U.P., a more continuous belt is observed starting from the Western U.P and extending up to Rai Bareily and Sultanpur districts of central U.P. Eighteen districts lie in this category. Champaran, Shahbad, Patna, Gaya, Singhbhum and Santhal Pargana districts of Bihar also lie in this category.

A large number of districts of Rajasthan, Gujarat, M.P and Maharashtra form a continuous belt of this growth pattern. This belt starts from Sikar and Nagaur districts of Rajasthan and extends up to the Mahbubnagar and Guntur districts of Andhra Pradesh. Kutch of Gujarat and Narsimhpur district of M.P form the Western and Eastern limit respectively of this belt. State wise ten districts of Rajasthan, thirteen districts each of Gujarat and M.P,

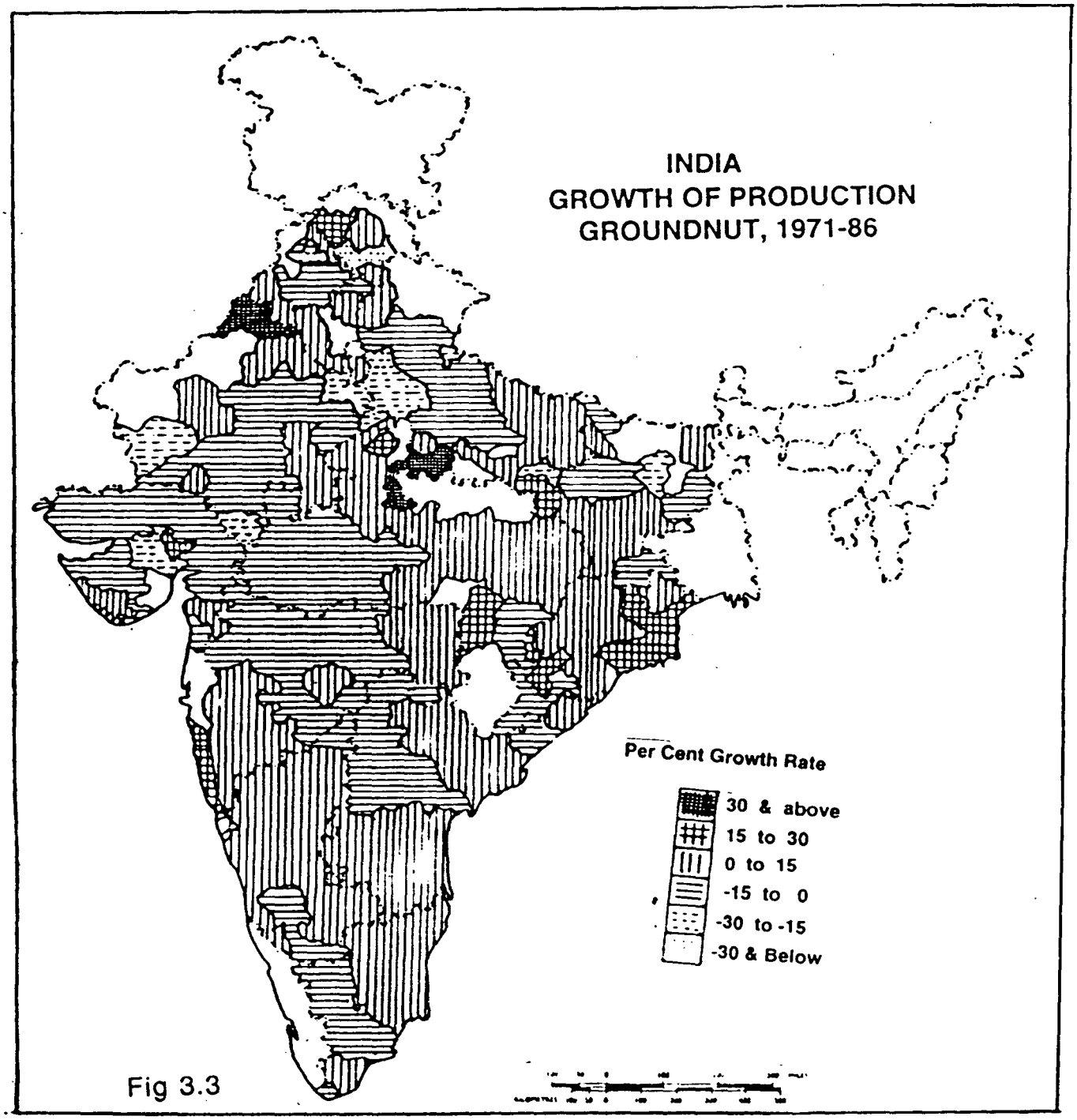

INDIA
GROWTH OF PRODUCTION
GROUNDNUT, 1971-86
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-30 to -15
-30 & Below

Fig 3.3

eleven of Maharashtra and eight districts of Andhra Pradesh lie in this belt.

District of Raipur of M.P, Koraput of Orissa and Vishakhapatnam of Andhra Pradesh form another continuous belt of this growth category. A narrow belt can be observed in the districts of Chickmanglur, Hassan, Mysore of Karnataka and Coimbatore, Madurai and Ramnathapuram of Tamilnadu.

Concludingly it can be said about this growth rate category that it is discernible in clusters and belts. Seven per cent districts in this category registered higher growth in area than the yield and 52% recorded higher yield growth than the area growth. Remaining 40% districts have experienced negative growth in production, area and yield.

Annual growth rate of production ranges from 0.99 and 0.009 per cent negatively in this category.

Vth Category :

Nineteen districts which account for 8 per cent of the groundnut growing districts lie in this category.

Spatially these districts are confined in Northern and Western parts of the country.

The district of Jullundhar in Punjab and Bilaspur of Himachal Pradesh lie in this growth rate category. A small cluster of this growth category is observed in Western U.P

in the districts of Bulandshar, Aligarh, Mathura, Etah and Mainpuri. Two districts of Rajasthan namely Alwar and Bharatpur also lie in this cluster.

In Rajasthan the district of Barmer, Dungarpur and Banswara fall under this category. Monghyr district of Bihar and Surendernagar of Gujarat also lie in this growth rate category. 58% districts have higher growth of yield than the area and remaining have negative growth rate in production, area and yield. Annual growth rate in production ranges from 1.07 and 1.83 per cent negatively in this category.

VIth Category :

Only the Simla district of H.P registered the negative growth in production above 30 per cent. The production, area and yield growth rates are negative for Simla.

As a conclusion of growth rate of production of groundnut it can be said that during 1981 - 1986 more districts recorded growth rate of 30% and above than the 1971-81 and 1971-86. Same is the case with the districts recording a growth rate between 15 and 30 percent. Districts registering growth rate between zero and 15 percent were highest during 1971-86 followed by 1971-81 and 1981-86.

Negative growth rate between zero and 15 per cent has been in large proportion of districts during 1971-81. Fifth

category (-15 to -0%) has noticed larger number of districts during 1981-86 followed by the periods 1971-86 and 1971-81. In sixth category proportion of districts have remained more or less same during 1971-81 and 1971-86, while it is highest during 1981-86.

During 1971-81, Nearly 32% of groundnut growing districts registered higher growth rate in area than the yield. Of these districts 56% have recorded negative growth rate in yield. 35% districts recorded higher yield growth than the area growth. Even in these 35% districts nearly 79% districts recorded the negative growth rate in yield.

Another 30% districts recorded negative growth rate in production, area and yield.

During 1981-86, 33% districts recorded higher area growth than the yield. Of these districts nearly 36% registered a negative growth in yield. 44% districts recorded higher yield growth than the area during this period and nearly 80% of these districts experienced negative growth in area. Only 19% districts recorded negative growth rate in production, area and yield during 1981-86.

During 1971-86, 34% districts registered higher area growth than the yield, 23% of these districts recorded

negative growth in yield. 43% districts registered higher growth of yield of these districts registered negative growth in area. Only 27% districts experienced negative growth in production, area and yield.

Rapeseed and mustard :

Rapeseed and mustard was grown in 250 districts in 1970-71. In other words rapeseed and mustard was grown in nearly seventy per cent districts of the country. The districts have been classified in five categories depending upon their production performance. Growth rate has been calculated for three periods 1971- 1981, 1981-1986 and 1971-1976 taking the triennium averages.

3.4 Pattern of Growth of Production, Area and Yield during 1971-81

Ist category :

This category includes those districts which registered growth rate of production 30 per cent and above. Four per cent (10) of the rapeseed and mustard growing districts lie in this category.

Kinnaur of Himachal Pradesh, Jhalwar and Bhilwara of Rajasthan, Amreli, Gandhinagar, and Ahmedabad of Gujarat, Burdwan of West Bengal lie in this category. Ninety per cent districts in this category have positive growth in area and yield. Remaining districts have negative growth in yield

but positive in area.

IInd category :

This category comprises the districts which recorded growth rate of production between 15 and 30 per cent. 12 per cent (29) of the rapeseed and mustard growing districts lie in this category.

A belt of this growth category starts from Kutch district of Gujarat and extends northward in Rajasthan comprising the districts of Barmer, Jodhpur, Nagaur, Sikar, Jhunjhunnu Pali and Churu. This belt continues in the districts of Dungarpur, Udaipur, Ajmer, Bundi and Kota. In U.P. small patches are observed in Aligarh, Etah and Farrukhabad. Two districts of West Bengal Bankura and Birbhum also lie in this category. Adilabad of Andhra Pradesh and Balasore district of Orissa also lie in this category.

Sixety nine districts in this category registered positive growth rate in both area and yield while, the remaining districts experienced positive growth in area but negative in yield.

TABLE 3.5

Growth pattern for Rapeseed & Mustard production during 1971-81.

Category	Growth in production	No. of districts	% of the rapeseed & mustard growing district
I	30 and above	10	4.00
II	15 to 30	29	11.6
III	0 to 15	151	60.4
IV	(-15)to (-0)	52	20.8
V	(30)to (-15)	8	3.2
	Total	250	100

IIIrd category :

Growth rate between 0 to 15 per cent demarcates the boundary of this category. This category is most important among other categories in terms of number of districts. 60 per cent (154) of the rapeseed and mustard growing districts lie in this growth rate category.

The largest concentration of this category is observed in the states of U.P., M.P., Bihar, Orissa, and Assam. A small patch is observed in Himachal Pradesh comprising the districts of Kulu, Kangra, Mandi, Bilaspur and Sirmaur. Starting from western U.P., a large cluster interrupted by negative growth category (IVth) at some places is observed in most of the U.P., Bihar and half of the M.P. in its eastern part (fig. 3.4). Except one district of Balasore all the districts of Orissa lie in this category. A narrow belt is discerned in North - Eastern region starting from the

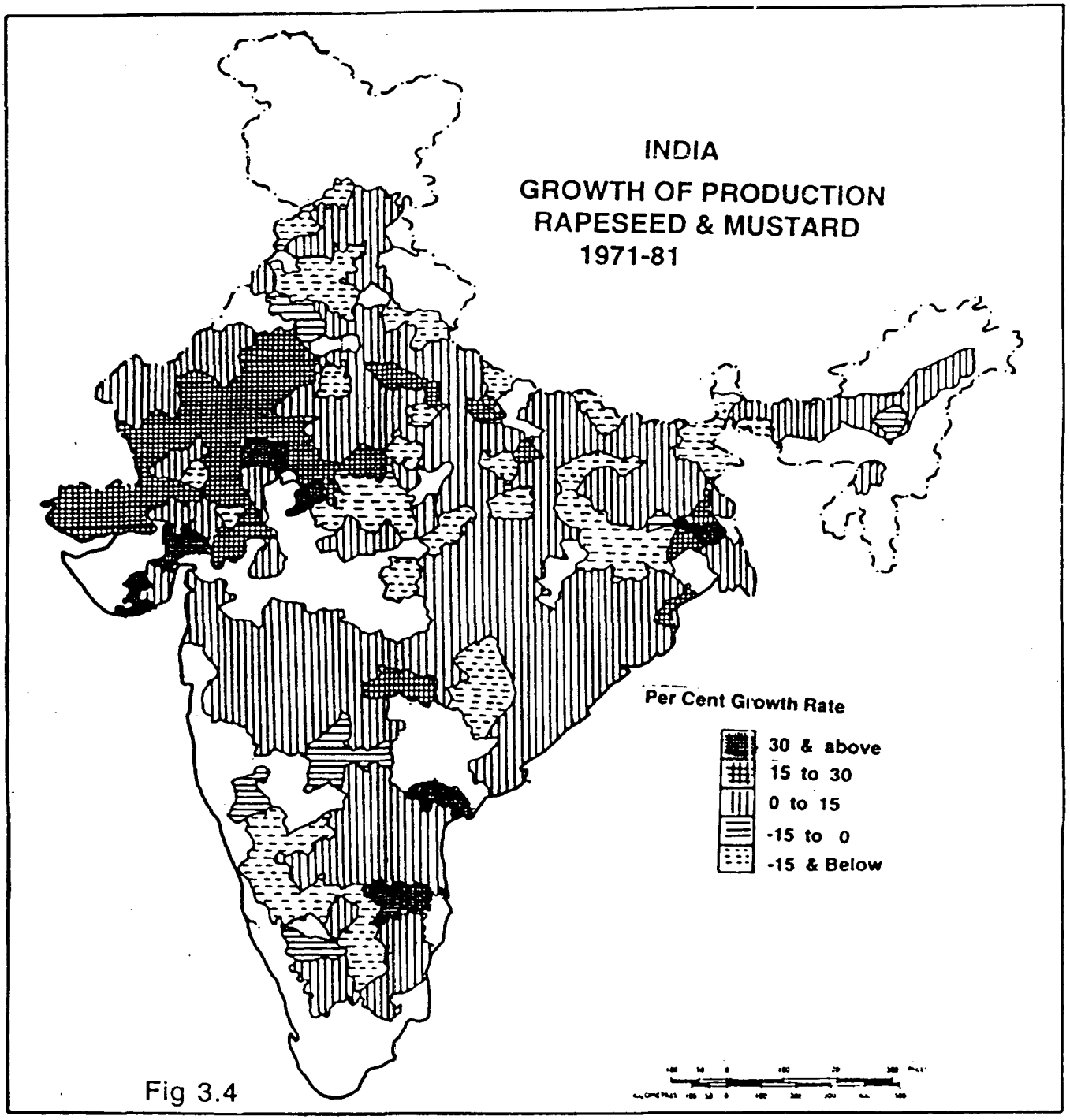

INDIA
GROWTH OF PRODUCTION
RAPESEED & MUSTARD
1971-81
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-15 & Below

Fig 3.4

Jalpaiguri district of West Bengal to the Lakhimpur district of Assam. Another Cluster is observed in Maharashtra comprising the districts of Nasik, Aurangabad, Buldhana, Akola, Parbhani, Bhir and Osmanabad. Two districts of Chittardurg and Bangalore of Karnataka, North Arcot of Tamilnadu also fall under this category.

Fifty eight per cent districts in this category registered positive growth rate in area and yield. 30 per cent districts experienced positive growth in area but negative in yield. Remaining districts have negative growth in area but positive in yield along with production.

IVth Category :

Those districts which registered negative growth rate between zero and 15 per cent lie in this category. Twenty one per cent (52) of the rapeseed and mustered growing districts of the country registered such a growth pattern.

The districts of Amritsar, Gurdaspur, Hoshiarpur of Punjab and Chamba of Himachal Pradesh form a continuous belt of this category. A small patch adjacent to the above mentioned belt lies in the districts of Bhatinda, Sangrur, Ludhiana, Patiala of Punjab and Karnal district of Haryana. In U.P., though no continuous belt is observed but the districts of Bijnor, Nainital, Rampur, Bahraich, Etawah and

Allahabad registered this growth pattern. In Bihar a contiguous belt is observed in the districts of Patna, Shahbad, Palamau, Ranchi, Singhbhum and Purulia, Malda, West Dinajpur. Darjeeling districts of West Bengal also formed a contiguous belt of this growth rate category.

A small cluster in discerned in the Raigarh, Guna, Vidisha, Sagar and Jhansi districts of M.P. Besides these districts, Sidhi, Jabalpur and Chindwara districts of M.P. also registered the growth pattern of this category.

In South India Bellary, Dharwar, Shimoga, Chickmanglur, Hassan, Tumkur and Kolar district form a contiguous belt which further extends in the Dharmpuri and Salem districts of Tamilnadu.

With regards to the growth rate of area and yield, it is found that 44 per cent districts registered negative growth rate in both area and yield along with production 38% districts registered negative growth rate in area but positive in yield. Fifteen per cent districts experienced positive growth rate in area but negative in yield. Nearly two per cent districts have positive growth rate in both area and yield but negative in production.

Vth Category :

This category includes those districts which registered

a negative growth rate of 15 per cent and more. Only three per cent (8) of the rapeseed and mustered growing districts lie in this category.

Hisar district of Haryana, Dhanbad of Bihar, Mikir hills of Assam lie in this category. Four districts namely Bidar, Gulbarga, Belgaum and Mysore of Karnataka and Hyderabad of Andhra Pradesh lie in this growth rate category.

75 per cent districts of this category registered a negative growth rate in both area and yield while the remaining districts registered negative growth rate in area but positive in yield.

3.5 Pattern of Growth of Production, Area and Yield during 1981-86 :

Growth rate for production, area end yield have been calculated by taking the triennium averages of 1980-81 - 1982-83 and 1985-86 - 1987-88 for a five year period.

Ist Category :

Nearly 12 per cent of the rapeseed and mustard growing districts lie in this category.

As regards to the spatial distribution of these districts, small patches can be observed in the Northern, Western and Eastern regions of India. Hisar district of Haryana, Merrut, Muzaffarnagar, Bijnor, Shahjanpur and

Mathura district of U.P. lie in this category. In Rajasthan a small cluster is observed in the districts of Alwar, Jaipur, Ajmer, Tonk, Bhilwara, Bundi and Kota. In Gujarat a contiguous belt is discerned in the districts of Kutch, Banas-Kantha, Mehsana, Sabarkantha, Panch Mahal and Ahmedabad. Four districts of West Bengal namely Midnapore, Bankura, Hoogly and Howrah from a small cluster of this category.

IInd Category :

Forty three districts constituting 17 per cent of the rapeseed and mustard growing districts of India lie in this category.

A belt of this category starts from Bikaner district of Rajasthan moves north ward encompassing the Ganganagar district of Rajasthan Ferozpur, Ludhiana of Punjab then it turns towards south in the districts of Patiala of Punjab, Ambala, Karnal, Jind and Rohtak of Haryana and terminates in the Alwar district of Rajasthan (fig. 3.5).

Bharatpur district of Rajasthan and Morena, Gwalior and Shivpuri of M.P. from another cluster of this category Saran, Champaran, Palamau and Singhbhum districts of Bihar also lie in this category. Five districts of West Bengal registered growth pattern of this category.

84 per cent districts of this category registered

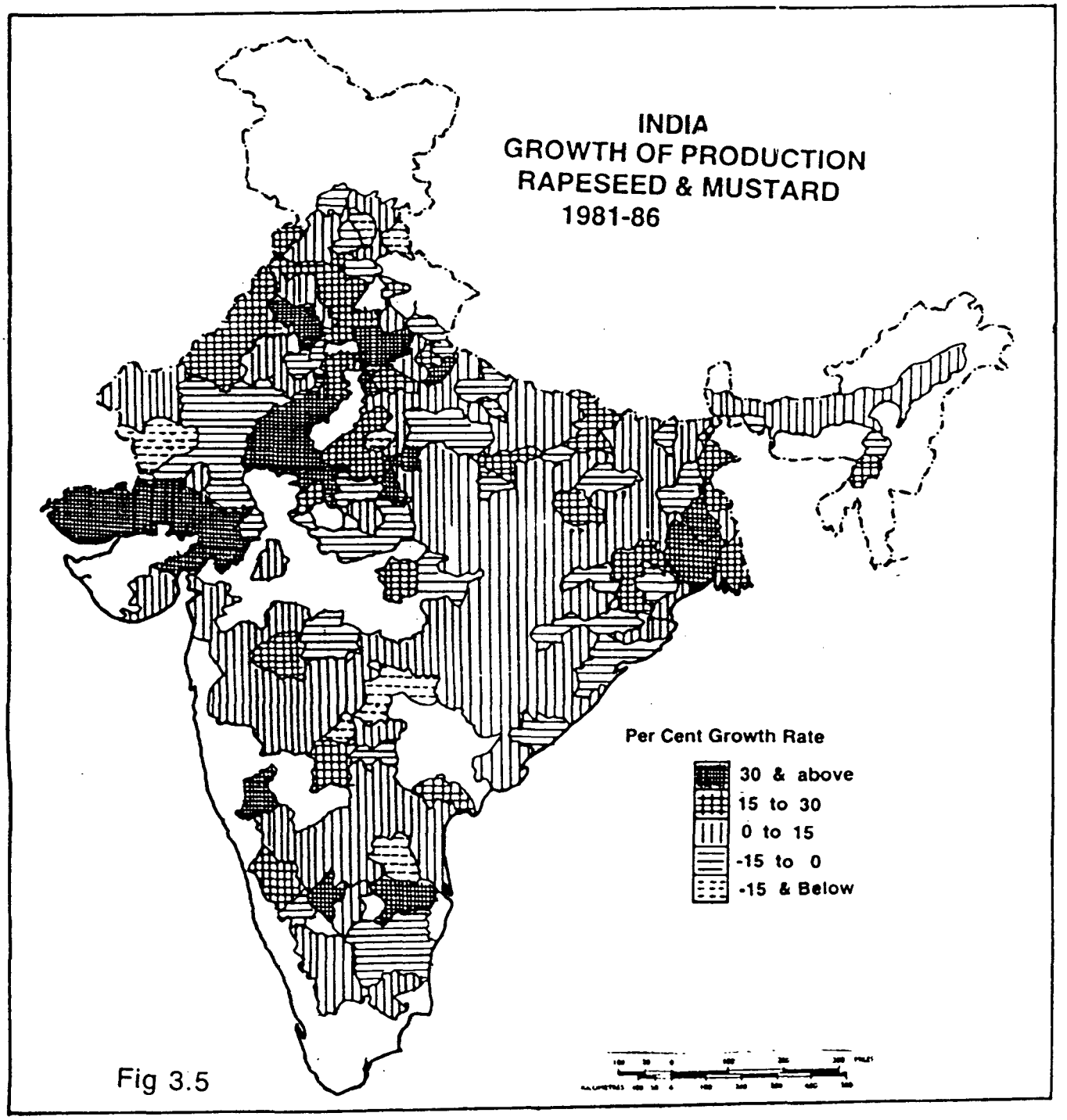

INDIA
GROWTH OF PRODUCTION
RAPESEED & MUSTARD
1981-86
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-15 & Below

Fig 3.5

positive growth in both area and yield. 12 per cent districts have positive growth in area but negative in yield. Remaining districts have negative growth in area but positive in yield.

IIIrd Category

46 per cent (116) of the rapeseed and mustard growing districts lie in this category of growth rate of production.

Hoshiarpur, Jullundhar, Kapurthala, Bhatinda districts of Punjab and Jind of Haryana lie in this category. Four districts of Rajasthan namely Jaisalmer, Sirohi, Churu and Sikar also fall under this category. In U.P. a cluster is observed in the districts of Gonda, Basti, Gorakhpur, Deoria, Faizabad, Sultanpur, Azamgarh and Partapgarh. In M.P. a contiguous belt is observed starting from the Tikamgarh districts extending upto the Raigarh district adjacent to Bihar and then spreads in Bastar district. Sambalpur, Kalahandi, Phulbani and Koraput districts of Orissa are also the part of this belt.

Another narrow belt lies in North-East starting from the Darjeeling district of West-Bengal and extending up to the Lakhimpur district of Assam.

In Maharashtra districts of Yeotmal, Parbhani, Bhir, Nanded and Osmanabad form a cluster of this growth category.

43 per cent districts of this category registered positive growth rate in both area and yield. 37 per cent districts have positive growth in area but negative in yield. Remaining districts have negative growth rate in area but positive in yield.

TABLE 3.6
Growth pattern for Rapeseed & Mustard production during 1981-86.

Category	Growth in production	No. of districts	% of the rapeseed & mustard growing district
I	30 and above	31	12.4
II	15to 30	43	17.2
III	0 to 15	116	46.4
IV	(-15)to (-0)	51	20.4
V	(-30)-(-15)	9	3.6
	Total	250	100

IVth Category:

51 districts accounting for 20 per cent of the rapeseed

and mustard growing districts constitute this category.

Jodhpur, Nagaur, Pali, Jalore, Udaipur and Banswara districts form a cluster in Rajasthan of this growth category. In U.P, Etawah, Jalaun, Kanpur, Unnao, Fathehpur and Rai-Bareily form a cluster. Other districts lying under this category are Nainital, Pilibhit, Sitapur in U.P. and Bahraich, Santhal Pargana, Gaya and Saharsa are the districts in Bihar in this category.

Six districts of Orissa, one each of West-Bengal and Assam lie in this growth category. Guna, Sagar, Raisen, Sehore, Shajapur, Seoni and Balaghat are the districts of M.P in this category.

24% districts in this category have negative growth rate in both area and yield. 41 per cent districts registered negative growth rate in area but positive in yield. Nearly 33 % districts experienced positive growth in area but negative in yield. Only two per cent of districts experienced positive growth in both area and yield but negative in production.

Vth Category:

Only 4 per cent (9) of the rapeseed and mustard growing districts lie in this category.

Kulu and Kinnaur districts of Himachal Pradesh, Barmer of Rajasthan, Adilabad, Nizamabad and Cuddapha of Andhra

Pradesh lie in this category. 66 Per cent districts in this category registered positive growth rate in area but negative in yield. Remaining districts have negative growth in area but positive in yield.

3.6 Pattern of Growth of Production, Area and Yield during 1971-1986:

Growth rate in production, area and yield have been calculated taking the triennium averages of 1970-71 - 1972-73 and 1985-86 - 1987-88 for fifteen years; annual growth rate is also calculated for the same.

Ist Category:

13 districts which constitute nearly five per cent of the rapeseed and mustard growing districts in country lie in this category. Most of districts of this category lie in Gujarat and Rajasthan, Kutch, Amreli, Kheda, Panch Mahal district of Gujarat and Banswara, Chitorgarh and Bhilwara of Rajasthan form a contiguous small belt of this category.

Most of the districts in this category registered a positive growth rate both in area and yield. Annual growth rate in this category ranges between 1.98 per cent and 4.17.

IInd Category :

Thirty districts which account for 12 per cent of the rapeseed and mustard growing districts of the country lie in this category. With regard to the spatial distribution of

these districts, it is clear from the map that the parts of Rajasthan, U.P. and West Bengal lie in this category. In Rajasthan a contiguous belt is observed from Jodhpur to Swai-Madhopur district. This belt continues in Morena and Shivpuri districts of M.P. Another cluster is observed in West-Bengal in the districts of Birbhum, Burdwan, Bankura and Hoogly.

Nearly 83 per cent districts in this category registered positive growth rate in both area and yield. 13 per cent registered positive growth in area and negative in yield. Remaining districts have experienced negative growth in area but positive in yield.

Though the overall growth rate in production for 15 years have been in between 15 and 30 per cent but annual growth rate ranges from 0.98 and 1.91 per cent.

IIIrd Category :

This category comprises the largest number of rapeseed and mustard growing districts. Nearly 64 per cent of the rapeseed and mustard growing districts were observed under this category.

This type of growth pattern is observed in two clusters in North India and Eastern India. Frontier districts of Rajasthan, South-Western Haryana and the major parts of Punjab are reported under this category. A majority of

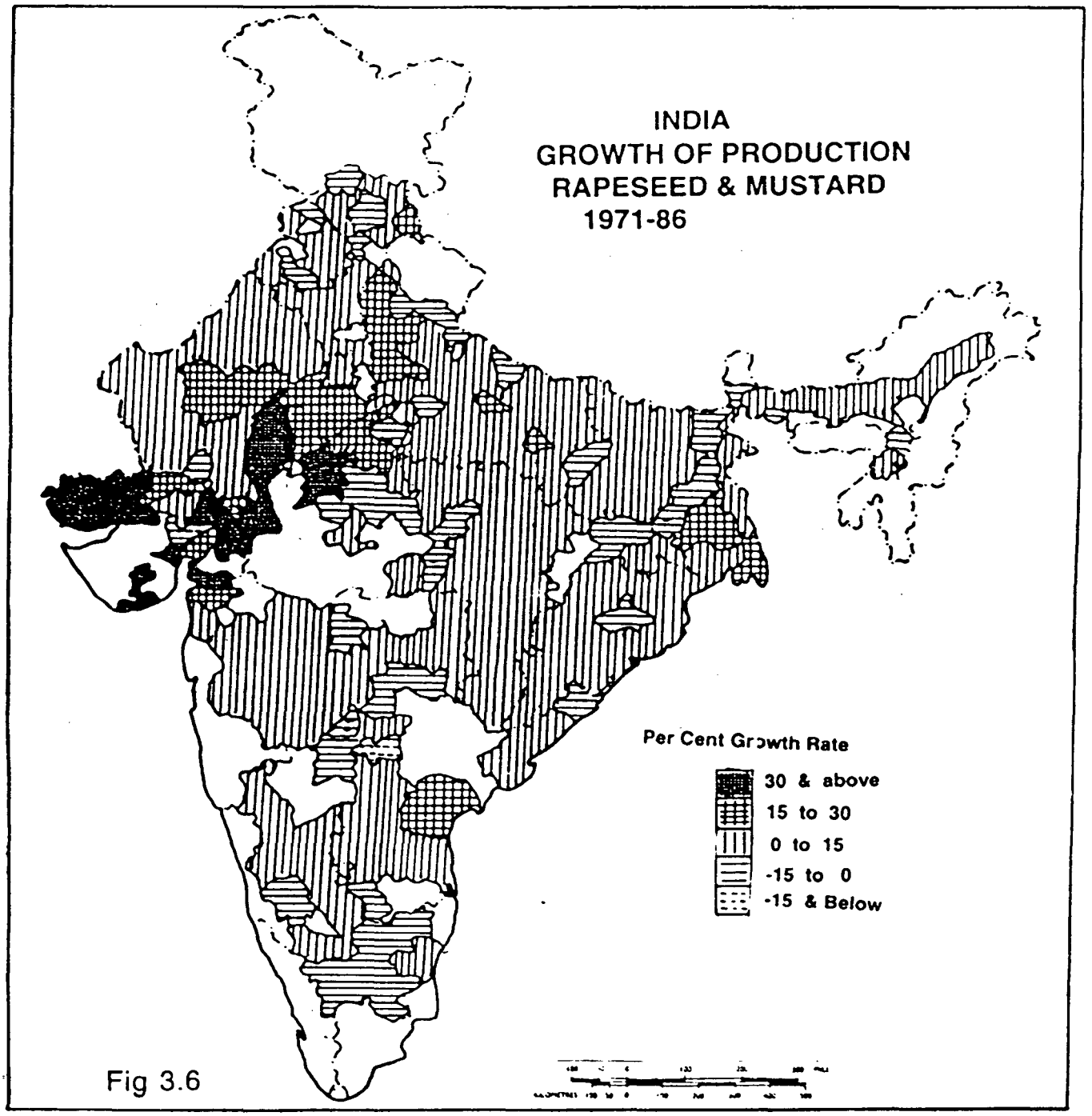

INDIA
GROWTH OF PRODUCTION
RAPESEED & MUSTARD
1971-86
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-15 & Below

Fig 3.6

districts in U.P. also lie in this category. A contiguous patch starts from Rampur district in North and then extends towards South. comprising a majority districts of M.P. All the districts of Orissa except Dhenkanal and the majority of districts of Bihar are also reported this category.

In North Eastern region a narrow belt starting from Jalpaiguri district of West-Bengal extends up to Lakhimpur district of Assam.

Another cluster of this growth can be observed in Maharashtra. Six districts have experienced the growth rate of third category. A belt of this growth is also observed in Karnataka starting from Belgaum to Banglore district (fig. 3.6).

67 per cent districts experienced positive growth rate in area and yield besides production.

23% districts have positive growth in area but negative in yield. Nine per cent districts registered negative growth in area but positive in area. Remaining one per cent districts have negative growth rate in area but no growth at all in the both yield and production. This category registered annual growth rate between zero to 0.97 per cent while growth rate in production for the period have been between zero and 15 per cent.

TABLE 3.7
Growth pattern for Rapeseed & Mustard production during 1971-86.

Category	Growth in production	No. of districts	% of the rapeseed & mustard growing district
I	30 and above	13	5.20
II	15 to 30	30	12.00
III	0 to 15	159	63.6
IV	(-15)to(-30)	46	18.40
V	(-30)to(-15)	2	0.8
	Total	250	100

IVth Category :

This category includes 18 per cent (46) of the rapeseed and mustard growing districts of India.

Districts registering this kind of growth can be observed all over the India. Chamba, Kulu and Mandi and Simla of Himachal Pradesh, Bijnor, Nainital, Pilibhit, Bahraich, Etawah districts of U.P. lie in this category. A small cluster is observed in M.P. Comprising the districts of Guna, Rajgarh, Vidisha and Sagar. A clearly defined narrow belt of this growth pattern is observed in Bihar. The belt emanates from Purnea in North and extends up to the Ranchi district in South.

Five districts of Tamilnadu, four of Karnataka and two districts of Andhra Pradesh lie in this category.

30 per cent districts in this category registered negative growth in all the three production, area and yield. 46 per cent districts have negative growth rate in area but positive in yield. Remaining districts experienced positive growth in area but negative in yield.

Annual growth rate for production in this category ranges from 0 to 0.88%.

Vth Category :

Only two districts lie in this growth category. These are Bidar of Karnataka and Hyderabad of Andhra Pradesh.

Annual growth rate in production in this category ranges between 1.93 and 1.15 per cent negatively.

Concludingly it can be said about rapeseed & mustard production growth that proportion of districts in category I has been highest during 1981-86 followed by 1971-86 and 1971-81. Same is the case with IInd category except that number of districts has remained almost same during 1971-81 and 1971-86. In IIIrd category proportion of districts has been highest during 1971-86 closely followed by 1971-81 and 1981-86. In case of IVth category proportion has been highest and same during 1971-86 and followed by almost proportion during 1971-81 and 1981-86.

During 1971-81 nearly 54 per cent of the rapeseed and mustard growing districts recorded higher area growth than the yield. 42 per cent districts recorded higher yield growth than the yield and only 12 per cent districts registered negative growth in all production, area and yield. In 14% districts no data is available on production and yield growth.

During 1981-86, 56% districts registered higher growth in area than the yield and 26 per cent recorded higher growth in yield than the area. Only five per cent experienced negative growth rate in production, area and yield. In 12% districts no data available on production and yield growth.

During 1971-86, 62% of districts registered higher growth in area than the yield and 22 per cent recorded higher growth in yield than the area. Only 6 per cent districts experienced negative growth rate in production, area and yield.

Area growth has been in large number of districts during 1971-86 while the yield growth is observed in large number of districts during 1971-81.

SESAMUM

Sesamum was grown in 298 districts which constitute 84% districts of the country taking 1970-71 as a base year. Of

the three edible oilseeds under study this oilseed is grown in largest number of districts than the other two.

3.7 Pattern of Growth of Production, Area and yield during 1971-81 :

Ist Category :

This category includes those districts which have a production growth rate of 30 per cent and above. Only five districts which constitute nearly 2 per cent of the sesamum growing districts in the country lie here. Of these five districts three districts -namely Burdwan, West-Dinajpur and Bankura are in west- Bengal. Rest of the two districts are Moradabad and Rampur of U.P.

IInd Category :

The districts which recorded the growth rate between 15 and 30 per cent in production have been included in this category. There are 30 districts which account for 10 per cent of the sesamum growing districts in the country in this category. Six districts of this category lie in West-Bengal forming a contiguous belt from Murshidabad in North to the Midnapore district in south, interrupted only by Burdwan, the district of high growth rate. Three districts namely Bolangir, Keonjhar and Sundergarh of Orissa and four districts Jaisalmer, Bikaner, Churu, and Jhunjhunnu in a contiguous form registered a growth rate between 15 and 30 per cent. In U.P. the districts of Bijnor, Nainital

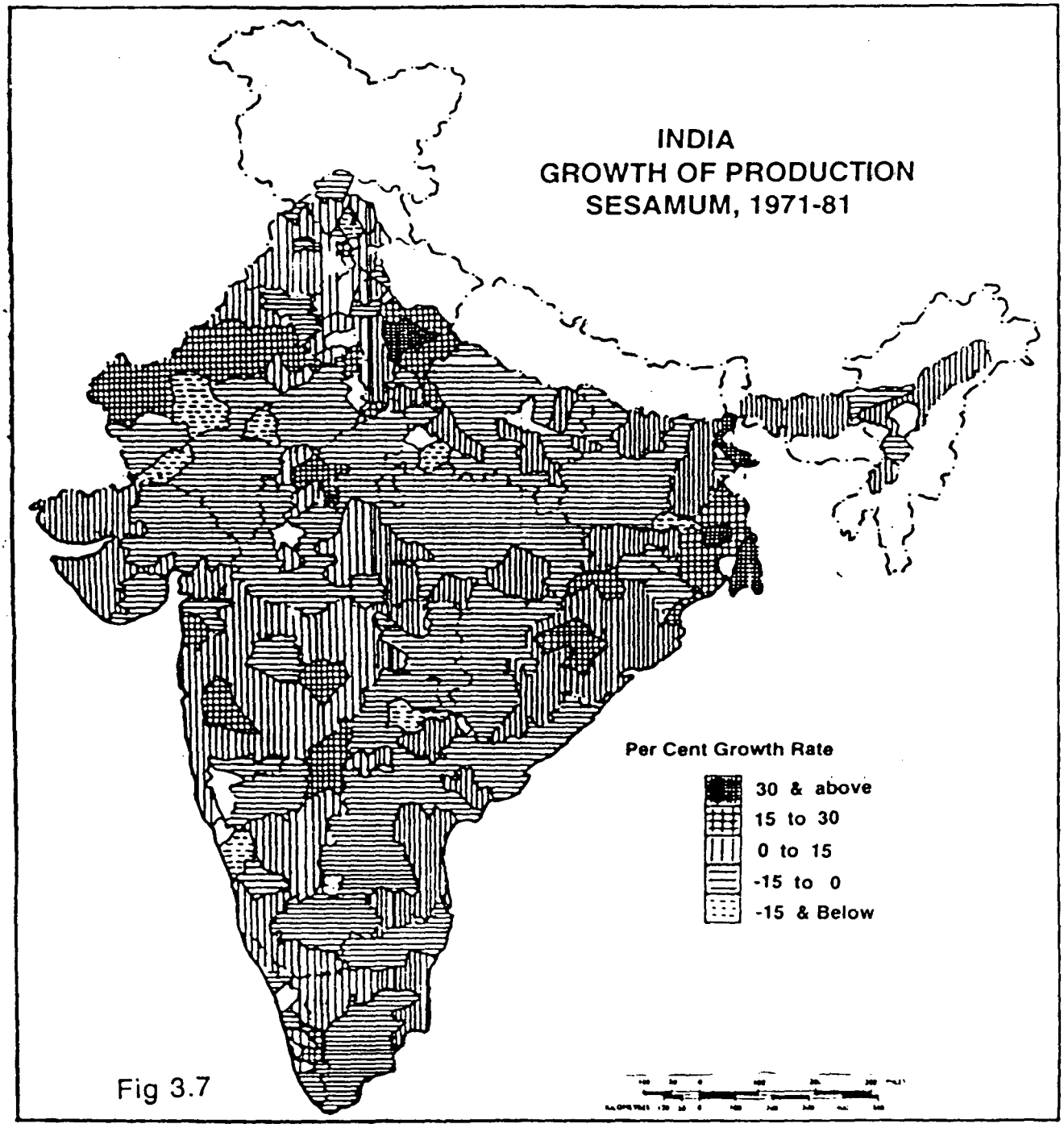

INDIA
GROWTH OF PRODUCTION
SESAMUM, 1971-81
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-15 & Below

Fig 3.7

Pilibhit, Bareily, Badaun and Farrukhabad from a cluster in the foothills of Himalayas. Two districts each of Maharashtra and Karnataka, one each of Kerala and Gujarat, Haryana and Himachal pradesh were observed under this category.

On the regional basis it can be said that the majority of districts lie in Northern region followed by Eastern region.

When we take into consideration the growth rate of production, area and yield then it is found that nearly 63 per cent districts have positive growth in production, area and yield.

IIIrd Category :

Production growth rate ranging from between 0 to 15 per cent demarcates third category. One hundred seventeen districts constituting nearly 39% of the sesamum growing districts were reported under this category. This type of growth can be observed throughout the India extending from Lakhimpur district of Assam in east to Kutch district of Gujarat in west and Kangra district of Himachal pradesh in north to Allepy district of Kerala in South.

In North India, Kangra and Sirmaur districts of Himachal pradesh, Amritsar, Ferozpur, Ludhiana and Patiala of punjab, Ganganagar, Sikar, Bundi, Jhalwar of Rajasthan

Constitute this category. In western U.P. five districts form a small belt of this growth category; overall, thirteen districts of U.P. are under this category. Bihar also shows a small belt comprising the districts of Purnea, Bhagalpur and Santhal Pargana. In M.P. a cluster is found in south-western part which continues in Maharashtra.

In the Eastern and North-Eastern region, all districts of Orissa except the four districts belonging to IInd category all the districts of Assam except Darrang, N.C.Hills experienced growth rate in between 0 to 15 %.

In western region coastal districts of Gujarat (only Jamnagar, Junagarh, and Kutch) form a small cluster. Besides this small cluster, a large cluster is observed in Maharashtra, interrupted only by Aurangabad and Parbhani districts of another category. This growth rate category embraces most of the districts of Maharashtra. Seven districts of Karnataka, four district each of Tamilnadu and Andhra Pradesh are reported in this category.

The majority of districts in this category lies in Northern region, followed by western and east and North-eastern and southern region.

When all the three components namely production, area and yield growth rate are examined then it is observed that nearly 77% districts registered positive growth rate in production and only 10 % recorded positive growth rate in production, area and yield. There are only 7% districts

where production and yield growth rate are positive but area growth rate is negative.

TABLE 3.8

Growth pattern for sesamum production during 1971-81

Category	Growth in production	No. of districts	% of the sesamum growing district
I	30 and above	5	1.68
II	15 to 30	30	10.07
III	0 to 15	117	39.26
IV	(-15)to(-0)	138	46.31
V	(-15) & below	8	2.68
	Total	298	100

IVth Category :

This category belongs to the negative growth rate of production. Negative growth rate in this category ranges from 0 to 15 per cent. It includes nearly 40 per cent (138 districts) of the sesamum growing districts of the country. During 1971-81, this growth rate category embraced the largest number of sesamum growing districts.

As revealed in the fig. 3.7 most of the districts of Rajasthan, M.P., U.P. and Bihar constitute this category. In Rajasthan except the districts of Jaisalmer, Bikaner, Churu, Jhunjhunnu, Jodhpur, Ajmer, Kota all other districts registered the negative growth rate between 15 and zero per

cent. In M.P. a continuous belt is observed, interrupted by the third growth rate category in south-western part. Except the districts of western part of U.P., this growth pattern is observed throughout U.P., in dispersed form.

Most of the districts of Gujarat are lying under this category. Only five districts of Maharashtra fall under this category. All the districts of Tamilnadu except the middle position districts of Salem and South Arcot lie in this category. Majority of districts of Andhra Pradesh experienced negative growth rate between zero and 15 per cent. Only two districts of Assam namely Darrang and N.C.hills lie in this category.

As regards to the spatial distribution it is Northern region comprising most of the districts of this category.

Nearly 75 per cent districts in this category have experienced negative growth rate in production, area and yield 23 percent districts registered negative growth rate in production and yield. Only 2 percent districts have experienced positive growth rate in yield but negative in production and area.

Vth category :

This category includes the districts registering negative growth rate of less than 15 percent in production. Only eight districts which constitute nearly 3 per cent of

the sesamum growing districts in India lie in this category. Three districts of Rajasthan namely Jodhpur, Jalore, and Ajmer, Mandi of Himachal Pradesh, Dhanbad of Bihar, Hamirpur of U.P, Karimnagar of Andhra Pradesh and North Kanara of Karnataka are reported under this category.

3.8 Pattern of Growth of Production, Area and Yield during 1981-1986:

For calculating the growth rate during this period triennium averages of 1980-81 - 1982-83 and 1985-86 - 1987-88 have been selected. All the sesamum growing districts have been classified in five categories depending upon their five years growth.

Ist Category:

Six districts which is nearly two per cent of the sesamum growing districts registered a positive growth rate more than 30 per cent and above in production. A total of six districts are reported under this category. Out of which five districts are in U.P and one in Bihar. All the districts in this category have positive growth rate in production area and yield.

IInd Category:

This category comprises 9.39 percent (28) of the sesamum growing districts of the country.

In western U.P, three districts namely Kheri,

Shahjanpur and Sitapur form a small cluster adjacent to Nepal. Other districts in U.P are Etawah, Allahabad, Faizabad and Ghazipur. Five districts of M.P. namely Rajgarh, Vidisha, Shajapur and Datia registered the growth rate between 15 and 30 per cent. Four districts of Maharashtra form a cluster in North, eastern part. Five districts of Karnataka, Two each of Andhra Pradesh, Orissa and West Bengal are also under this category.

With regard to the growth rate of production, area and yield, it is clear that 96% districts registered positive growth rate in all the three components namely - production, area and yield. Only one district of wardha registered positive growth rate in production and area but negative in yield.

TABLE 3.9

Growth pattern for sesamum production during 1981-86

Category	Growth in production	No. of districts	% of the sesamum growing district
I	30 and above	6	2.01
II	15 to 30	28	9.40
III	0 to 15	133	44.6
IV	(-15) to(-0)	88	29.53
V	(-15) and below	43	14.43
	Total	298	100

IIIrd Category :

Of the sesamum growing districts in India 44 per cent (133) registered a growth rate between zero to 15 per cent.

A narrow belt of this growth rate category starts from Punjab and further expands in U.P., becomes much wider in M.P. and Orissa and forms a cluster (fig.3.8). Another narrow belt starts from Bhilwara district of Rajasthan move towards south and swallowes in the districts of Maharashtra. Again a narrow strip along the Coromandal coast in the districts of Tamilnadu is observed. Four districts of Assam namely Goalpara, Kamrup, Darrang and Sibsagar form a contiguous belt in North-Eastern region.

As a conclusion it can be said that a huge cluster is observed in the states of M.P and Orissa which embraces a majority of districts of this category.

Seventy eight percent districts in this category registered positive growth rate in production, area and yield. Nineteen percent experienced negative growth rate in area but positive in production and yield. Only four percent districts registered a negative growth rate in yield but positive in production and area. Concludingly, it can be said that the majority of districts experienced positive growth rate in production, area and yield.

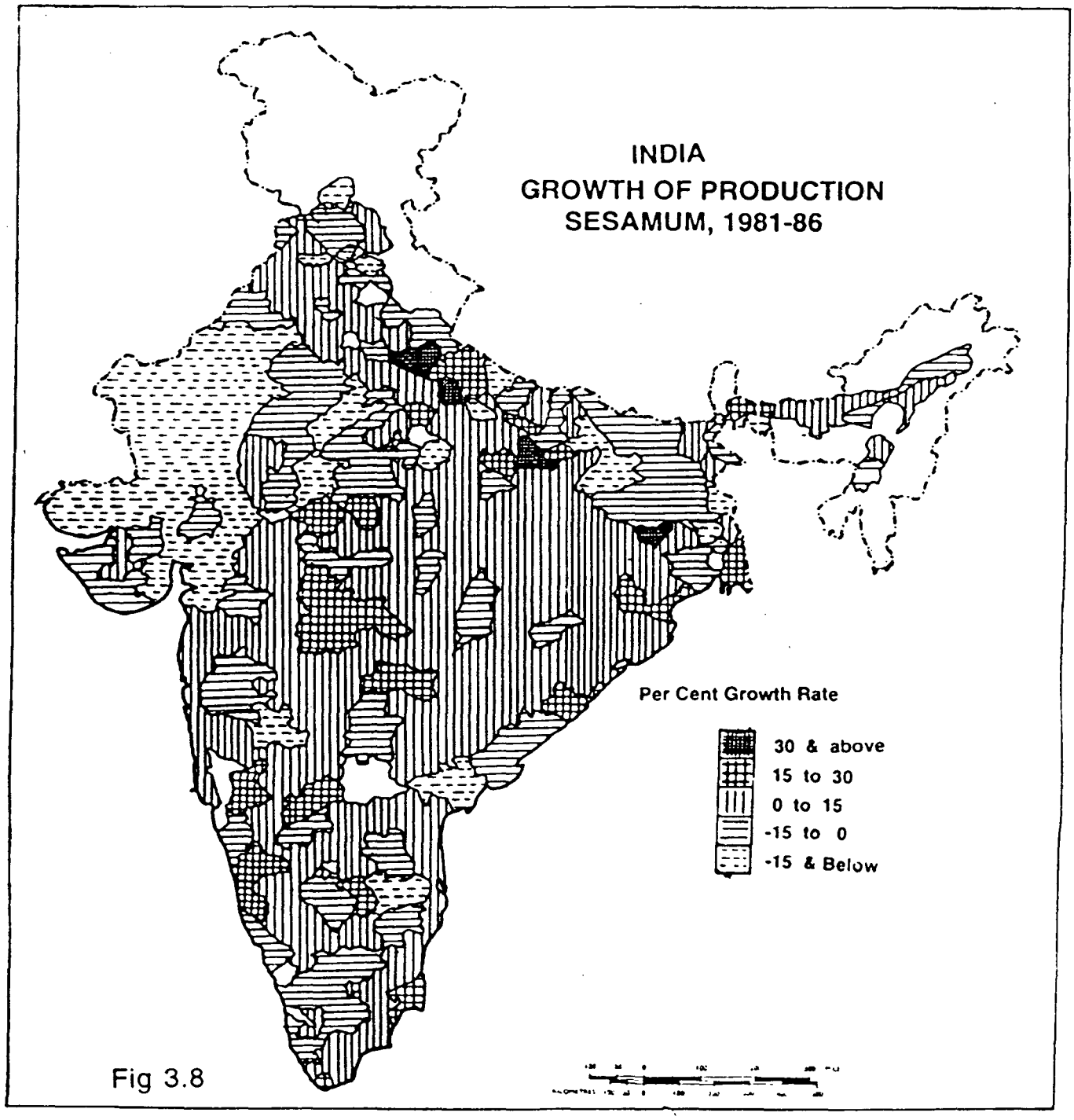

INDIA
GROWTH OF PRODUCTION
SESAMUM, 1981-86
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-15 & Below

Fig 3.8

IVth category:

Eighty-eight districts which constitute 30 percent of the sesamum growing districts are under this negative growth rate category. This is most important category after IIIrd category in terms of the number of districts.

A small cluster is observed comprising the districts of Kangra, Mandi, Bilaspur, Amritsar in the states of Himachal Pradesh and Punjab. But its larger area lie in Himachal Pradesh. A bigger cluster than the above is discerned in district of Ganganagar, Jhunjhunnu, Sikar, Alwar, Jaipur, Ajmer, Tonk, Bundi of Rajasthan and Morena, Shivpuri, Guna and Mandsaur of M.P. It is interrupted by a narrow belt of Vth category. Another cluster is clearly identified in Bihar.

Besides these major clusters, small patches of this category are observed in Andhra Pradesh and Tamilnadu. Three districts of Assam namely Lakhimpur, Nowgong and Sibsagar lie in this category. In western region Jamnagar, Junagarh, Amreli, Surendernagar and Sabarkantha of Gujarat and Pune, Ahmednagar and Dhulia of Maharashtra fall under this category.

Sixty six percent districts in this category experienced negative growth rate in production and area but positive growth rate in yield. Sixteen percent districts

have registered negative production growth rate but positive in both area and yield and negative growth rate in production and yield but positive in area. There are only two districts which registered negative growth rate in all the three production, area and yield.

Vth Category :

This category comprises those districts which registered a negative growth rate of 15% and below. Forty three per cent of the sesamum growing districts are observed under this category.

A large belt of this category is clearly observed in western Rajasthan and Gujarat. Twelve districts of Rajasthan and ten districts of Gujarat lie in this belt. Another narrow strip comprising the districts of Bharatpur, Swai-Madhopur, Kota and Jhalwar is observed in Rajasthan. A small patch is discerned in Bihar comprising the districts of Gaya, Patna, Saran and Balia district of U.P.

Two districts of west Bengal, Burdwan and Murshidabad, three of Andhra Pradesh and one of Maharashtra registered negative growth rate of less than 15% .

Out of the total districts under this category a many as sixety five percent districts have negative growth rate in production, area and yield. 30% registered negative growth rate in production and area both but positive is

yield. Only 4% districts experienced negative growth rate in area and yield but positive in area.

3.9 Pattern of Growth of Production, Area and Yield during 1971-1986:

Ist Category :

Only three districts which constitute nearly one percent of the sesamum growing districts lie in this category. Two districts namely Badaun and Moradabad of U.P and 24 Pargana of West-Bengal are reported under this category.

All the three districts experienced positive growth rate in production, area and yield.

Though the over all growth rate during this period has been 30 percent and above in these districts but annual growth rate is only 2 percent and above.

IInd Category :

Eleven districts which comprises nearly three percent of the sesamum producing districts of the country fall in this category.

Four districts namely Bareily, Farrukhabad, Hardoi and Jaunpur of U.P and four districts of West Bengal namely, West Dinajpur, Bankura, Burdwan, Nadia lie in this category. Two districts of Karnataka namely Bidar and Gulbarga also lie in this category (fig. 3.9).

As many as 36% districts in this category registered positive growth rate in production, area and yield. Remaining districts have positive growth rate in production and area but negative in yield.

As regards to the annual growth rate in production these districts have experienced growth between 1 and 2 percent.

TABLE 3.10
Growth pattern for sesamum production during 1971-86

Category	Growth in production	No. of districts	% of the sesamum growing district
I	30 and above	3	1.01
II	15-30	11	3.70
III	0-15	143	47.98
IV	(-15)to(-0)	130	43.62
V	Below -15 above	11	3.69
	Total	298	100

IIIrd category :

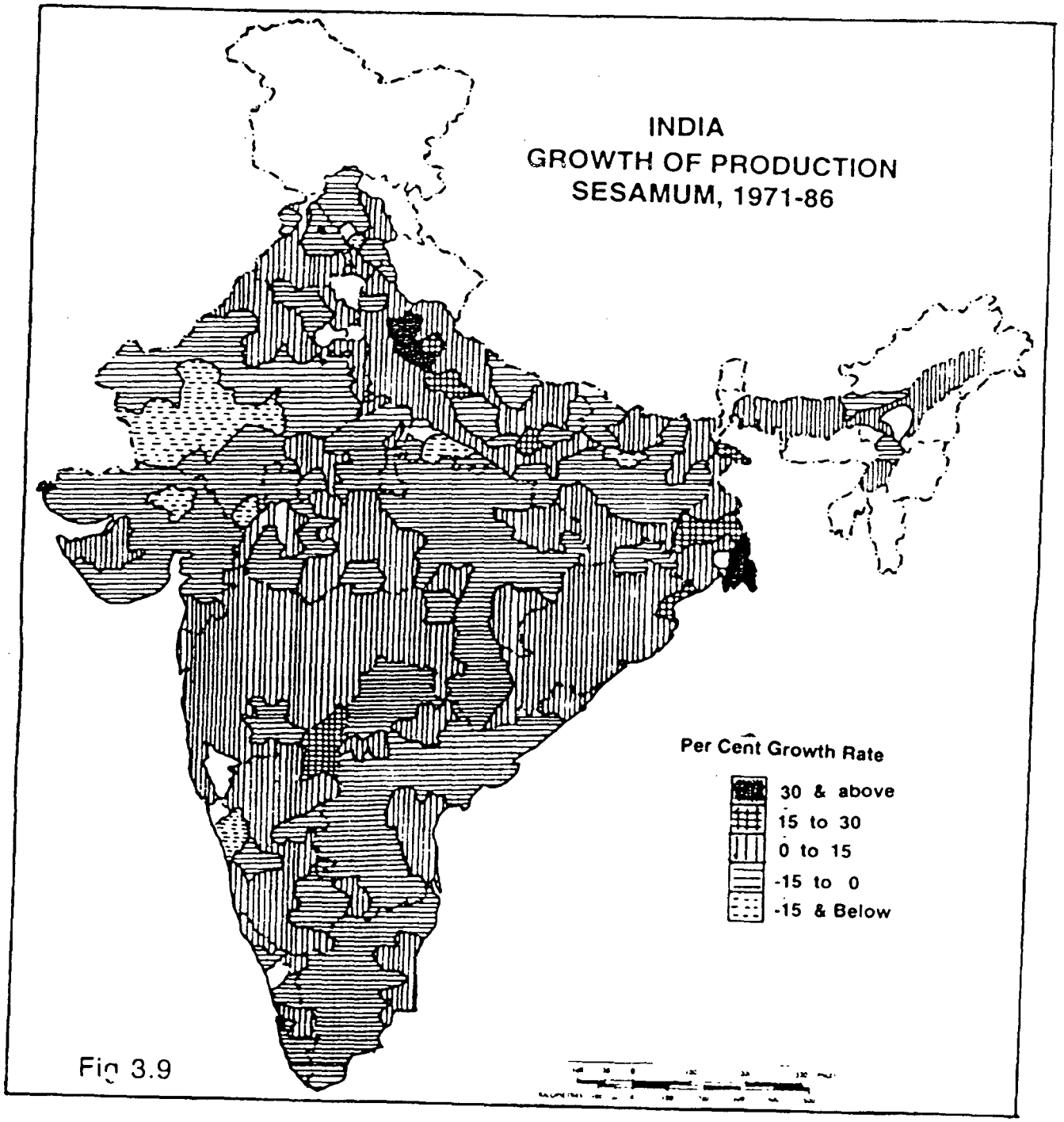

INDIA
GROWTH OF PRODUCTION
SESAMUM, 1971-86
Per Cent Growth Rate
30 & above
15 to 30
0 to 15
-15 to 0
-15 & Below

Fig 3.9

Nearly forty eight per cent of sesamum growing districts registered a growth rate between zero and 15 percent (143).

This type of growth rate pattern in production is observed in different clusters. In North India a continuous belt starts from the Ferozpur district of Punjab, encompasses Ganganagar, Churu, Jhunjhunnu districts of Rajasthan then it extends eastwards comprising the Mahendergarh and Gurgaon districts of Haryana. In western U.P it becomes wider and then tapers towards east upto the Varanasi and Ghazipur districts touching the state boundary of Bihar. Another narrow belt emanates from Mahasu district of Himachal Pradesh, engulf in its fold Ambala district of Haryana and Hill districts of U.P namely Nainital, Rampur, Pilibhit and kheri.

Seven districts of Bihar, six of West Bengal have registered the growth rate of this category. A continuous belt is observed in North-east comprising most of the districts of Assam.

Two large cluster of this growth category are discerned in Maharashtra and Orissa. All the districts of Maharashtra except Kolaba, Satara, Sangli, Kolhapur and Sholapur form a large cluster. Same is the case with Orissa. Except the Balasore district all districts have a growth rate between

zero and 15 percent.

Other small patches are observed in Karnataka and Tamilnadu.

Though the growth rate over fifteen years have remained between zero and 15 percent but annual growth rate ranged between 0 to 0.96 percent.

Nearly forty percent districts in this category registered positive growth rate in production, area and yield. Another 40 percent districts have positive growth rate in yield. Ten percent districts registered positive growth rate in yield but negative in area. Another 10 percent districts have positive rate in production and area but no data available for yield. Ambala is the only districts which experienced negative growth rate in both area and yield of sesamum.

IVth Category :

As many as 43 percent (130) of the sesamum growing districts in India registered a negative growth rate between fifteen and zero percent.

As regard to the spatial distribution (fig. 3.9) these districts are dispersed through out the country. A regular pattern interrupted only at some places is seen starting from and passing through Rajasthan, M.P and then extending in the southern states of Andhra- Pradesh and Tamilnadu.

North - east ward this continuous belt is observed in Bihar.

A small patch of this growth pattern can be discerned in Himachal Pradesh also.

Annual growth in these districts ranges from -0.96 to -0.005 % during the period under study.

When we scrutinize the growth rate of the production, area and yield then we find that nearly one - half of the districts registered negative growth rate in production, area and yield. Nearly one fourth districts have experienced negative growth rate in area but positive in yield. Fifteen percent districts registered positive growth rate in area but negative in yield.

Vth CAtegory :

Nearly four (11) percent of the sesamum growing districts fall under this negative growth rate category. Of these Rajasthan alone accounts for 6 districts. The remaining districts are Simla, Hamirpur of Himachal Pradesh, Patna of Bihar, Mehsana of Gujarat and North Kanara of Karnataka lie in this Category.

As a conclusion of growth rate of production of sesamum it can be asserted that the proportion of districts in the Ist category (30% and above) is high and almost equal during 1971-81 and 1981-86. Same is the case with second category. In third category proportion of districts has been

higher during 1971-86 followed by 1981-86 and 1971-86. In negative growth rate category of zero and 15 per cent proportion of districts is higher during 1971-81 followed by 1971-86 and 1981-86. In Vth category proportion of districts has been higher during 1981-86 followed by 1971-86 and 1971-81. During 1971-81, fifty per cent of sesamum growing districts recorded higher growth in area than the yield and of these districts 90 per cent have recorded negative growth in yield. Only 6 per cent districts registered positive growth rate in yield than the area and of these 55% districts experienced negative growth rate in area. 39% districts have recorded negative growth rate in production, area and yield.

During 1981-86, only 23% districts registered higher growth in area than the yield; and nearly 50 per cent of these districts recorded negative growth rate in yield. As many as 58% districts registered higher growth in yield and of these 56% recorded negative growth in area. Only 9 per cent districts experienced negative growth rate in production, area and yield. During 1971-86, 45 per cent of the sesamum growing growth rate in all production, area and yield.

3.10 Conclusion :

Three oilseeds showed different growth pattern in three periods. The major finding are as follows:

Groundnut :

In case of groundnut positive growth in production

in all categories was recorded in large proportion of districts during 1971-86 followed by period 1981-86 and 1971-81. During 1971-81 the proportion of districts having negative growth rate was highest followed by the period 1971-86 and 1981-86 respectively.

Highest positive growth rate was recorded in large proportion of districts during 1981-86 while the highest negative growth rate was observed in greater number of districts during 1971-86.

Rapeseed and mustard :

Positive growth of production was registered is large number of districts during period 1971-86. The proportion of districts during 1971-81 and 1981-86 under rapeseed and mustard was more or less equal. During 1971-86 proportion of districts having negative growth rate was also higher which is followed by 1971-81 and 1981-86.

Highest positive growth rate was recorded in large proportion of districts during 1981-86 while the highest negative growth rate was observed in greater number of districts during 1971-86.

Sesamum :

In case of sesamum positive growth rate was observed in larger proportion of districts during 1981-86 followed by period 1971-81 and 1971-86. Negative growth in all categories was more in large number of district as compared to the other periods under study.

CHAPTER IV

Instability in production, area and yield of oilseeds

Oilseeds play a vital role in the economy of country. Country is always facing shortage of oilseeds and we have to import a huge amount of oilseeds to supplement the demand. The scarcity of oilseeds is further intensified by instability in production of oilseeds. Instability in oilseeds as well as in other crops is a function of several factors. Oilseeds are grown largely in rainfed tracts of India, hence due to lack of irrigation facility and dependence of rainfall, oilseed production is more instable. Besides rainfall, there are several other factors which

determine the stability of oilseed production.

The present chapter attempts to identify the various levels of instability in production, area and yield of groundnut, rapeseed and mustard and sesamum in India. The effects of area and yield have been taken into consideration while explaining the instability of production of these crops. Coefficient of variation has been taken as a measure of instability. Districts have been classified in various categories for separate crops depending upon their coefficient of variation (C.V) in production.

4.1 Groundnut:

Groundnut was grown in 241 districts of India in 1970-71. C.V of production ranges from 19.08 per cent in Raigarh district of M.P. to 332.6 per cent in Bundi district of Rajasthan. All these districts have been classified in five categories of less unstable, moderately less unstable, moderately unstable, highly unstable and very highly unstable.

Areas with low Instability:

This category includes those districts which have coefficient of variation between zero and 25 per cent. The districts in this category are most consistent in production among all the groundnut growing districts. Nearly five per cent districts lie in this category. Four districts of M.P

namely Sehore, Surguja, Bilaspur and Raigarh lie in this category. (fig. 4.1)

Chengalput, Salem, Tiruchirapalli and Thanjavur district of Tamilnadu also lie in this category.

More than 60 per cent districts in this category show higher C.V in yield than the area, while remaining districts have higher c.v in area than the yield hence it can be said that production instability is a result of yield instability in majority of districts in this category.

Area with Moderately low Instability.

In this category c.v in production ranges between 25 and 50 per cent. Ninety four districts which constitute nearly 39 per cent of the groundnut growing districts in the country lie in this category.

Most of the districts in this category lie in western and southern regions of India. Twelve districts of U.P and five districts of Rajasthan lie in this category. In M.P a continuous belt is observed, starting from Guna and Vidisha in north to the west Nimar and East Nimar districts in south. This belt continues in Dhule, Jalgaon, Buldhana and Aurangabad on the one hand and Amravati, Nagpur, Wardha and Yeotmal on the other. Only two districts of Orissa namely Mayurbhanj and Sambalpur lie in this category.

In South India most of the districts of Andhra Pradesh,

Karnataka and Tamilnadu lie in this category.

Fourty seven per cent districts in this category have higher c.v in yield and fifty two per cent districts recorded higher coefficient of variations in area. Hence, it can be inferred from the above that area and yield instability are equally responsible for instability production.

Areas with moderate Instability:

This category has coefficient of variation between 50 to 75 per cent. Nearly 30 per cent groundnut growing districts in the country experienced moderate instability in production of groundnut.

The districts of this category are spread all over India. three districts of Punjab, two of Haryana and fourteen of U.P lie in this category. In Rajasthan; Sikar, Jaipur, Kota, Bhilwara, Pali and Sirohi registered the production c.v between 50 and 75 per cent. Eight districts of M.P, five of Bihar and five of Orissa also lie here.

Nasik, Ahmednagar, Bhir and Nanded district of Maharashtra form a continuous belt.

Sixty three per cent districts have higher coefficient of variation in area than the yield. Six districts namely Raisen, Santhal Pargana, Hisar, Azamgarh, Sikar, Farrukhabad have recorded c.v of more than 70 per cent in area.

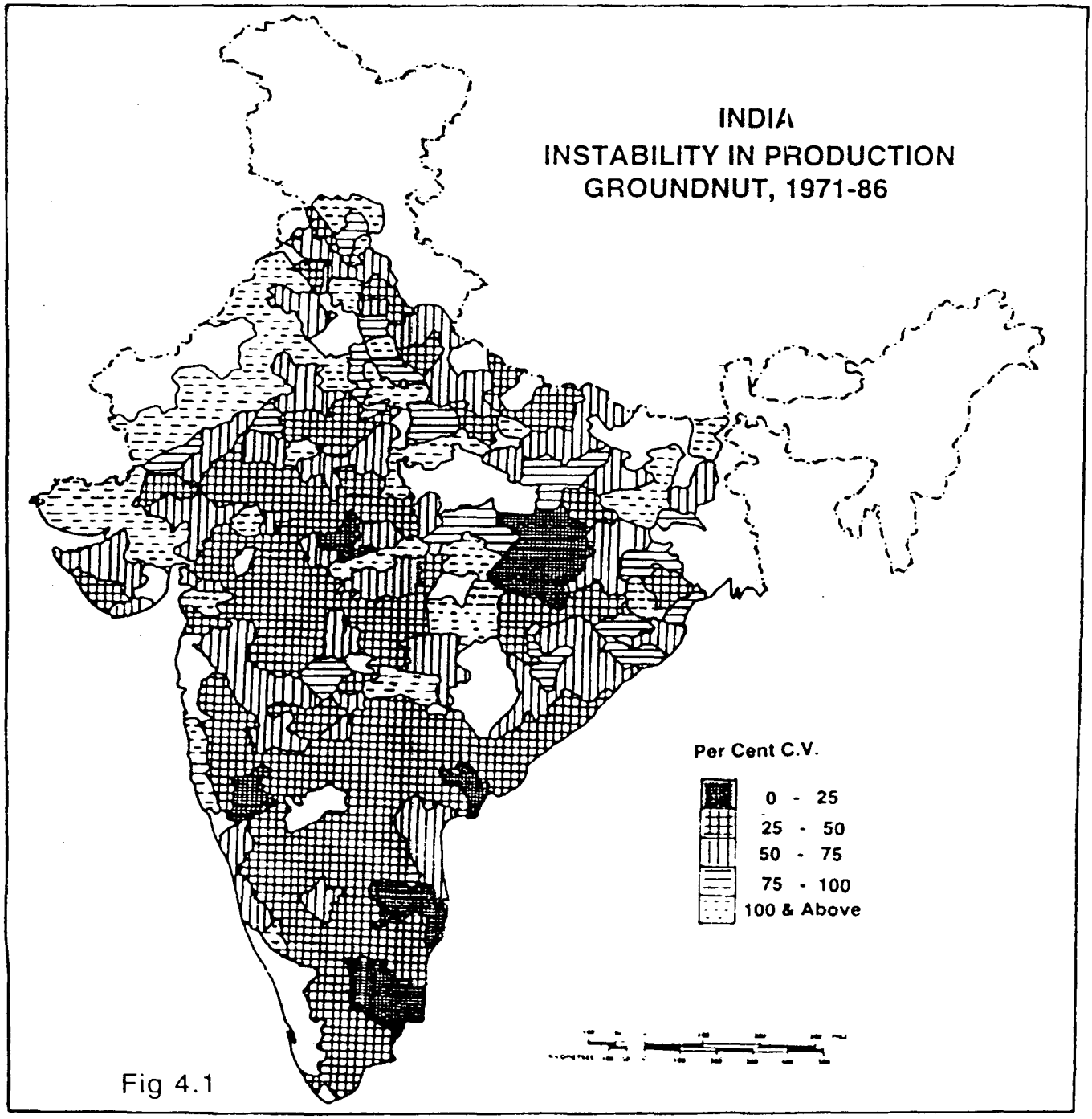

INDIA
INSTABILITY IN PRODUCTION
GROUNDNUT, 1971-86
Per Cent C.V.
0 - 25
25 - 50
50 - 75
75 - 100
100 & Above

Fig 4.1

Remaining 37 per cent districts recorded higher coefficient of variation in yield. Only the districts of Amreli, Jamnagar, Santhal pargana, Hardoi, Patna and pali have recorded c.v between 50 and 70 per cent in yield. It can be said that area instability has been responsible for the production instability in these districts.

Areas with High Instability:

This category is of high instability in production. Coefficient of variation ranges between 75 to 100 per cent. Twenty five districts which constitute ten per cent of the groundnut growing districts have been included in this category.

Majority of districts of this category are spread in three states namely U.P, M.P and Orissa. Merrut, Aligarh, Etah, Etawah, Jalaun, Kanpur, Mirzapur and Varanasi districts of U.P lie in this category. Two districts each of M.P, Rajasthan and Bihar also lie in this category.

Balasore, Dhenkanal and Kalahandi of Orissa and Parbhani district of Maharashtra lie in this category.

Nearly 90 per cent districts in this category have higher c.v in area than the yield. Remaining districts have recorded higher c.v in yield than the area. Hence it can be said that instability in productions is due to area instability.

Table 4.1

Range of the Coefficients of Variation in production of Groundnut 1971-1986

Category	Level of Instabi-	C.V. (in %)	Total Districts	% of districts to the Groundnut Growing Districts
1	Low Unstable	less than 25	11	4.56
2	Mod. low unstable	25-50	94	39
3	Mod.High unstable	50-75	71	29.46
4	Highly Unstable	75-100	25	10.37
5	Very Highly Unstable	100 & above	40	16.22
	Total		241	100

Areas with very High Instability:

Those districts which have a coefficient of variation of more than 100 per cent are included in this category. Fourty districts constituting 16 per cent of groundnut producing districts are included in this category. Eight districts; Barmer, Jodhpur, Jhunjhunnu, Ferozpur, Surendranagar, Churu, Simla, Monghyr have c.v of more than 200 per cent to 300 per cent. Two districts namely Gandhinagar and Bundi recorded coefficient of variation of more than 300 per cent.

Kangra and Kulu districts of H.P lie in this category. A belt of districts of this category starts from Ferozpur

and Bhatinda districts of Punjab, embraces the Ganganagar, Churu, Nagaur, Jodhpur and Barmer districts of Rajasthan and reaches up to the Kutch district of Gujarat. Four districts of M.P and three of Bihar lie in this category.

Except one districts of Kulu all the districts in this category have higher c.v in area than the yield. Production instability in these districts has been caused by area instability.

4.2 Rapeseed and mustard:

Rapeseed and mustard was grown in 250 districts of India in 1970-71. Coefficient of variation (c.v) has been calculated for these 250 districts for production, area and yield coefficient of variation of production has been taken into consideration in classifying the districts into different categories. It ranges from 22.37% in Bahraich district of U.P to 301 per cent in Bidar district of Karnataka. On the basis of c.v of production of rapeseed and mustard, districts are classified into five categories as in case of ground nut.

Areas with low Instability:

Those districts which recorded a coefficient of variation of production less than 25 per cent are included in this category. Seven districts constituting mainly three per cent of the rapeseed and mustard growing districts are

included here.

Four district namely Yeotmal, Nellore, Valsad and Jalgaon have not recorded instability. In two districts of Bahraich and Bhir yield c.v is higher than the area c.v, hence yield instability has been mainly responsible for the production instability.

Table-4.2
Range of the Coefficients of Variation in production of Rapeseed & Mustard 1971-1986

Category	Level of Instabi-	C.V. (in %)	Total Districts	% of districts to the Rapeseed & Mustard Growing Districts
1	Low Unstable	less than 25	12	2.80
2	Mod. low unstable	25-50	79	31.60
3	Mod.High unstable	50-75	58	24.06
4	Highly Unstable	75-100	42	17.46
5	Very Highly Unstable	100 & above	59	24.48
	Total		250	100

Areas with Moderately low Instability:

This category includes those district which recorded coefficient of variation between 25 and 50 per cent. 79 district constituting nearly 32 per cent of rapeseed and mustard growing districts of India have been included in this category.

Chamba and Kangra districts of H.P, Gurdaspur, Amritsar and Bhatinda districts of Punjab lie in this category. In U.P a continuous belt is observed in the districts bordering Nepal. These are Nainital, Rampur, Pilibhit, Kheri, Shahjanpur, Sitapur and Gonda. Eighteen districts of M.P. and four of Orissa form a continuous belt. Another belt can be discerned in Bihar starting from Monghyr and spreading in the districts of Hazaribagh, Purnea and Singhbhum.

A narrow belt is observed in Assam starting from Goalpara in west to the Lakhimpur district in east.

A cluster is also observed in Maharashtra in the districts of Buldhana, Akola, Aurangabad, Parbhani, Nanded and Osmanabad. Four districts of Tamilnadu are also included in this category.

In 47 per cent district of this category c.v of area has been higher than the c.v of yield. Remaining district have higher c.v of yield than that of area. In this case it

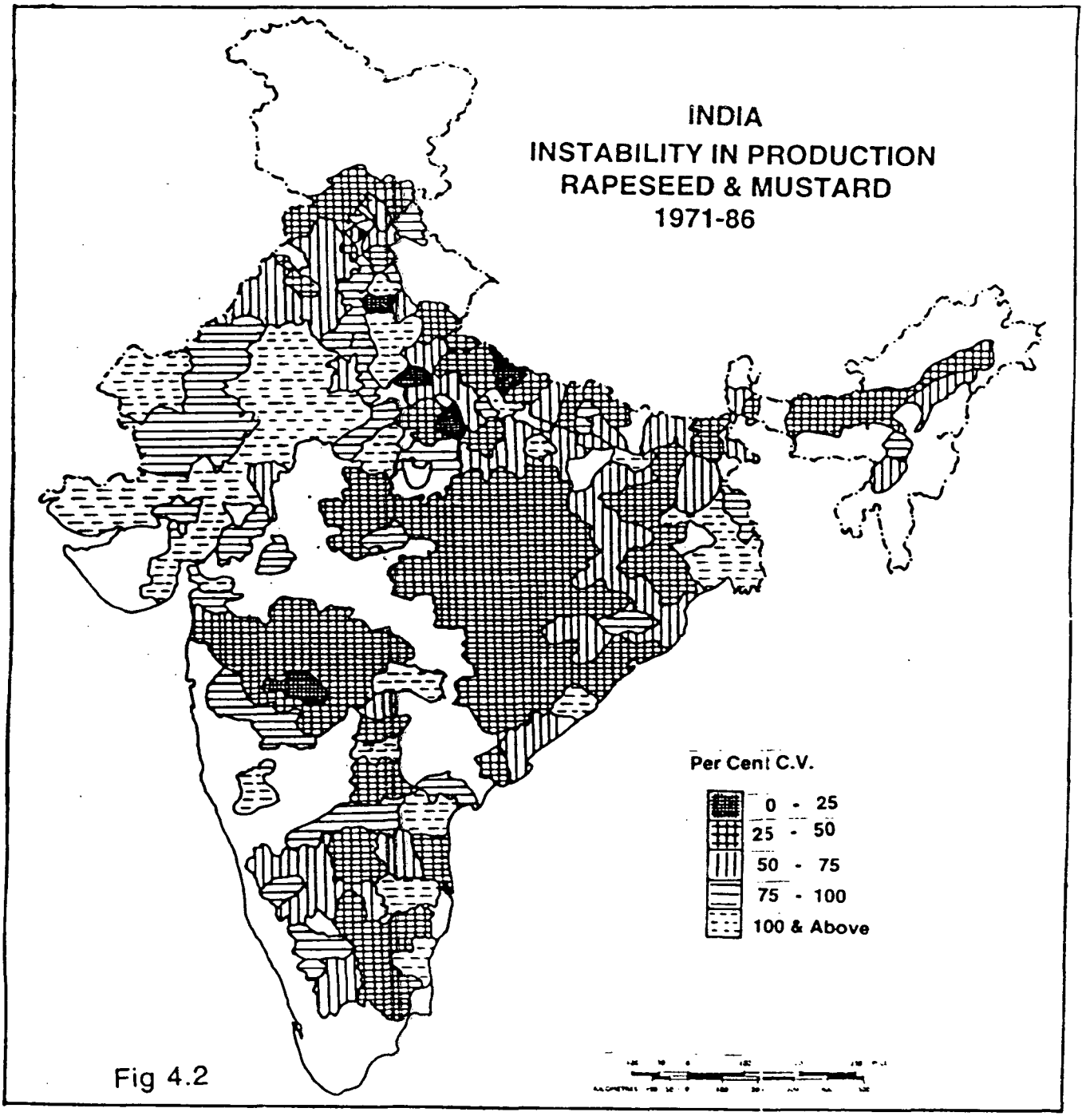

INDIA
INSTABILITY IN PRODUCTION
RAPESEED & MUSTARD
1971-86
Per Cent C.V.
0 - 25
25 - 50
50 - 75
75 - 100
100 & Above

Fig 4.2

can be inferred that yield instability has been a major factor for production instability in a majority of districts.

When we examine the range of c.v of area (294.8) and c.v of yield (194.2), we find a wide gap between these two. In other words area has been highly instable than the yield.

Areas with Moderate Instability:

This category deals with the districts which recorded c.v of production between 50 and 75 per cent. Fifty eight districts accounting for one fourth of rapeseed and mustard growing districts lie in this category.

Kulu, Mahasu and Bilaspur districts of H.P lie in this category. Five districts of Punjab namely Jullundhar, Ludhiana, Ferozpur, Sangrur and Patiala also lie in this category. In Haryana Hisar and Jind, Ganganagar, Alwar and Chittorgarh districts of Rajasthan fall under this category. In U.P a majority of districts lie in this category. But concentration of districts of U.P in this category is in eastern part. these districts can be mentioned as Basti, Sultanpur, Pratapgarh, Allahabad, Azamgarh, Gorakhpur and Varanasi.

A continuous belt of this category is observed in Bihar in the districts of Gaya, Palamau and Ranchi. Other districts of Bihar are Darbhanga, Bhagalpur and Santhal

Pargana. Two districts of Assam namely Sibsagar and Cachar lie in this category. Balasore, Keonjhar and Cuttack districts of Orissa are also in this category.

In South India four districts of Andhra Pradesh and five districts of Karnataka lie in this category.

Nearly 22% districts in this category registered higher C.V. of yield than the C.V. of area. In the remaining 78% districts C.V. of area has been higher than the C.V. of yield. On the basis of above it can be said that in majority of districts area instability has been responsible for production instability.

Areas with High Instability:

The districts, which experienced c.v of production between 75 to 100 per cent are included in this category. Forty two districts constituting nearly 17 per cent of the rapeseed and mustard growing districts of the country are included in this category.

Majority of districts in this category lies in Northern and Western India. Kinnaur, Mahasu districts of H.P, Ambala, Karnal, Rohtak, Mahendergarh and Gurgaon of Haryana lie in this category. Five districts of Rajasthan in western part form a continuous belt. Only four districts of U.P and six of M.P are included in this category.

Three districts of Gujarat namely Mehsana, Panchmahal

and Surat and two of Maharashtra fall under this category. In South India Guntur and Kurnool of Andhra Pradesh, Bellary, Chickmanglur and Mysore of Karnataka and Nilgiri district of Tamilnadu lie in this category.

Nearly 70% districts recorded higher C.V. of area than the yield. Remaining districts experienced higher C.V. of yield than the area.

Areas with Very High Instability.

The districts recording c.v of production more than 100 per cent constitute this category. Fifty nine i.e. one fourth of rapeseed and mustard growing districts fall under this category. Thirteen districts namely Tonk, Gwalior, Dhanbad, Barabanki, Chittor, Ajmer, Kota, Jhalwar, Chanda, Amreli, Dharwar, Mandi and Bundi have c.v of production between 100 and 200 per cent. Four districts namely Dungarpur, Gulbarga, Sahabad and Bhilwara recorded c.v of production more than 200 per cent. Bidar is the only district which has registered a c.v of more than 300 per cent in production.

A small cluster of districts in this category is observed in Western U.P., five districts namely Merrut, Moradabad, Bulandsahar, Aligarh and Mathura form this cluster. A continuous belt of districts starts from Churu and Jhunjhunnu of Rajasthan, bifurcates in two parts in the

West and South in Gujarat, Kutch district demarcates Western boundary while Bhavnagar southern.

Another cluster of districts is observed in West Bengal in Burdwan, Birbhum, Hoogly, Midnapore and 24 Pargana.

Nearly 85 per cent district registered higher c.v of area than yield. Remaining districts recorded higher c.v of yield than the area. In other words most of the districts in this category recorded production instability mainly because of area instability.

4.3 Sesamum:

Sesamum was grown in 298 districts of the country in 1970-71 accounting for 84 per cent districts of the country. for instability measure coefficient of variation has been calculated for production, area and yield of these district. C.v of production has been taken into consideration in classifying the districts into different categories, which will indicate different levels of instability of production amongst the districts. C.v of production ranges between 12.94 per cent in Cachar district of Assam to 339.81 in North Kanara district of Karnataka. On the basis of different categories of instability sesamum producing districts have been classified into five categories as in the case of other oil seeds under study.

Areas with Low Instability

The districts which recorded c.v of production less than 25 per cent are included in this category. Nearly 2 per cent of the sesamum growing districts lie here. These districts are Cachar, Goalpara, Gurdaspur, Chingelput, Nowgong, West Nimar and Hoshangabad. Though these districts are most consistent in production among all the sesamum growing districts, whatever instability in there, it is because of area instability in majority of districts. Because c.v of area has been higher than the c.v of yield.

Areas with Moderately low Instability;

C.V. of production ranges between 25 and 50 per cent for this category. Nearly one third sesamum growing districts are included in this category.

Three districts of H.P lie in this category. Six districts of U.P also lie in this category.

A continuous belt of this category can be observed in majority of districts of M.P. Three districts of Orissa namely Ganjam, Cuttack and Mayurbhanj also lie in this category. In Assam a continuous belt is observed in Kamrup, Darrang and Lakhimpur districts.

In Maharashtra a cluster of districts is observed in Chanda, Yeotmal, Akola, Parbhani, Bhir, Osmanabad, Ahmednagar and Thane.

In Southern region a cluster of districts is observed in three districts Nellore, Cuddapha and Chittoor. Another cluster is observed in Tamilnadu in the districts of South Arcot, Salem, Tiruchirapalli, Madurai and Thanjavur. Hassan and Mysore and Belgaum districts of Karnataka and Palghat and Alleppey districts of Kerala lie in this category.

More than half of districts in this category recorded higher c.v of area than the yield. In the remaining 44 per cent districts c.v of yield is higher than the c.v of area. Hence taking into consideration the number of districts it can be inferred that area instability is largely responsible for the production instability in this category.

Table-4.3
Range of the Coefficients of Variation in production of Sesamum 1971-1986

Category	Level of Instabi-	C.V. (in %)	Total Districts	% of districts to the Sesamum Growing Districts
1	Low Unstable	less than 25	11	3.71
2	Mod. low unstable	25-50	96	32.21
3	Mod.High unstable	50-75	101	33.89
4	Highly Unstable	75-100	47	15.77
5	Very Highly Unstable	100 & above	43	14.42
	Total		298	100

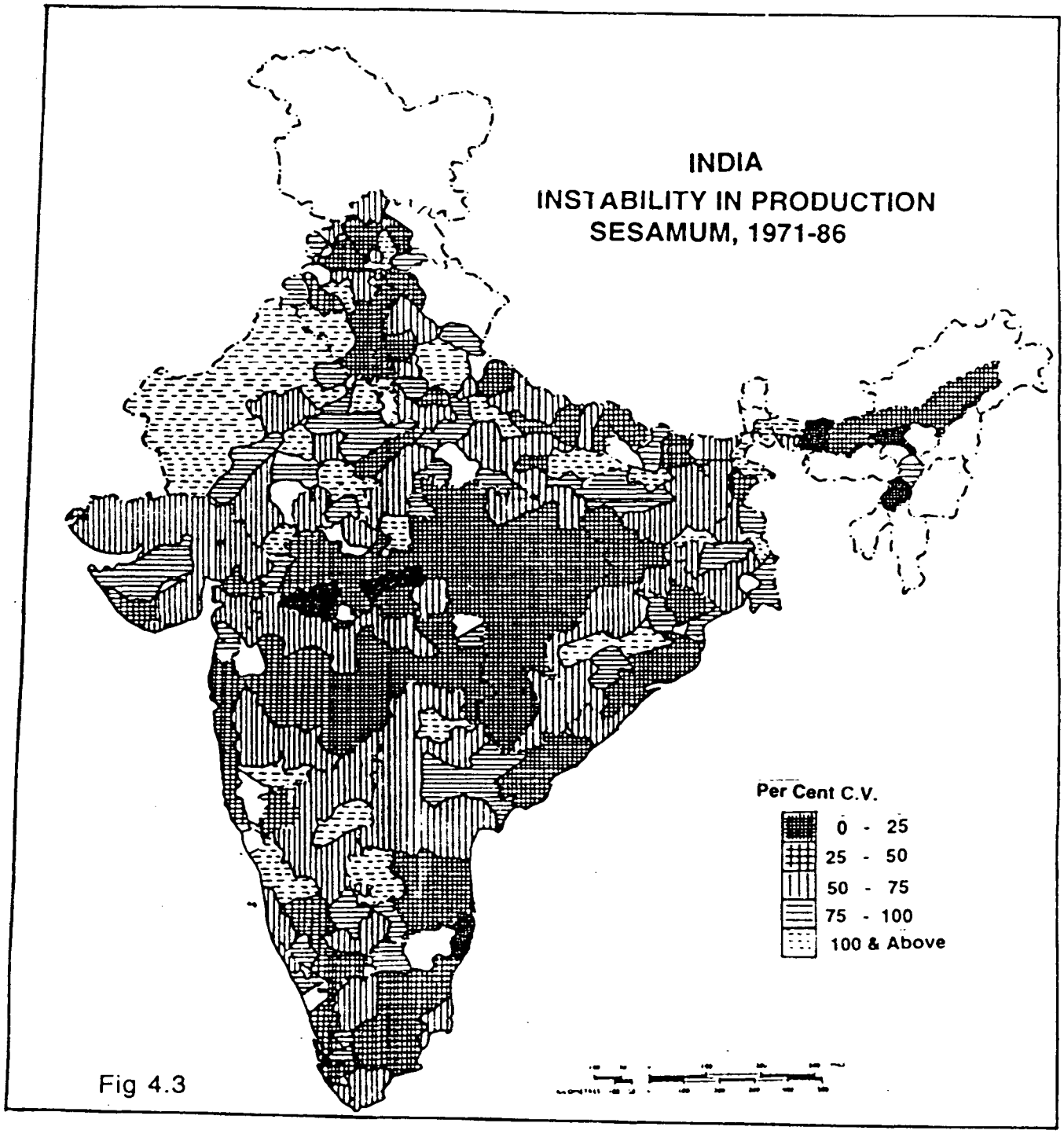

INDIA
INSTABILITY IN PRODUCTION
SESAMUM, 1971-86
Per Cent C.V.
0 - 25
25 - 50
50 - 75
75 - 100
100 & Above

Fig 4.3

Areas with Moderate Instability:

This category includes those districts which have recorded c.v of production between 50 and 75 per cent. Altogether 101 districts constituting nearly 34 per cent of sesamum growing districts are included in this category.

Two districts of H.P and three of Punjab lie in this category. Saharanpur, Muzaffarnagar and Bijnor districts form a small cluster in western U.P, Sitapur, Bahraich and Gonda form another cluster adjacent to Nepal. Besides these above mentioned districts two more districts of U.P also lie in this category. In Rajasthan only three districts, namely, Nagaur, Udaipur and Tonk lie in this category. Four districts of M.P namely Gwalior, Shivpuri, Guna and Raigarh form a continuous belt. Other districts of U.P in this category are Rewa, Satna and Chindwara. Saharsa, Purnea and Monghyr, Bhagalpur, Santhal Pargana form a cluster. The other districts of Bihar in this category is of Singhbhum.

Four districts each of Orissa and West Bengal lie in this category.

In Western region the greatest concentration of districts can be discerned in Gujarat. Twelve districts of Gujarat lie in this category. Nine districts of Maharashtra also lie in this category.

In Southern region a continuous belt of districts is

observed in Andhra Pradesh and Karnataka. Nine districts of Andhra Pradesh and eight districts of Karnataka are observed in this category, three districts of Tamilnadu and one of Kerala also lie in this category.

Nearly 70 per cent districts in this category have registered higher c.v of area than the c.v of yield. Therefore, it can be said that area instability has again been the main reason for the production instability.

Areas with High Instability:

The range of c.v of production lies between 50 to 75 per cent. Sixteen per cent of the sesamum growing districts have been included in this category on the basis of their c.v of production.

Mahasu district of H.P, Amritsar and Ferozpur of Punjab lie in this category. Eight districts of U.P and Seven districts of Rajasthan lie in this category. Muzaffarpur, Shahbad and Gaya districts of Bihar also lie in this category. Balasore, Keonjhar and Puri districts of Orissa, Bankura, Murshidabad and 24-Pargana districts of West Bengal and N.C. Hills of Assam lies in this category.

In Western region only four districts of Gujarat lie in this category.

In Southern region Khammam, Nalgonda and Krishna districts of Andhra Pradesh form a cluster, Coorg, Tumkur

and Kolar districts of Karnataka, Dharmpuri of Tamilnadu and Kottayam of Kerala lie in this category.

Nearly eighty per cent districts of this category registered higher c.v of area than the c.v of yield. Remaining 20 per cent districts have experienced higher c.v of yield than the area.

Concludingly, it can be said that area instability has played a vital role in production instability.

Areas with Very high Instability:

C.v. of production in this category is above 100 per cent and the districts included in this category are highly unstable in production performance. Nearly 15 per cent sesamum growing districts have recorded c.v of production greater than 100 per cent. Some districts like Badaun, Dhanbad and Hardoi have registered c.v of production between 150 to 200 per cent. Three districts namely Simla, Jaunpur and North Kanara registered a c.v of production greater than 200 per cent.

One district of H.P. two of Punjab and eight of U.P lie in this category. In western U.P, Moradabad, Rampur, Badaun and Bareily form a cluster. Another cluster of districts is observed in Eastern U.P in the districts of Azamgarh, Jaunpur, Balia and Gorakhpur. In Rajasthan a continuous belt starts from Ganganagar and Churu districts in north and

extends upto the Barmer and Jalore in South. Overall seven districts lie in this belt. Vidisha is the only district of M.P. in this category,

Bolangir and Dhenkanal districts of Orissa, Patna and Dhanbad of Bihar and Nadia, West Dinajpur and Jalpaiguri of West Bengal lie in this category.

In southern region Karimnagar and Adilabad districts of Andhra pradesh, North Kanara, and Shimoga of Karnataka lie in this category.

Around 67 per cent districts have recorded higher instability in area than the yield. Remaining 33 per cent district have attained higher c.v of yield than the c.v of area. Hence it is clear here that area instability largely influenced the production instability.

4.4 Major findings:

In case of groundnut only a small proportion (5%) districts registered low instability in productions. Largest number of districts (39%) recorded moderately low instability followed by the districts of Moderately high instability (30%) and highly instable districts (16%).

Area instability has been higher than the yield instability in 71 per cent of the groundnut producing districts. hence it is clear that area instability is more responsible for production instability than the yield

instability in case of groundnut.

In rapeseed and mustard only 3 per cent districts are low instable. But majority of districts (32%) like groundnut crop registered moderately low instability followed by the districts of very high instability and moderate instability.

Area instability is mainly responsible for the production instability in majority (66%) of rapeseed and mustard growing districts.

In sesamum two per cent districts are less unstable in production. Large number of districts (34%) recorded medium instability followed by districts of moderately less instability, moderately high instability and highly instable districts.

Area instability has been higher than the yield instability in majority of districts (65%), hence it can be said that area instability is responsible for productions instability.

Finally it can be said on the basis of above discussion that area instability is largely responsible for production instability in all the three oilseeds under study.

Chapter - V

Determinants of Area and Yield of Oilseeds

In the present chapter an attempt has been made to examine the role of agricultural inputs namely irrigation, fertilizer consumption and prevailing prices on the yield and area of three oilseed crops namely - Groundnut, Sesamum and Rapeseed and Mustard. This analysis has been carried out for three points of time i.e. triennium, of 1970-73, 1980-83, and 1985-87. The triennium averages have been calculated in order to avoid early fluctuations for all the variables under study. In case of irrigation and prices of oilseeds, data was available separately. However, in case of fertilizer consumption data was not available separately for oilseed crops. Therefore, fertilizer consumption pertains to total cropped area instead of area under oilseed crops.

Regression analysis has been carried out to examine the role of independent variables (fertilizer consumption, irrigation and price) in explaining the variations in yield and area of three selected oilseed crops. The following equation has been used for the above purpose ;

$$Y_{aj} = a + b_1x_1 + b_2x_{2j} + b_3x_{3j}$$

Where Y_{aj} = area under oilseed crop j,

x_1 = Fertilizer consumption (Kg) per hectare,

x_2 = irrigated area as percentage of total area under crop j,

x_3 = the prevailing price of oilseed crop j,

a = Constant (intercept) &

b_1b_2b = regression coefficients for variable x_1, x_2 x_3 respectively.

This exercise has been carried out for three selected oilseed crops for three points of time separately. The first part of the chapter deals with groundnut crop which is followed by rapeseed and mustard, sesamum.

5.1 Variations in Area under groundnut

The regression equation of the percentage of area under groundnut on a set of three independent variables (i) X_1 = fertilizer consumption, (ii) x_2 = % irrigated area under crop and

(iii) x_3 = Price of groundnut during the year 1970-73) is as follows;

Area under

groundnut = $5.4+(0.069)x_1+(-0.025)x_2+(-0.006)x_3$

Above stated three variables explained only 3.2% variations in the distribution of area under groundnut during the year 1970-73. Out of the three only fertilizer consumption explained variations in area under groundnut was significant.

Value of R square, revealed increased role of x_1 to x_3 on area under groundnut during the year 1980-83. During this period R value explains more than 4% variations in the distribution of area under groundnut. Interestingly, the role of independent variables has declined from 4% in 1980-83 to 2% in 1985-87 (Table - 5.1).

Table 5.1

Role of Fertilizer consumption, Irrigation and prices in area and yield of groundnut

Year	Yield		Area	
	R Value	% variation Explained	R Value	% variation Explained
1970-73	0.176	17.60	0.032	3.20
1980-83	0.054	05.4	0.04	4.00
1985-87	0.103	10.3	0.024	2.04

It is worth to note that fertilizer consumption explained significant negative role in area under groundnut, which is indicated by beta value in Table-5.1.

Overall results prove that independent variables under study have little impact on the area under groundnut crops over the year 1970-73 to 1985-87.

5.2 Variations in the Yield of Groundnut 1970-73.

In case of yield, fertilizer consumption and irrigation have significant role. During the year 1970-73, these variables explained about 17.6% variation in the yield of groundnut.

The regression equation of yield on $x_1, x_2 x_3$ is as follows:

Yield of G.nut 1970-73 = $1.73-(0.395)*X_1-(0.114) * X_2 + (0.102) * X_3$

* = significant at 5%level

Interestingly, fertilizer consumption had negative

role in explaining the yield of groundnut, explanation of which needs further research. Prices of the crop, however, had a positive role in explaining the yield but it is insignificant.

5.3 Variations in Yield of Groundnut 1980-83:

During the year 1980-83, the role of fertilizer consumption, irrigation and prices of the crop declined when compared with 1970-73 as R squared value explained only 5.4% variations in the distribution of the yield of groundnut as compared to 17.6% in 1970-73. The regression equation of yield during 1980-83 is as follows: Yield of G.nut 1980-83 $=1.38*-(0.0034)*x_1-(0.0005)x_2+(0.0005)x_3$

* = significant at 5% level

Fertilizer consumption is negatively explaining the yield of groundnut. The prevailing price of groundnut for which regression coefficient is insignificant at 5% level, had positive impact on the yield of groundnut.

Negative relationship of fertilizer consumption with the yield of groundnut may be because of the use of fertilizer consumption data for the total cropped area. It means that areas, experiencing high yield of groundnut show less consumption of fertilizer and vice-versa. It is probable that in the lower yield districts of groundnut intensive cultivation of food crops such as wheat & rice, which required more consumption of fertilizers, was

undertaken in between 1970-73 to 1980-83.

5.4 Variations in Yield of Groundnut 1985-87:

The percentage of variations in the yield explained by set of independent variables under study has increased from 5.4% in 1980-83 to 10.3% in 1985-87. The regression equation is as follows :

Yield of G.nut 1985-87 = $-6.45-(2.83)*x_1-(3.188)X_2+*(4.87)X_3$

*significant at 5% level

Again here regression coefficient for fertilizer is negative but insignificant. Interestingly, prices of groundnut, had most significant positive role in explaining the yield of groundnut during this period. Regression coefficient reveals that per unit increase in prices leads to 4.86 unit increase in yield of groundnut. Overall analysis shows that agricultural inputs such as fertilizer and irrigation have only marginal impact on the area as well as yield of groundnut. Groundnut being a Kharif crop needs less irrigation, hence it is obvious that irrigation has marginal role in explaining the area and yield of groundnut. However, the prevailing prices of the groundnut showed quite significant role on the yield of groundnut which has increased from 1970-73 to 1985-87. It means farmers are becoming economic minded; and the selection of crops in general and groundnut in particular is

significantly determined by the prevailing prices of crops.

The negative impact of fertilizer as stated earlier also may be attributed to the production of groundnut in the areas of non-food crops; and dependence of groundnut cultivation on rainfall. Apart from these three independent variables under study, there are certain other factors, which explain about 75% variation in the distribution of the yield of groundnut the identification of the role of unknown variables begs efforts for further research.

Rapeseed and Mustard (RM) :

5.5 Variations in Area of Rapeseed & mustard:

Examination of R squared values (Table-3) reveals that the role of fertilizer consumption, irrigation and the prevailing prices of the crop do not significantly determine the percentages of area under rapeseed & mustard. For all these points of time R squared values do not contribute even more than 1% variation in the distribution of the area under rapeseed and mustard. This may be because of heavy dependency of rapeseed and mustard on the certain other variables like rainfall, farmer's satisfaction etc. The regression equation of the area under rapeseed and mustard on independent variables are as follows :

Area under RM 70-73 = $0.389+(0.00396)x_1-(0.00074)\ x_2$ +

$(0.0057)\ x_3$

Area under RM 80-83 = $2.334-(0.00149)x_1+(0.000429)x_2-(0.00127)\ x_3$

Area under RM 85-87 = $4.788+(0.000567)x_1-(0.000469)x_2-(0.00348)x_3$

While examining the regression equation, it is clear that regression coefficient of none of the variable is significant for all the three points of times. The negligible impact of x1 to x3 on the area under rapeseed and mustard either questions the reliability of data or its heavy dependency on certain other variables. .ls1

Table 5.2

Role of Fertilizer consumption, Irrigation and Prices in Area and Yield of Rapeseed and mustard

Year	Yield		Area	
	Value	% variation Explained	Value	% variation Explained
1970-73	0.010	01.00	0.0058	0.58
1980-83	0.236	23.60	0.0048	0.48
1985-87	0.420	04.20	0.0035	0.35

5.6 Variations in Yield of Rapeseed and Mustard :

Given set of three independent variables had more role in explaining the yield of rapeseed and mustard than area. This set explains only 1% variation in the distribution of rapeseed and mustard, during 1970-73, but during the year 1980-83 there was a abrupt increase and it explained about

23% variation, which may be attributed to the intensification of rapeseed and mustard cultivation. During the year 1985-87, there was a sharp decline in R value. It explained only 4.2% variation in the distribution of yield of rapeseed and mustard during this period. This clearly indicates instability in the yield of rapeseed and mustard.

The regression equations of the yield of rapeseed and mustard on independent variables are as follows :

Yield of RM 70-73 = $0.363(0.00104)^{**}x_1 + (0.000117)x_2 + (0.000117)x_3$

Yield of RM 80-83 = $-0.04218 + (0.0042)\ x_1 + (0.0094)^{**}x_2 + (0.00106)x_3$

Yield of RM 86-87 = $0.7829^{**}+(0.00164)^{**}x_1-(0.00013)x_2-(0.000386)x_3$

** significant at 5% level of significance

* Significant at 10% level of significance

During the year 1970-73 regression coefficient of none of the variables explained significant role in the yield of rapeseed and mustard. Irrigation has emerged as one of the most significant determinant of the yield of rapeseed and mustard during the year 1980-83 as the regression coefficient of irrigation is significant at 5% level. Fertilizer consumption, however, had significant role in explaining the yield of rapeseed and mustard during the year 1985-87. Interestingly prices of the crop do not explain any significant role in the yield of rapeseed and mustard.

Sesamum :

5.7 Variations in area of sesamum:

The consumption of fertilizer, irrigation and the prevailing prices of the sesamum crop have relatively less role in explaining the area under sesamum crop; because these variables together explain less than 10% variation extending from 1970-73 to 1985-87 (Table 2). The regression equation of the percentage of area selected variables are as follows:

Area under sesamum 1970-73 = $-1.56-(0.023)X_1-(0.011)X_2+*(0.017)X_3$

* significant at 5% level

Area under sesamum 1980-83 = $-1.898-(0.0028)X_1-(0.00017)X_2+*(0.00611)X_3$

* significant at 5% level

Area under sesamum 1985-87 = $-0.429-(0.003)X_1-(0.006)X_2+(0.002)X_3$

Out of three independent variables, it is the price of the crop, which shows a significant positive role in the area under sesamum crop at five per cent level of significance. For the year 1985-87, the role of prices is insignificant at 5%, but significant at 10% level. Rest of the two variables fertilizer and irrigation have insignificant role in explaining the area under sesamum.

It means except the prevailing prices, it is not fertilizer consumption and irrigation, but certain other factors, which are beyond the scope of the per cent study, may have significant role in explaining the area under sesamum. The significant role of prices on area under sesamum suggests that increase in the prices of sesamum, % area under sesamum can be increased significantly.

Table - 5.3
Role of Fertilizer consumption, Irrigation and Prices in Area and Yield of Sesamum:

Year	Yield		Area	
	Value	% variation Explained	Value	%variation Explained
1970-73	0.126	12.60	0.057	5.70
1980-83	0.822	08.20	0.040	4.00
1985-87	19.890	19.89	0.067	6.70

5.8 Variations in Yield of Sesamum :

The set of independent variables under study have significant role in explaining the yield of sesamum crop; the per cent variation explained in the distribution of yield of sesamum are 12.6, 8.2 & 19.89% in 1970-73, 1980-83 & 1985-87 respectively. Increase in the impact of agricultural inputs-fertilizer consumption, irrigation and prices indicate towards the process of intesification of sesamum crop. During the years 1985-87, these variables explained about 1/5 of the total variation in the yield of

sesamum which means that the account of 4/5 variation needs the inclusion of other variables in 1985-87.

The regression equations for the year 1970-73 to 1985-87 of the yield on independent variables are as follows :

Yield of sesamum 1970-73 = *0.189 + *$(0.0018)X_1$ + *$(0.0011)X_2$ + $(0.00069)X_3$

* significant at 5 % level. Yield of sesamum 80-83 =

0.3306+$(0.000123)x_1$+$(0.00154)x_2$-$(0.000295)x_3$

* significant at 5 % level.

Yield of sesamum 85-87 = *0.594+$(0.000115)x_1$+*$(0.000679)x_2$-$(0.00049)x_3$

* significant at 5 % level.

Interestingly, irrigation and fertilizer consumption have significant role in explaining the yield of sesamum. Prevailing prices, however, does not explain significant impact on the yield of sesamum for the year 1970-73. The regression coefficient of irrigation is significant for all three points of time which means the role of irrigation in the yield of sesamum can not be denied. While comparing the significance level of regression coefficients, it is clear that the irrigation is relatively more significant than the fertilizer consumption. Regression coefficient of prices indicates significant negative role in explaining the yield of sesamum.

While comparing the role of three independent

variables under study in explaining the area and yield of sesamum crop, it is clear that the role of these variables is relatively more in yield than in area under the crop.

5.9Conclusion:

From the overall analysis it is clear that fertilizer consumption, irrigation and the prevailing prices have marginal role in explaining the area under groundnut, sesamum and rapeseed and mustard. There has been more or less insignificant increase in the impact of these variables on the area under oilseed crops under study . In case of yield, however, independent variables under study have significant role. Moreover, there had been increase in the percentage of variation explained by these variables on the yield of oilseed crops from 1970-73 to 1985-87, which clearly indicates towards the intensification of oilseed crops. In case of groundnut, the prevailing prices of the crop emerged as one of the most significant determinants of yield, while irrigation is the most significant in the determination of the yield of sesamum.In case of rapeseed and mustard, however, irrigation and fertilizer consumption emerged as most significant for the years 1980-83 and 1985-87 respectively. While examining the distribution of R values, it is clear that the yield of sesamum is the most stable which is followed by groundnut and rapeseed and mustard. The instability of groundnut and rapeseed and mustard may be because these crops are dependent on the vagaries of rainfall.

Chapter VI

Summary and Conclusion

The present study covers the time period 1970-71 to 1987-88. Entire study in divided in three period - 1970-71 to 1980-81, 1980-81 to 1985-86 and 1970-71 and 1986-87. The study takes into account only three oilseeds-groundnut, rapeseed and mustard and sesamum. All the districts of India growing these crops in 1970-71 are taken into consideration. The present study tries to:

1. Present a spatio-temporal analysis of growth of production, area and yield of oilseeds (groundnut, rapeseed and mustard, and sesamum) in the districts of India.

2. Study the instability in production, area and yield of the oilseeds.

3. Study the role of fertilizer consumption, irrigation and prices in explaining the variations in area and yield of oilseeds.

The results of the study are as follows:

The three oilseed crops showed different patterns of growth in production, area and yield for different periods.

In the case of groundnut it is observed that production has recorded a growth rate of more than 15% in large number of districts during 1981-86 than the 1971-81. The largest number of districts experienced growth rate of production between 0-15% during the period 1971-81 than the period 1981-86.

While examining the extreme variations in the growth pattern of groundnut, it is clear that the highest positive and negative growth rates were reported in largest number of districts for the period 1981-86 than the 1971-81. Overall positive growth rate in production of groundnut was reported in largest number of districts during the same period as compared to the period 1971-81. While the overall negative growth rate is observed in largest number of districts during the period 1971-81 as compared to 1981-86.

If we examine the growth pattern in production over 15 years (1971-86) then it is found that largest number of districts recorded growth rate between zero and fifteen per cent followed by negative growth rate between 0 and 15%.

In the districts registering production growth rate of 30 percent and above growth rate of area has been higher than that of yield during 1971-81 and 1981-86. Same is the

case with districts recording production growth between 15 to 30 and zero to 15 percent. In other words, in districts registering positive production growth rate, growth rate in area has been higher than that of yield during 1971-81 and 1981-86.

In the districts recording negative growth rate in production, yield growth rate has been higher than the area during 1971-81 and 1981-86. Negative growth in production, area and yield has been in large number of districts during 1971-81. Closely followed by 1981-86.

In case of rapeseed and mustard highest growth rate in production is recorded in largest number of districts during 1981-86 than the 1971-81. Same is the case with the districts reporting growth rate between 15 and 30%. Production growth rate between 0 and 15% is found in largest number of districts during 1971-81 than the 1981-86. Highest negative growth has been reported in more districts during 1981-86 closely followed by the period 1971-81.

Overall positive growth rate in production of rapeseed and mustard is reported during 1971-81 in largest number of districts than 1981-86. While the number of districts recording highest negative growth rate is equal equal during 1971-81 and 1981-86.

While over the period 1971-86 a large proportion of

districts recorded production growth rate between 0 to 15% followed by the districts registering growth rate of 15 to 30%.

In the districts registering production growth of 30 percent and above growth of area has been higher than that of yield. Again it is found that in all the districts which recorded positive growth in production, area growth has been higher than that of yield during the periods studied.

Districts experiencing negative growth in production recorded higher growth in yield than that of area in all the three periods under study. Negative growth in production, area and yield has been in largest number of districts during 1971-81, followed by 1981-86.

In case of sesamum largest number of districts in Ist category (production growth rate of 30% and above) is observed during than 1981-86 than 1971-81. The maximum number of districts in IInd category of growth rate is reported during 1971-81 followed by 1981-86. While the highest negative growth rate is observed in maximum number of districts during 1981-86 followed by 1971-81.

Overall positive and negative growth rate is reported in largest number of districts during 1981-86 and 1971-81 respectively.

In the districts which recorded production growth rate

of 15 percent and above, area growth has been higher than that of yield during 1971-81 and 1981-86. But the districts which registered a positive growth in production between zero and 15%, growth of yield has been higher than that of area during 1981-86, while during 1971-81 growth of area has been higher than that of yield.

The districts which recorded negative growth of production between zero and 15 percent registered higher growth in yield than that of area during 1981-86 and 1971-86.

Negative growth in production, area and yield has occurred in large proportion of districts during 1971-81 while it was lowest during 1981-86.

The analysis of the district wise decomposition of instability across the time period 1971-86 shows that variability in the growth rate of production of groundnut, rapeseed and mustard and sesamum is largely explained by the variability in area than the yield.

Another set of findings is related to the relationship of area and yield of the groundnut, rapeseed and mustard and sesamum with irrigation, fertilizer consumption and prices. It is found that irrigation fertilizer consumption and prices have marginal impact on the area under the groundnut, rapeseed and mustard, sesamum.

In the case of groundnut fertilizer and irrigation are marginally determining the area and yield. Groundnut being a kharif crop needs less irrigation hence, it is obvious that irrigation has a marginal role in case of area under groundnut. But the prevailing prices of the groundnut showed quite significant relationship with the yield of groundnut.

In case of sesamum, except irrigation and fertilizer consumption, prices have significant relationship with the area while in case of yield it is irrigation and fertilizer consumption which show a significant relationship. In case of rapeseed and mustard none of these, irrigation, fertilizer consumption and prices, have showed relationship with the area under the crop. Irrigation and fertilizer consumption showed a significant relationship with the yield but the prices of crop do not explain any significant relationship with the yield.

APPENDIX - I

1. Agricultural situation in India, For different years from 1972 to 1989. Published by Directorate of Economics & Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi.

2. Farm Harvest Prices of principal crops in India 1970-71 to 1974-75. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, New Delhi.

3. Farm Harvest Prices of Principal crops in India 1980-81 to 1983-84. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, New Delhi.

4. Farm Harvest Prices of principal crops in India 1985-86 to 1986-87. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, New Delhi.

5. Farm Harvest Prices of Principal crops in India 1986-87 to 1988-89. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, New Delhi.

6. Fertilizer Statistics 1971-72, Published by The Fertilizer Association of India, New Delhi.

7. Fertilizer Statistics 1972-73, Published by The Fertilizer Association of India, New Delhi.

8. Fertilizer Statistics 1973-73, Published by The Fertilizer Association of India, New Delhi.

9. Fertilizer Statistics 1981-82, Published by The Fertilizer Association of India, New Delhi.

10. Fertilizer Statistics 1982-83, Published by The Fertilizer Association of India, New Delhi.

11. Fertilizer Statistics 1983-84, Published by The Fertilizer Association of India, New Delhi.

12. Fertilizer Statistics 1986-87, Published by The Fertilizer Association of India, New Delhi.

13. Fertilizer Statistics 1987-88, Published by The Fertilizer Association of India, New Delhi.

14. Fertilizer Statistics 1988-89, Published by The Fertilizer Association of India, New Delhi.

15. Indian Agricultural Statistics, vol.II, 1970-71 to 1973-74. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agricultural, New Delhi.

16. Indian Agricultural Statistics, vol.II 1980-81 to 1981-82. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agricultural, New Delhi.

17. Indian Agricultural Statistics, vol.II 1982-83 to 1984-85. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agricultural, New Delhi.

18. Indian Agricultural Statistics, vol.II 1985-86 to 1987-88. Published by Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agricultural, New Delhi.

APPENDIX - II

GROWTH RATE OF PRODUCTION, AREA AND YIELD OF GROUNDNUT

GROWTH RATE 1971-81				GROWTH RATE 1981-86				GROWTH RATE 1971-86			
DISTT.NAME	PRODUCTION	AREA	YIELD	DISTT.NAME	PRODUCTION	AREA	YIELD	DISTT. NAME	PRODUCTION	AREA	YIELD
DURG	42.000	37.219	-5.431	GANDHINAGAR	160.297	120.762	18.391	GANGANAGAR	40.664	41.373	-0.202
NARSIMPUR	40.036	44.828	-0.381	GANGANAGAR	92.470	92.306	1.558	JHANSI	33.129	31.643	0.802
BALASORE	38.113	39.365	-0.970	PURNEA	90.196	114.429	-8.976	HAMIRPUR	29.433	29.324	0.777
JHANSI	33.743	34.695	-0.907	KODAGU(COORG)	45.260	45.920	-4.879	BALASORE	28.757	29.392	-0.493
MIRZAPUR	33.600	34.784	-0.950	HAMIRPUR	43.910	37.162	4.326	GANDHINAGAR	28.219	20.909	0.000
JODHPUR	31.390	33.745	0.067	KEONJHAR	38.385	24.850	8.840	MIRZAPUR	22.678	21.712	0.773
PURI	24.071	21.375	2.428	KANGRA	37.098	56.698	-11.136	KANGRA	21.191	30.642	0.000
HAMIRPUR	22.750	25.574	-0.952	SURAT	35.227	29.212	5.608	KEONJHAR	19.419	19.358	-0.141
JALAUN	21.357	24.085	-0.463	JHANSI	31.909	25.744	4.310	RATNAGIRI	18.724	14.095	0.000
GANGANAGAR	20.253	21.215	-1.071	SARAN	27.226	26.191	1.883	GWALIOR	18.649	20.946	-1.809
CUTTACK	19.513	20.218	-0.634	ALLAHABAD	27.118	23.800	3.099	PURI	18.521	15.981	2.361
GWALIOR	18.941	22.592	-3.070	HISSAR	26.433	43.097	-11.282	DURG	18.443	13.095	0.000
HAZARIBAGH	18.483	19.302	4.288	PARBHANI	25.277	8.928	10.558	CUTTACK	15.894	15.841	0.070
AZAMGARH	18.376	19.987	-1.036	ADILABAD	25.222	17.378	-1.136	KALAHANDI	15.768	14.570	1.047
MUZAFFARNAGAR	16.903	16.309	0.586	SHIVPURI	24.035	18.429	4.372	JALAUN	13.748	13.641	1.001
KALAHANDI	16.413	16.054	0.533	KOLAR	23.896	11.955	11.363	KODAGU(COORG)	13.387	12.600	0.000
KANGRA	13.944	19.287	-9.932	CHINDWARA	23.558	14.751	8.910	DHENKANAL	13.087	11.232	1.537
GURGAON	13.666	11.612	6.359	SEONI	23.490	14.664	5.219	SHIVPURI	11.543	11.013	0.318
RANCHI	13.397	11.267	2.650	DHENKANAL	23.227	16.521	5.486	DAKSHINAKANNADA	11.392	10.861	1.116
BALLIA	12.720	13.122	-0.737	CHANDRAPUR	22.866	20.791	0.981	UTTARAKANNADA	11.255	10.427	1.092
JHUNJHUNU	12.479	12.693	-2.822	NELLORE	22.493	18.707	2.405	KOTA	11.133	6.244	4.631
VIDISHA	12.335	13.269	-0.508	TUMKUR	22.079	12.531	8.813	CHANDRAPUR	10.815	7.599	2.816
SANTHAL PARGANA	11.612	11.394	6.598	SHAHDOL	21.673	8.447	11.382	GANJAM	10.773	9.402	1.337
KEONJHAR	10.934	16.704	-4.349	SUNDARGARH	20.173	8.690	11.305	NELLORE	10.702	7.612	2.921
PHULBANI	10.595	4.602	6.134	DHARMAPURI	19.715	4.736	14.516	HAZARIBAGH	10.423	12.090	0.184
DANGS	9.493	-11.909	0.640	DAKSHINAKANNAD	19.279	14.297	3.134	KARNAL	10.269	6.299	0.000
PRAKASAM	9.466	1.166	7.420	KORAPUT	18.769	13.756	4.504	SUNDARGARH	10.177	9.321	0.897
JAUNPUR	8.842	9.763	0.000	BANGALORE	18.717	11.963	6.408	AZAMGARH	9.996	8.215	1.856
DEORIA	8.821	10.066	-0.926	UTTARAKANNADA	18.562	19.855	-0.369	SURAT	9.476	7.696	1.999
KOTA	8.784	4.984	3.795	MORENA	18.466	9.461	8.217	PHULBANI	9.265	6.401	2.847
DHENKANAL	8.334	8.678	-0.382	GWALIOR	18.066	17.721	0.761	BALLIA	9.221	8.230	0.903
DEHRADUN	8.331	8.447	-0.603	DAMOH	17.845	15.156	6.511	DEORIA	8.872	7.323	1.927
SIRMAUR	8.131	10.153	-1.437	MANDYA	17.239	15.802	3.413	JODHPUR	8.808	8.098	0.000
WARDHA	8.007	2.634	5.187	BIJAPUR	17.093	2.041	15.613	PURNEA	8.488	10.602	-1.478
GANJAM	7.879	7.278	0.654	GANJAM	16.796	13.777	2.716	ALLAHABAD	8.482	8.348	2.212
SIROHI	7.830	8.886	-1.065	SOLAPUR	16.733	0.552	13.548	TUMKUR	8.338	7.818	0.505
UTTARAKANNADA	7.772	5.995	1.830	GULBARGA	16.497	10.216	6.294	RANCHI	8.305	7.320	1.068
PUNE	7.679	4.827	1.817	KOTA	15.985	8.808	6.323	PRAKASAM	8.186	3.052	4.431
BAHRAICH	7.652	5.042	2.607	CUDDAPAH	15.258	11.680	3.413	HISSAR	8.132	16.135	-6.774
DAKSHINAKANNADA	7.647	9.183	0.122	KALAHANDI	14.490	11.660	2.083	VIDISHA	8.063	6.499	2.045
FAIZABAD	6.585	4.018	2.591	BHANDARA	13.896	10.197	2.667	CHITRADURGA	7.556	7.560	1.253
CHITRADURGA	6.367	6.675	0.791	KOLHAPUR	13.883	4.689	8.859	WARDHA	7.508	5.886	1.638
RAJKOT	5.966	5.021	-3.040	SHIMOGA	13.641	9.950	3.429	ANANTPUR	7.401	5.253	2.041
SHIVPURI	5.777	7.481	-1.650	KHAMMAM	13.362	10.243	3.060	MUZAFFARNAGAR	7.379	5.297	0.914
MAHABOOBNAGAR	5.741	0.893	4.768	TONK	12.060	5.416	4.318	BHANDARA	7.294	2.873	4.189
SAMBALPUR	5.701	4.850	0.953	DHARWAD	11.985	-0.854	14.112	PARBHANI	7.212	1.561	3.861
SUNDARGARH	5.495	9.639	-3.937	BALASORE	11.905	11.536	0.467	JAUNPUR	7.048	5.733	1.033
FATEHPUR	5.314	6.393	0.783	PATNA	11.843	-14.448	30.895	SAMBALPUR	6.919	5.973	0.938
ANANTPUR	5.290	5.011	0.045	ANANTPUR	11.750	5.740	6.153	GULBARGA	6.652	3.083	3.653
EAST GODAVARI	5.280	1.402	3.941	NANDED	11.382	3.209	3.881	BIJAPUR	6.429	1.089	6.109
CHANDRAPUR	5.241	1.553	3.746	CHURU	10.757	3.131	9.239	RAICHUR	6.046	1.446	4.493
NELLORE	5.239	2.460	3.180	SOUTH ARCOT	10.581	4.779	5.671	PUNE	6.032	4.337	1.014
AMRELI	5.226	2.925	2.378	RAICHUR	10.349	3.817	6.203	KOLHAPUR	5.807	1.073	4.735
SAHARANPUR	4.986	2.863	1.825	KARIMNAGAR	10.090	12.245	-2.069	NAGPUR	5.659	2.017	3.575
TIRUNELVELI	4.629	0.715	4.143	CHITRADURGA	9.976	9.352	2.184	DAMOH	5.626	2.868	4.377
JAMNAGAR	4.552	4.143	-0.730	SANGLI	9.925	5.063	4.169	CHINDWARA	5.611	-0.111	5.621
NAGPUR	4.340	-0.229	4.622	SAMBALPUR	9.399	8.255	0.908	JABALPUR	5.555	4.729	0.000
JUNAGARH	4.234	1.960	2.177	BOLANGIR	9.052	13.123	-2.925	KOLAR	5.519	5.273	0.361
FEROZPUR	4.138	2.257	1.556	BELLARY	9.044	7.955	0.360	BANGALORE	5.409	6.616	-4.202
BHANDARA	4.138	-0.604	4.959	CUTTACK	8.981	7.558	1.494	GURGAON	5.397	1.033	5.290
AHMEDNAGAR	3.973	0.438	4.202	DEORIA	8.974	2.042	7.882	FEROZPUR	4.729	4.533	0.000

RAICHUR	3.958	0.280	3.648	BILASPUR	8.857	3.444	5.183	BOLANGIR	4.518	4.166	0.657
BADAUN	3.815	1.153	2.250	GONDA	8.669	5.542	2.163	KHAMMAM	4.009	0.459	3.625
WEST GODAVARI	3.537	1.091	2.363	MAYURBHANJ	8.574	10.345	-2.055	GONDA	3.953	1.225	2.470
PALAMAU	3.514	1.539	2.345	SATARA	8.561	2.374	6.012	SATARA	3.893	0.494	3.490
BASTI	3.389	4.522	-0.932	NAGPUR	8.346	6.662	1.510	BUNDI	3.856	4.004	-0.180
SARGUJA	3.318	3.173	0.149	PURI	8.154	5.903	2.227	DANES	3.781	-7.407	-2.622
NASIK	3.204	3.865	-0.441	JHALAWAR	8.112	-0.251	6.543	SARGUJA	3.749	2.989	0.710
GHAZIPUR	3.124	3.098	-0.871	NAINITAL	7.987	3.257	4.383	PALAMAU	3.720	0.507	3.167
THANJAVUR	2.700	0.567	2.052	BUNDI	7.227	4.604	1.347	CUDDAPAH	3.489	1.638	1.809
BROACH	2.573	3.026	-0.521	PHULBANI	6.651	10.093	-3.424	SIROHI	3.444	3.223	-0.270
PALI	2.477	3.342	-1.071	WARDHA	6.517	12.701	-5.105	DHARMAPURI	3.322	1.688	1.616
AURANGABAD	2.347	-2.105	6.179	FEROZPUR	5.922	9.239	-2.328	FAIZABAD	3.304	0.642	2.471
BOLANGIR	2.322	-0.015	2.497	PRAKASAM	5.671	6.929	-1.301	BAHRAICH	3.292	0.721	2.469
WARANGAL	2.244	-0.355	2.474	CHIKMAGALUR	5.653	1.208	4.267	JHUNJHUNU	2.818	1.690	-1.367
BUNDI	2.210	3.706	-0.935	VISAKHAPATNAM	5.187	5.136	-0.125	SOLAPUR	2.790	-3.171	6.678
TUMKUR	2.059	5.536	-3.409	RAIGARH	5.166	-0.848	6.177	KARIMNAGAR	2.751	1.825	0.662
GULBARGA	2.046	-0.308	2.357	HASSAN	5.146	1.643	7.521	SOUTH ARCOT	2.662	1.416	1.234
KOLHAPUR	1.987	-0.688	2.731	EAST NIMAR (KH	4.884	3.945	1.950	TONK	2.590	2.811	-0.557
HOSHANGABAD	1.840	2.257	0.000	SIKAR	4.778	2.001	1.346	BASTI	2.549	0.355	1.930
HYDERABAD	1.789	-2.891	4.449	GORAKHPUR	4.727	-2.861	7.911	WEST GODAVARI	2.348	0.815	1.535
GONDA	1.672	-0.867	2.623	CHITTOOR	4.712	0.690	4.152	GHAZIPUR	2.301	1.076	0.794
SATARA	1.634	-0.433	2.251	SARGUJA	4.617	2.623	1.842	MORENA	2.268	0.637	1.448
SEHORE	1.603	1.571	1.424	CHENGALPATTU	4.363	2.995	1.411	CHENGALPATTU	2.229	2.125	0.199
BARABANKI	1.566	-0.818	2.606	PALAMAU	4.133	-1.526	4.833	GORAKHPUR	2.180	0.305	1.930
COIMBATORE	1.521	0.017	1.545	SHAHABAD	3.993	-15.991	21.130	SHIMOGA	2.025	2.809	-0.621
BIJAPUR	1.467	0.616	1.655	CHITTOR	3.786	5.452	-2.300	MAYURBHANJ	2.000	3.335	-1.315
AMRAVATI	1.366	-1.979	3.401	NALGONDA	3.651	3.183	1.233	WARANGAL	1.798	1.609	0.181
KRISHNA	1.205	-1.382	2.721	BEED	3.580	-2.064	4.397	BELLARY	1.794	-0.943	2.687
CHENGALPATTU	1.178	1.692	-0.403	JAUNPUR	3.549	-1.888	0.000	CHITTOR	1.762	-0.240	1.940
NIZAMABAD	1.062	-4.787	5.172	RAIPUR	3.519	-0.703	1.677	SIRMAUR	1.745	5.327	-3.963
NORTH ARCOT	1.034	1.204	-0.799	MIRZAPUR	3.440	-0.752	4.311	MANDYA	1.727	3.880	-1.535
JALGAON	1.020	4.483	-14.657	SRIKAKULAM	3.434	5.965	-1.670	BILASPUR	1.708	0.222	1.452
GORAKHPUR	0.930	1.927	-0.935	BELGAUM	3.367	-3.189	6.992	AHMEDNAGAR	1.654	-2.552	4.093
CHITTOR	0.764	-2.970	4.129	SAGAR	3.341	-3.463	0.000	JUNAGARH	1.542	1.176	0.000
CHAMPARAN(EAST)	0.763	1.280	-2.959	BHILWARA	3.324	-3.473	6.307	DHARWAD	1.438	-1.288	3.175
TIRUCHIRAPALLI	0.464	-0.169	0.561	HOSHIARPUR	3.131	7.394	-3.581	EAST GODAVARI	1.432	0.615	0.898
SAGAR	0.323	-0.874	1.576	SALEM	2.858	2.258	0.627	SANGLI	1.399	-1.515	4.122
RAMANATHAPURAM	0.276	-1.287	1.576	PUNE	2.814	3.363	-0.575	SAHARANPUR	1.370	0.298	0.918
ALLAHABAD	0.215	1.361	1.771	MEERUT	2.707	3.922	-1.255	SAGAR	1.319	-1.744	0.000
KODAGU(COORG)	0.178	-1.088	-4.220	BALLIA	2.545	-0.928	4.265	SARAN	1.314	4.172	0.000
KURNOOL	0.127	-2.616	2.855	GUNA	2.292	-9.452	12.871	NORTH ARCOT	1.309	0.929	0.350
SRIKAKULAM	0.104	2.829	-2.705	BIJNOR	2.207	-6.190	9.081	KRISHNA	1.270	-0.755	2.117
SALEM	0.010	0.607	-0.634	NORTH ARCOT	1.861	0.382	2.686	SRIKAKULAM	1.202	3.864	-2.361
BARMER	0.000	0.000	0.000	JALORE	1.755	-1.021	5.085	SALEM	0.950	1.155	-0.216
SHAHDOL	0.000	10.305	0.000	KRISHNA	1.400	0.509	0.919	DEHRADUN	0.803	-0.371	1.032
HISSAR	0.000	4.624	-4.435	TIRUCHIRAPALLI	1.340	19.390	-6.092	TIRUCHIRAPALLI	0.755	5.966	-1.736
KARNAL	0.000	0.000	0.000	MANDSAUR	1.118	4.786	-4.087	TIRUNELVELI	0.748	-0.833	1.615
DAMOH	0.000	-2.775	3.326	WARANGAL	0.911	5.654	-4.253	CHURU	0.705	1.033	0.000
MANDLA	0.000	17.462	0.000	BASTI	0.890	-7.486	7.904	FATEHPUR	0.692	0.457	1.545
JABALPUR	0.000	-14.866	0.000	GHAZIPUR	0.676	-2.849	4.210	JHALAWAR	0.620	-1.159	1.742
RATNAGIRI	0.000	0.000	0.000	KURNOOL	0.622	1.187	-0.873	SEONI	0.431	-1.900	2.388
BULDHANA	-0.204	1.039	-1.684	WEST GODAVARI	0.011	0.267	-0.103	RAIGARH	0.376	-1.081	1.495
KHAMMAM	-0.374	-4.103	3.908	MEDAK	0.009	1.913	-1.734	KURNOOL	0.292	-1.365	1.597
DHULE	-0.383	-1.594	1.281	MANDLA	0.000	0.000	0.000	THANJAVUR	0.281	-0.200	0.626
BANAS KANTHA	-0.582	0.993	-0.663	VIDISHA	0.000	-5.851	7.351	HOSHIARPUR	0.096	2.310	-2.187
BANGALORE	-0.674	4.038	-9.104	KULU	0.000	0.000	0.000	BELGAUM	0.024	-1.812	2.131
KARIMNAGAR	-0.733	-3.016	2.086	MANDI	0.000	-6.802	0.000	SHAHDOL	0.000	9.682	0.000
MADURAI	-0.787	-2.416	1.476	JABALPUR	0.000	58.489	0.000	KULU	0.000	0.000	0.000
PARBHANI	-0.819	-1.933	0.666	BARMER	0.000	0.000	0.000	MANDI	0.000	2.299	0.000
SOUTH ARCOT	-1.083	-0.224	-0.915	RATNAGIRI	0.000	0.000	0.000	DHANBAD	0.000	0.000	0.000
GUNA	-1.127	-8.432	0.694	KARNAL	0.000	0.000	0.000	GUNA	0.000	-8.773	4.599
MAYURBHANJ	-1.136	-0.001	-0.942	BHATINDA	0.000	5.922	-3.581	MANDLA	0.000	0.000	0.000
HOSHIARPUR	-1.388	-0.142	-1.483	DHANBAD	0.000	0.000	0.000	AMRAVATI	-0.146	-1.465	1.216
MYSORE	-1.463	0.366	-1.820	MYSORE	-0.055	3.682	-3.723	CHITTOOR	-0.241	0.720	-0.958
SURAT	-1.498	-1.678	0.241	JALAUN	-0.069	-4.686	3.995	MAHABOOBNAGAR	-0.263	-1.354	1.145
BELGAUM	-1.607	-1.117	-0.216	RAEBARELI	-0.516	-10.409	11.846	CHAMPARAN(EAST)	-0.484	-0.347	-1.658
BELLARY	-1.648	-5.113	3.870	GAYA	-0.823	-13.403	14.675	JALGAON	-0.689	2.696	-10.934
BILASPUR	-1.689	-1.350	-0.363	YEVATMAL	-1.010	-7.556	7.301	NIZAMABAD	-0.922	-4.425	3.555
BAREILLY	-1.832	-1.903	0.752	RANCHI	-1.202	-0.160	-2.024	MYSORE	-0.996	1.460	-2.459

TONK	-1.841	1.533	-2.909	JAIPUR	-1.267	-0.969	-1.387	EAST NIMAR (KHA	-1.091	-2.028	0.764
RAIGARH	-1.936	-1.197	-0.764	OSMANABAD	-1.398	0.760	-2.003	AURANGABAD	-1.256	-2.136	1.981
CUDDAPAH	-1.937	-3.039	1.016	KUTCH	-1.682	-2.534	5.685	KORAPUT	-1.354	1.642	-2.947
JHABUA	-2.200	-1.860	-0.367	NAGAUR	-2.032	-8.131	7.282	SEHORE	-1.392	-2.825	1.938
CHINDWARA	-2.360	-6.804	4.014	KANYA KUMARI	-2.280	-4.866	2.439	RAMANATHAPURAM	-1.460	-1.957	-0.092
SANGRUR	-2.436	-3.761	1.642	WEST NIMAR(KHA	-2.599	-2.772	0.313	HOSHANGABAD	-1.477	-3.085	2.089
VADODARA	-2.510	-2.237	-0.066	UNNAO	-2.626	-13.751	13.102	DHULE	-1.594	-1.298	-0.287
RAEBARELI	-2.584	-2.000	-0.550	AHMEDNAGAR	-2.830	-8.267	3.875	RAEBARELI	-1.900	-4.888	3.422
SANGLI	-2.612	-4.648	4.099	CHAMPARAN(EAST	-2.931	-3.523	0.996	SANTHAL PARGANA	-1.966	-2.053	-0.440
KOLAR	-2.620	2.083	-4.726	FAIZABAD	-2.958	-5.786	2.231	BHATINDA	-2.061	1.089	-2.667
CHITTOOR	-2.629	0.735	-3.432	AMRAVATI	-3.103	-0.429	-3.015	CHIKMAGALUR	-2.221	1.032	-3.205
KHEDA	-2.634	-4.909	1.730	GUNTUR	-3.383	-4.142	1.073	BULDHANA	-2.347	-2.172	-0.188
PILIBHIT	-2.709	-2.475	0.742	JUNAGARH	-3.636	-0.374	-3.826	NALGONDA	-2.458	-4.146	1.927
SAWAI MADHOPUR	-2.861	-3.489	0.582	BIDAR	-3.864	-6.013	2.820	RAIPUR	-2.489	-3.461	1.026
KHERI	-2.914	-2.797	-0.029	BETUL	-3.902	-13.060	7.105	BIJNOR	-2.576	-3.856	1.447
JHALAWAR	-2.930	-1.609	-0.577	DHULE	-3.971	-0.432	-3.352	HYDERABAD	-2.864	-4.327	1.313
BHATINDA	-3.075	-1.244	-2.207	JALGAON	-4.022	-0.788	-2.994	COIMBATORE	-2.923	-0.384	-2.293
VALSAD	-3.095	-3.293	-0.045	HAZARIBAGH	-4.090	-1.052	-7.547	BARABANKI	-2.963	-5.277	2.467
AMBALA	-3.284	-2.836	-0.769	SITAPUR	-4.207	-9.830	5.665	BAREILLY	-3.087	-5.264	2.250
AKOLA	-3.315	-4.202	1.270	THANJAVUR	-4.388	-1.716	-2.166	YEVATMAL	-3.116	-4.615	1.530
SHIMOGA	-3.330	-0.585	-2.586	RAMPUR	-4.569	-5.013	1.233	BHILWARA	-3.167	-1.370	-1.616
DHARWAD	-3.458	-1.505	-1.895	NIZAMABAD	-4.772	-3.698	0.394	JAIPUR	-3.492	-1.859	-1.687
SOLAPUR	-3.544	-4.980	3.400	SIROHI	-4.798	-7.235	1.339	BEED	-3.767	-6.807	3.501
RAMPUR	-3.557	-4.141	1.032	RAMANATHAPURAM	-4.843	-3.283	-3.345	WEST NIMAR(KHAR	-3.779	-3.388	-0.575
SHAJAPUR	-3.600	1.400	-16.077	BAHRAICH	-4.906	-7.395	2.193	RAMPUR	-3.896	-4.433	1.099
EAST NIMAR (KHA	-3.949	-4.884	0.176	AZAMGARH	-5.027	-11.977	7.897	UNNAO	-3.943	-6.475	2.686
DHANBAD	-3.974	-4.980	0.000	SAHARANPUR	-5.493	-4.643	-0.872	VISAKHAPATNAM	-4.025	-4.348	0.347
CHURU	-3.974	0.000	-5.239	BAREILLY	-5.550	-11.644	5.313	OSMANABAD	-4.043	-5.121	1.372
DHARMAPURI	-4.012	0.197	-4.278	EAST GODAVARI	-5.845	-0.942	-4.924	NASIK	-4.052	-3.260	2.758
KAPURTHALA	-4.032	-4.795	0.730	RAJGARH	-5.885	-9.295	4.421	SANGRUR	-4.057	-4.752	0.633
SABARKANTH	-4.144	-2.016	-2.000	BULDHANA	-6.495	-8.292	2.875	MANDSAUR	-4.167	-3.614	-0.609
YEVATMAL	-4.151	-3.109	-1.238	SINGHBHUM	-6.508	-7.091	-0.329	GUNTUR	-4.248	-5.408	1.413
DEWAS	-4.162	-3.776	-0.489	TIRUNELVELI	-6.586	-3.858	-3.258	SAWAI MADHOPUR	-4.309	-1.943	-2.546
WEST NIMAR(KHAR	-4.363	-3.695	-1.016	DANGS	-6.765	2.299	-8.860	HASSAN	-4.446	-4.531	0.984
JAIPUR	-4.586	-2.301	-1.837	SEHORE	-7.121	-11.054	5.829	NARSIMPUR	-4.516	-7.713	0.000
RAISEN	-4.591	-5.881	1.441	SAWAI MADHOPUR	-7.140	1.223	-8.513	MEDAK	-4.734	-6.082	1.485
UNNAO	-4.594	-2.610	-2.157	SANGRUR	-7.220	-6.702	-1.355	KHERI	-4.806	-4.317	-0.346
SHAHJAHANPUR	-4.634	-4.374	0.781	MEHSANA	-7.420	-0.806	-10.827	KHEDA	-4.871	-7.204	2.918
GUNTUR	-4.678	-6.035	1.584	HOSHANGABAD	-7.789	-12.945	6.400	RAJKOT	-4.889	1.785	-9.454
UJJAIN	-4.805	-4.595	-0.260	FATEHPUR	-7.953	-10.440	3.086	KANYA KUMARI	-5.004	-5.003	-0.234
BIJNOR	-4.883	-2.668	-2.167	AURANGABAD	-8.085	-2.198	-5.922	GAYA	-5.034	-5.081	-0.201
MORENA	-4.980	-3.504	-1.776	UDAIPUR	-8.176	3.069	-13.503	AMBALA	-5.083	-6.484	1.305
UDAIPUR	-5.054	-6.648	2.407	HARDOI	-8.393	-18.723	16.885	BANAS KANTHA	-5.220	-2.079	-3.388
MANDYA	-5.242	-1.612	-3.993	KHERI	-8.480	-7.286	-0.976	AKOLA	-5.373	-5.714	0.676
OSMANABAD	-5.339	-7.931	3.104	AMBALA	-8.579	-13.374	5.586	NAINITAL	-5.520	-6.472	0.771
INDORE	-5.343	-4.252	-1.242	KHEDA	-9.192	-11.628	5.337	SITAPUR	-5.622	-5.774	0.171
RAIPUR	-5.361	-4.811	0.702	AKOLA	-9.359	-8.665	-0.503	NANDED	-5.669	-5.760	-0.087
NALGONDA	-5.376	-7.613	2.276	GURGAON	-9.380	-17.212	3.183	BIDAR	-5.853	-7.419	2.064
PANCH MAHALS	-5.767	-4.463	-1.637	MUZAFFARNAGAR	-9.404	-13.697	1.573	SHAHABAD	-5.961	-5.550	0.000
DHAR	-5.876	-3.739	-2.419	PANCH MAHALS	-9.453	-6.478	-2.192	RAJGARH	-6.010	-6.429	0.655
CHIKMAGALUR	-5.936	0.944	-6.738	RAISEN	-9.712	-7.789	0.000	MADURAI	-6.042	-5.991	-0.185
SULTANPUR	-6.003	-7.505	2.722	SIRMAUR	-9.917	-3.702	-8.821	UDAIPUR	-6.106	-3.515	-3.198
RAJGARH	-6.072	-4.962	-1.177	LUCKNOW	-10.183	-18.089	11.837	BETUL	-6.185	-7.983	1.836
VARANASI	-6.085	-5.472	-0.890	COIMBATORE	-11.236	-1.180	-9.541	BROACH	-6.232	-4.110	-1.893
BHILWARA	-6.258	-0.302	-5.354	MAHABOOBNAGAR	-11.268	-5.697	-5.730	JHABUA	-6.271	-4.947	-0.982
SITAPUR	-6.322	-3.678	-2.467	BARABANKI	-11.423	-13.601	2.191	SHAJAPUR	-6.306	-2.855	-11.189
KANYA KUMARI	-6.337	-5.072	-1.545	SHAJAPUR	-11.493	-10.837	-0.543	RAISEN	-6.330	-6.522	0.959
MANDSAUR	-6.704	-7.558	1.177	HYDERABAD	-11.541	-7.136	-4.680	KUTCH	-6.498	-5.242	2.081
BIDAR	-6.832	-8.114	1.688	ETAWAH	-12.553	-15.726	3.299	AMRELI	-6.729	-0.160	-6.414
MEHSANA	-6.871	-7.590	0.815	DEHRADUN	-12.722	-15.913	4.384	MEERUT	-6.888	-8.515	-0.061
ALIGARH	-6.934	-2.956	-4.381	BANAS KANTHA	-13.856	-7.945	-8.617	PANCH MAHALS	-7.012	-5.139	-1.822
MEDAK	-7.020	-9.841	3.134	JHABUA	-13.912	-10.833	-2.198	MEHSANA	-7.054	-5.382	-3.225
PATIALA	-7.049	-6.035	-1.100	JHUNJHUNU	-14.086	-17.200	1.608	VADODARA	-7.406	-4.807	-2.624
GAYA	-7.073	-0.625	-6.900	MATHURA	-14.447	-21.991	8.370	PATNA	-7.619	-9.728	2.100
KANPUR	-7.102	-7.488	0.666	AJMER	-15.152	-17.929	0.902	BADAUN	-8.481	-10.265	2.055
BEED	-7.243	-9.092	3.056	MADURAI	-15.731	-12.752	-3.426	SABARKANTH	-8.512	-2.284	-2.674
BETUL	-7.306	-5.335	-0.701	VADODARA	-16.473	-9.746	-7.546	HARDOI	-9.013	-10.142	3.318
ETAWAH	-7.376	-7.666	0.648	SABARKANTH	-16.660	-2.820	-4.008	JAMNAGAR	-9.039	0.130	-11.055
LUDHIANA	-7.724	-7.794	-0.055	NASIK	-17.070	-16.076	9.466	SIKAR	-9.073	-9.024	-0.271

AHMEDABAD	-7.943	-7.388	-0.537	DHAR	-17.390	-17.532	2.675	ETAWAH	-9.134	-10.435	1.524
MORADABAD	-8.097	-4.694	-3.378	SULTANPUR	-17.553	-16.999	0.031	SHAHJAHANPUR	-9.236	-8.698	-0.847
VISAKHAPATNAM	-8.324	-8.764	0.584	DURG	-17.594	-23.176	11.577	NAGAUR	-9.422	1.625	-9.508
MANDI	-8.756	7.177	-15.674	SHAHJAHANPUR	-17.785	-16.767	-4.024	VALSAD	-9.547	-9.942	0.854
KUTCH	-8.817	-6.568	0.325	BILASPUR	-17.812	-22.980	9.269	KAPURTHALA	-9.577	-8.085	-1.797
HASSAN	-8.909	-7.476	-2.133	RATLAM	-17.857	-13.477	-4.626	LUCKNOW	-9.672	-11.782	3.422
FARRUKHABAD	-9.166	-8.545	-0.701	MAINPURI	-18.167	-27.273	11.597	DHAR	-9.882	-8.576	-0.750
HARDOI	-9.321	-5.517	-2.863	KAPURTHALA	-19.726	-14.327	-6.660	SULTANPUR	-10.022	-10.784	1.817
LUCKNOW	-9.415	-8.449	-0.545	BANSWARA	-21.145	-21.911	1.352	SINGHBHUM	-10.454	-12.891	3.069
SEONI	-9.429	-9.261	1.001	VALSAD	-21.191	-21.900	2.676	INDORE	-11.176	-11.092	0.005
SARAN	-9.591	-5.352	-3.344	KANPUR	-21.272	-23.624	3.318	DEWAS	-11.407	-11.462	0.519
GANDHINAGAR	-10.010	-10.520	-0.040	SURENDRANAGAR	-21.377	2.445	-22.597	UJJAIN	-11.796	-12.245	1.451
AJMER	-10.081	-2.205	-10.335	BROACH	-21.640	-16.933	-4.581	AJMER	-11.804	-7.756	-6.736
KORAPUT	-10.099	-3.922	-6.471	INDORE	-21.787	-23.343	2.548	KANPUR	-12.088	-13.213	1.542
RATLAM	-10.232	-10.890	0.792	PATIALA	-21.841	-17.320	-6.254	PATIALA	-12.267	-9.959	-2.849
BULLANDSHAHR	-10.237	-12.184	0.741	JALANDHAR	-22.163	-21.173	0.422	JALORE	-12.504	-12.671	1.298
ROPAR	-10.470	-10.126	-0.256	RAJKOT	-23.378	-4.390	-21.038	ADILABAD	-12.521	-12.787	0.286
SHAHABAD	-10.574	-6.147	-6.438	FARRUKHABAD	-23.402	-25.918	3.291	RATLAM	-12.849	-11.761	-1.047
JALANDHAR	-11.060	-10.059	-1.581	MORADABAD	-23.538	-26.459	4.474	PALI	-13.506	-0.748	-15.224
MEERUT	-11.343	-14.164	0.542	UJJAIN	-24.274	-25.754	4.960	MORADABAD	-13.563	-12.584	-0.829
DUNGARPUR	-11.619	-10.310	-1.049	DEWAS	-24.296	-25.042	2.566	FARRUKHABAD	-14.183	-14.747	0.612
NAINITAL	-11.626	-10.987	-0.988	SANTHAL PARGAN	-24.368	-24.274	-13.153	LUDHIANA	-14.340	-13.924	-0.874
ALWAR	-12.018	-10.277	-1.066	AGRA	-24.966	-31.330	11.345	PILIBHIT	-14.702	-14.338	-0.874
KULU	-12.184	-4.465	-4.419	JODHPUR	-25.379	-29.385	1.337	JALANDHAR	-14.926	-13.928	-0.918
SINGHBHUM	-12.365	-15.654	4.811	LUDHIANA	-26.182	-24.988	-2.490	BILASPUR	-14.943	-15.283	2.770
NAGAUR	-12.905	6.885	-16.890	DUNGARPUR	-26.453	-28.050	0.568	MATHURA	-16.133	-16.373	0.844
NANDED	-13.190	-11.377	-2.014	AMRELI	-26.717	-6.057	-21.799	AHMEDABAD	-16.290	-16.137	1.287
BILASPUR	-13.471	-11.150	-0.334	BULLANDSHAHR	-28.629	-35.561	29.427	BULLANDSHAHR	-16.841	-20.793	9.516
MONGHYR	-14.160	-20.875	6.753	BADAUN	-28.876	-29.379	1.667	DUNGARPUR	-16.869	-16.662	-0.513
ETAH	-14.549	-10.902	-4.376	ETAH	-28.892	-35.878	11.561	BARMER	-17.211	-15.645	0.000
SIKAR	-15.296	-14.082	-1.069	MONGHYR	-28.952	-17.624	-8.533	BANSWARA	-17.424	-17.056	-0.445
BHARATPUR	-15.438	-9.846	-6.869	AHMEDABAD	-30.783	-31.235	5.037	VARANASI	-18.469	-19.103	0.950
BANSWARA	-15.497	-14.517	-1.332	JAMNAGAR	-31.151	-7.439	-28.595	MAINPURI	-18.927	-19.658	0.674
PATNA	-16.040	-7.271	-9.827	SIMLA	-32.239	1.220	-31.227	SURENDRANAGAR	-19.283	-10.886	-6.510
AGRA	-16.867	-14.005	-4.344	PILIBHIT	-34.435	-33.911	-4.029	MONGHYR	-19.404	-19.806	1.393
MATHURA	-16.963	-13.414	-2.721	ROPAR	-35.561	-24.214	-14.972	ETAH	-19.626	-20.155	0.666
PURNEA	-18.065	-20.567	2.500	PALI	-38.381	-8.447	-37.747	AGRA	-19.659	-20.218	0.623
SURENDRANAGAR	-18.214	-16.885	2.747	VARANASI	-38.554	-40.751	4.732	ROPAR	-19.765	-15.091	-5.425
JALORE	-18.866	-17.971	-0.543	BHARATPUR	-39.823	-40.493	1.338	ALWAR	-22.517	-22.435	-0.644
MAINPURI	-19.305	-15.556	-4.379	ALWAR	-39.907	-42.031	0.205	BHARATPUR	-24.504	-21.504	-4.210
ADILABAD	-26.883	-24.824	1.005	NARSIMPUR	-55.607	-62.527	0.000	ALIGARH	-27.596	-27.852	0.472
SIMLA	-46.851	-41.778	-7.057	ALIGARH	-56.178	-60.121	10.932	SIMLA	-42.369	-29.992	-15.934

GROWTH RATE OF PRODUCTION, AREA AND YIELD OF RAPESEED AND MUSTARD

DISTT.NAME	GROWTH RATE 1971-81 PRODUCTION	AREA	YIELD	DISTT.NAME	GROWTH RATE 1981-86 PRODUCTION	AREA	YIELD	DISTT. NAME	GROWTH RATE 1971-86 PRODUCTION	AREA	YIELD
KINNAUR	63.854	48.169	10.047	SABARKANTHA	118.380	72.131	0.333	GANDHI NAGAR	62.588	54.600	5.267
CHHITOR	56.191	53.736	0.456	GANDHI NAGAR	113.153	59.532	25.000	CHHITOR	48.197	49.482	-0.181
AMRELI	47.876	46.697	0.000	HISAR	82.194	74.179	0.698	AHMEDABAD	39.605	30.682	6.095
JHALWAR	45.190	38.337	1.438	BELGAUM	64.155	65.723	0.149	BHILWARA	38.787	42.016	-1.029
GANDHI NAGAR	42.000	52.192	47.876	DUNGARPUR	62.477	73.872	0.699	JHALWAR	37.068	31.672	1.859
BARA BANKI	41.263	14.244	23.719	AJMER	62.360	72.937	0.706	BHAVNAGAR	35.936	20.269	12.615
BHILWARA	36.041	29.381	0.456	KAIRA	54.018	27.625	0.421	KOTAH	33.931	28.836	2.209
BURDWAN	34.683	22.679	9.823	KUTCH	53.869	23.873	0.333	AJMER	32.914	33.856	-0.580
AHMEDABAD	34.060	35.472	-2.233	BULANDSAHAR	51.709	46.155	0.532	KUTCH	32.614	28.718	3.785
GUNTUR	33.759	29.121	6.640	KOTAH	51.603	44.187	0.706	SABARKANTHA	31.684	23.088	7.177
NAGAUR	27.482	24.393	-2.808	AHMEDABAD	51.391	21.604	0.318	PANCHMAHAL	31.510	23.533	6.964
ETAH	26.132	27.213	-1.033	PANCHMAHAL	47.577	27.226	0.500	BROACH	29.797	19.512	9.471
KOTAH	25.884	21.784	0.554	TONK	46.331	62.602	0.706	AMRELI	29.797	19.988	12.688
BIRBHUM	24.967	20.718	4.411	MEERUT	45.534	44.593	0.532	BURDWAN	28.741	18.929	7.765
BANSWARA	24.891	22.355	0.600	BHILWARA	44.444	71.108	0.706	GUNTUR	28.385	21.751	7.217
JODHPUR	24.788	23.013	-0.562	BUNDI	43.930	41.320	0.706	BIRBHUM	28.262	22.831	4.600
ADILABAD	24.293	24.274	1.497	MIDNAPORE	43.556	29.911	0.329	KINNAUR	28.160	34.769	-4.523
PANCHMAHAL	24.145	21.727	2.136	HOWRAH	41.537	43.715	0.786	BUNDI	27.437	27.167	1.088
UDAIPUR	23.790	17.612	0.550	MORADABAD	41.245	36.443	0.485	KAIRA	27.041	19.661	6.345
LUCKNOW	23.237	24.550	-1.876	JAIPUR	41.008	44.429	0.761	TONK	26.061	24.913	1.008
JHUNJHUN	23.139	17.531	4.447	SAWAI MADHOPUR	38.204	31.951	0.537	ALIGARH	23.962	23.049	0.677
KUTCH	23.114	31.212	-5.270	BIRBHUM	35.115	27.168	0.583	ETAH	22.928	22.048	0.645
ALIGARH	22.905	24.051	-1.032	JHANSI	34.982	29.297	0.331	BANASKANTHA	21.934	14.726	6.358
PAL	21.599	17.660	-0.768	MEHASANA	34.201	7.266	0.365	MEERUT	21.674	20.743	0.518
AJMER	20.258	17.764	0.538	SAHARANPUR	33.962	29.148	0.532	JAUNPUR	20.936	20.091	0.298
SHIVPURI	20.044	18.125	1.690	CHHITOR	33.417	41.324	0.706	SHIVPURI	20.090	18.294	1.152
BUNDI	19.914	20.631	0.602	TUMKUR	32.611	47.758	0.266	BANKURA	19.820	12.121	6.741
JAUNPUR	19.397	19.715	-0.851	BANASKANTHA	31.609	12.921	0.547	HOOGHLY	19.791	12.698	6.652
CHHATARPUR	18.275	17.165	0.911	MATHURA	31.153	20.855	0.588	BULANDSAHAR	19.029	16.925	1.659
SIKAR	17.645	10.549	6.272	HOOGHLY	31.081	22.857	0.650	SURAT	18.849	7.892	10.155
BANASKANTHA	17.366	15.639	1.640	BANKURA	29.569	23.262	0.721	ONGOLE	18.849	-2.831	0.000
BARMER	17.015	11.098	0.555	MORENA	28.347	32.378	0.819	LUCKNOW	18.078	19.451	-1.772
TONK	17.004	9.483	6.597	CHINDWARA	27.226	15.601	0.500	MATHURA	17.994	15.682	2.039
BALASORE	15.382	14.747	0.728	KARNAL	27.226	20.642	0.667	NAGAUR	17.343	14.057	0.786
KAIRA	15.380	15.867	-0.321	24-PARGANA	26.935	17.022	0.492	SAWAI MADHOPUR	16.959	11.086	4.534
BANKURA	15.224	6.935	7.652	MUZZAFFARNAGAR	26.387	21.890	0.532	JAIPUR	16.555	13.357	2.700
FAIZABAD	14.951	13.935	1.499	ALIGARH	26.103	21.071	0.588	MORENA	16.006	10.140	4.866
CHURU	14.768	16.130	0.550	ROHTAK	25.927	20.112	0.625	MUZZAFFARNAGAR	15.907	13.663	1.646
HOOGHLY	14.516	7.938	6.891	WEST DINAJPUR	25.596	14.253	0.349	DUNGARPUR	15.480	17.574	-0.621
NADIA	13.603	6.903	6.288	PATIALA	24.573	13.397	0.533	JODHPUR	15.357	21.380	-1.801
DURG	13.346	3.489	2.460	JAUNPUR	24.075	20.845	0.402	SAHARANPUR	15.130	13.188	1.660
DARBHANGA	13.280	9.721	3.623	SARAN	23.285	3.244	0.500	MORADABAD	14.890	13.603	1.278
GWALIOR	12.857	7.683	8.258	JHALWAR	22.162	19.290	0.705	24-PARGANA	14.823	9.147	5.007
GANJAM	12.575	8.015	4.460	MOHINDERGARH	21.673	13.697	0.700	BARA BANKI	14.538	13.577	0.872
HARDOI	12.074	14.306	-1.839	MALDA	21.346	17.715	0.563	BANSWARA	14.420	14.766	-1.002
MATHURA	11.919	13.179	-1.031	ALLAHABAD	21.170	16.805	0.499	HOWRAH	13.960	10.446	3.268
MAINPURI	11.864	12.596	-1.031	SINGHBHUM	21.108	7.906	0.231	NADIA	13.728	7.087	6.223
PRATPGARH	11.558	9.828	1.531	CACHAR	21.074	23.303	0.509	SIKAR	13.555	12.614	0.692
BIKANER	11.538	7.995	0.551	CHICKMANGLUR	20.290	36.873	0.265	BIKANER	13.138	10.035	1.062
SITAPUR	11.496	13.510	-1.844	SHIVPURI	20.183	18.633	0.432	CHHATARPUR	12.971	12.450	0.312
BOLANGIR	11.388	7.453	3.394	RUPAR	20.112	10.757	0.750	MOHINDERGARH	12.171	6.997	4.122
MEERUT	11.254	10.337	0.621	GURDASPUR	20.112	4.564	0.500	UDAIPUR	11.964	9.059	-0.079
PHULBANI	11.165	5.739	5.749	FEROZPUR	19.007	4.495	0.534	MURSIDABAD	11.878	8.328	3.344
BILASPUR	11.039	10.279	0.801	SHIMOGA	18.996	33.257	0.288	BALASORE	11.831	11.873	0.074
MUZZAFFARNAGAR	10.998	9.760	0.610	MURSIDABAD	18.918	17.146	0.648	ROHTAK	11.728	8.160	3.513
KANGARA	10.934	7.712	3.824	BHARTPUR	18.822	16.281	0.793	AMBALA	11.689	6.189	4.941
SAMBALPUR	10.613	13.138	-2.502	AMBALA	18.466	12.196	0.500	FAIZABAD	11.560	11.041	0.828
MORENA	10.288	0.464	6.582	CHAMPARAN	18.389	-1.609	0.403	PAL	11.519	7.948	0.750
CHITRADURGA	9.763	7.317	1.749	GUNTUR	18.276	8.250	0.188	CACHAR	11.177	10.774	1.984
GAYA	9.682	6.678	2.748	ALWAR	18.110	40.393	3.961	HARDOI	11.176	8.910	2.147
MAYURBHANJ	9.636	9.832	-0.517	BAREILLY	18.015	15.349	0.485	MEHASANA	11.109	5.462	5.421
SUNDERGARH	9.558	8.465	-0.813	DEHRADUN	17.895	13.361	0.523	CHITRADURGA	10.965	10.235	0.093
FARRUKHABAD	9.546	10.837	-1.499	BURDWAN	17.631	11.770	0.861	SARAN	10.813	4.768	6.222

24-PARGANA	9.207	5.411	3.742	GULBARGA	16.886	14.927	0.109	MIDNAPORE	10.508	7.388	2.180
CUTTACK	8.895	7.345	1.386	ETAH	16.762	12.338	0.588	GANGANAGAR	10.377	9.435	0.641
SAHASA	8.759	5.023	3.494	BIKANER	16.406	14.230	0.706	DARBHANGA	10.329	6.521	3.807
RAI BARELI	8.711	10.709	-1.828	GANGANAGAR	16.305	15.146	0.800	DURG	10.130	4.902	0.219
SULTANPUR	8.617	5.510	1.528	BALIA	16.171	13.254	0.402	CHURU	9.973	16.497	-0.959
LALORE	8.576	8.831	-1.243	GURGAON	15.501	11.283	0.720	JIND	9.682	4.616	4.550
JAISALMER	8.547	4.275	0.698	AMRITSAR	15.425	8.601	0.874	JHUNJHUN	9.659	10.254	1.864
MURSIDABAD	8.516	4.172	4.238	KEONJHAR	15.405	7.242	0.300	DEHRADUN	9.465	7.569	1.660
AMBALA	8.447	3.308	4.859	PALAMAU	14.982	3.169	0.236	FARRUKHABAD	9.416	6.855	2.177
JIND	8.447	-2.527	10.788	AURANGABAD	14.870	-11.645	0.155	BANDA	9.285	6.738	2.423
AGARA	8.422	6.454	1.696	LUDHIANA	14.870	20.112	1.000	GURGAON	9.261	3.815	5.689
BANDA	8.328	7.126	1.041	NOWGONG	14.364	1.612	0.209	MAINPURI	9.176	8.636	0.240
MONGHYR	8.310	8.328	0.200	NADIA	13.978	7.456	0.617	SIBSAGAR	9.150	6.709	2.214
FATEHPUR	8.269	9.831	-1.498	KOLAR	13.717	26.958	0.292	JAISALMER	8.447	8.799	-0.915
JALAUN	8.170	7.273	1.032	AZAMGARH	13.556	7.045	0.430	OSMANABAD	8.357	7.438	2.349
SIBSAGAR	8.159	4.742	3.243	CHITRADURGA	13.409	16.311	0.218	HISAR	8.312	3.197	4.659
GONDA	8.102	6.636	1.509	BADNAUN	13.404	10.930	0.485	JULLULANDHAR	8.285	4.521	4.608
VISAKHAPATNAM	7.919	7.311	0.567	PATNA	13.102	-0.184	0.601	AGARA	8.257	6.514	1.622
MOHINDERGARH	7.702	3.797	2.780	JULLULANDHAR	12.888	12.888	1.400	DEORIA	8.250	6.396	1.926
SAWAI MADHOPUR	7.595	1.926	3.675	DEORIA	12.876	6.585	0.430	SAMBALPUR	8.238	9.258	-1.127
GANGANAGAR	7.527	6.686	0.329	PURNEA	12.365	0.310	0.344	BHARTPUR	7.965	5.556	1.868
OSMANABAD	7.177	8.686	0.446	JIND	12.196	20.510	1.125	HAMIRPUR	7.944	5.394	2.425
BULDHANA	7.177	1.185	9.149	SANGRUR	12.196	2.535	0.648	PHULBANI	7.937	3.827	4.202
SEHORE	7.177	2.919	0.000	SIDHI	12.011	11.072	0.219	CUTTACK	7.936	6.833	1.061
UNNAO	6.828	9.110	-1.841	MUZAFFARPUR	11.961	1.654	0.417	SULTANPUR	7.916	6.071	0.843
SAHARANPUR	6.732	5.964	0.622	PURULIA	11.734	23.419	0.681	KANGARA	7.831	12.862	-2.199
HAMIRPUR	6.672	5.546	1.043	BANDA	11.223	5.965	0.331	PRATPGARH	7.605	6.820	0.853
CACHAR	6.537	4.995	4.228	SIBSAGAR	11.161	10.755	0.683	GANJAM	7.430	4.084	3.198
PILIBHIT	6.475	6.446	0.103	GOALPARA	10.991	8.983	0.393	SITAPUR	7.403	9.253	-1.760
GURGAON	6.269	0.271	6.923	VARANSI	10.979	8.019	0.401	MUZAFFARPUR	7.396	2.934	4.986
BHAGLPUR	6.168	3.851	1.668	OSMANABAD	10.757	4.985	0.174	BADNAUN	7.239	6.552	1.023
JULLULANDHAR	6.054	0.573	10.652	HAMIRPUR	10.534	5.091	0.331	AZAMGARH	7.209	5.193	1.881
DEORIA	6.008	6.301	-0.155	HARDOI	9.400	-1.131	0.375	VARANSI	7.201	6.885	0.306
PURI	5.971	6.212	0.077	FARRUKHABAD	9.155	-0.687	0.499	WEST DINAJPUR	7.084	4.310	2.256
JAIPUR	5.968	0.426	5.574	MIRZAPUR	8.591	5.612	0.401	PATIALA	7.026	3.020	40.812
DEHRADUN	5.478	4.785	0.457	RANCHI	8.461	-3.993	0.223	BOLANGIR	6.756	4.409	2.123
SHAHJANPUR	5.440	5.465	0.103	HOSHIARPUR	8.447	27.226	3.000	GONDA	6.713	4.965	1.775
BULANDSAHAR	5.432	4.581	0.621	LUCKNOW	8.399	9.871	0.375	NOWGONG	6.596	2.545	3.801
GHAZIPUR	5.404	6.769	-0.893	BIJNOR	8.294	6.442	0.532	BAREILLY	6.539	5.800	1.023
VARANSI	5.360	6.323	-0.851	JAISALMER	8.247	18.444	0.701	FEROZPUR	6.141	3.324	2.645
LAKHIMPUR	5.345	5.155	0.301	BHATINDA	8.019	-1.516	0.553	SUNDERGARH	6.069	6.599	-1.300
BASTI	5.319	5.246	-0.149	AGARA	7.928	6.633	0.742	MONGHYR	6.022	5.102	0.943
HAZARIBAGH	5.304	4.193	1.106	DARANG	7.789	10.678	0.548	GAYA	5.667	3.115	2.675
ROHTAK	5.241	2.637	2.843	MANDALA	7.008	2.327	0.517	BHAGLPUR	5.597	2.683	2.644
MUZAFFARPUR	5.183	3.580	2.587	BHIND	6.532	7.850	0.507	BALIA	5.257	4.976	0.293
KORAPUT	5.096	7.016	-1.909	SULTANPUR	6.527	7.203	0.415	GORAKHPUR	5.155	3.930	1.453
SARAN	5.059	5.538	0.225	GORAKHPUR	6.222	2.833	0.446	KEONJHAR	5.030	7.840	-2.658
KALAHANDI	4.986	4.827	0.279	PANNA	6.161	7.785	0.295	BASTI	5.023	5.122	-0.220
KANPUR	4.973	5.770	-0.703	CUTTACK	6.043	5.816	0.565	RUPAR	4.823	-0.346	4.953
GORAKHPUR	4.626	4.483	0.217	DHARWAR	6.017	5.818	0.157	AURANGABAD	4.729	-3.530	8.132
BADNAUN	4.284	4.428	0.103	BASTAR	5.997	0.889	0.451	HAZARIBAGH	4.703	1.901	2.778
AZAMGARH	4.170	4.278	-0.202	SIKAR	5.796	16.861	0.706	MALDA	4.662	1.667	2.866
PARBHANI	4.138	-3.232	12.252	BILASPUR	5.710	5.455	0.429	JALAUN	4.645	2.446	2.255
NASIK	4.138	4.138	1.553	SHADOL	5.484	4.449	0.283	LAKHIMPUR	4.637	7.159	-2.247
KULU	3.992	-2.645	17.656	RAIPUR	5.315	6.322	0.583	VISAKHAPATNAM	4.561	1.453	3.221
MORADABAD	3.618	3.660	0.106	VIDISHA	5.223	2.114	0.455	SEHORE	4.553	-0.030	0.000
KAMRUP	3.597	2.142	1.332	FAIZABAD	5.075	5.472	0.414	GOALPARA	4.442	4.452	-0.052
BALAGHAT	3.329	-0.180	3.591	BALASORE	5.056	6.338	0.560	RAI BARELI	4.205	6.009	-1.748
AKOLA	2.919	-1.326	8.842	DARBHANGA	4.655	0.397	0.718	PATNA	4.078	2.143	2.258
SATNA	2.919	2.801	-0.415	BHAGLPUR	4.464	0.387	0.725	KORAPUT	3.963	3.704	0.257
BHARTPUR	2.914	0.571	2.194	BASTI	4.432	4.875	0.430	ALWAR	3.849	2.765	0.917
NOWGONG	2.912	3.014	-0.290	KHERI	4.409	2.347	0.384	UNNAO	3.846	5.858	-1.757
SHADOL	2.466	0.102	2.787	MAINPURI	3.992	1.130	0.588	KARNAL	3.758	3.123	1.351
SABARKANTHA	2.257	4.086	-1.547	GONDA	3.989	1.702	0.414	AMRITSAR	3.734	0.893	2.877
HOWRAH	2.257	-3.178	6.667	DURG	3.968	7.786	0.464	CHITTOR	3.659	0.681	0.000
JALPAIGURI	1.840	-1.204	3.329	SAHABAD	3.902	6.527	0.588	KALAHANDI	3.650	2.264	1.247
DAMOH	1.553	0.489	1.185	DAMOH	3.747	2.223	0.500	JHANSI	3.650	1.368	2.421
SURGUJA	1.465	0.007	1.558	SAMBALPUR	3.640	1.892	0.485	MAYURBHANJ	3.633	5.994	-2.397
GOALPARA	1.313	2.258	-0.914	HAZARIBAGH	3.513	-2.531	0.421	SAHASA	3.618	4.837	0.207

DARANG	1.279	1.394	0.240	LAKHIMPUR	3.235	11.281	0.695	MIRZAPUR	3.586	3.264	0.307
SIRMAUR	1.244	1.895	-0.627	CHHATARPUR	3.065	3.583	0.274	CHINDWARA	3.464	5.778	8.229
BAREILLY	1.227	1.327	0.102	SURGUJA	2.877	2.943	0.422	SHADOL	3.462	1.530	1.917
MANDALA	1.185	1.249	0.061	JALPAIGURI	2.819	-1.556	0.362	DARANG	3.404	4.399	-0.740
RAIPUR	1.185	-0.643	1.553	DARJEELING	2.760	-4.724	0.361	PURI	3.263	3.011	0.283
KHERI	1.181	2.905	-1.604	SATNA	2.231	6.017	0.258	FATEHPUR	3.200	3.370	-0.217
MIRZAPUR	1.171	2.109	-0.843	KAMRUP	2.089	4.498	0.340	KAMRUP	3.092	2.921	0.027
MEHASANA	1.099	4.571	-3.202	JABALPUR	1.901	1.932	0.397	MANDALA	3.090	1.607	1.391
PANNA	0.692	0.749	0.200	KANGARA	1.882	23.914	0.404	SHAHJANPUR	3.013	2.768	0.281
S.PARGANA	0.550	-2.631	4.046	PHULBANI	1.760	0.107	0.400	GHAZIPUR	2.916	2.926	0.285
DHENKANAL	0.273	11.150	-9.367	KORAPUT	1.734	-2.616	0.410	PARBHANI	2.740	-3.348	9.227
FEROZPUR	0.240	2.744	-1.924	MONGHYR	1.590	-1.065	0.727	NASIK	2.740	9.498	0.000
KEONJHAR	0.198	8.140	-7.442	DATIA	1.184	0.261	0.342	SATNA	2.689	3.862	-1.148
BALIA	0.191	1.067	-0.846	KALAHANDI	1.029	-2.675	0.445	BILASPUR	2.573	2.940	-0.326
BILASPUR	0.187	-1.346	1.224	CHURU	0.976	17.235	0.706	RAIPUR	2.543	1.626	0.666
MANDI	0.021	7.011	-6.015	RAIGARH	0.867	0.735	0.453	PANNA	2.483	3.042	-0.127
TIKAMGARH	0.000	13.346	0.000	SIROHI	0.859	-5.694	0.551	ALLAHABAD	2.407	2.114	0.068
NELLORE	0.000	0.000	0.000	DHANBAD	0.820	-7.354	0.368	DAMOH	2.279	1.064	1.271
NORTH ARCOT	0.000	-5.442	-5.388	BANGLORE	0.819	0.869	0.270	SANGRUR	2.246	-0.598	204.756
CHITTOR	0.000	0.000	0.000	RAMPUR	0.672	-2.839	0.485	KHERI	2.246	2.719	-0.385
POONA	0.000	0.000	0.000	PRATPGARH	0.113	1.050	0.414	JALPAIGURI	2.165	-1.322	3.348
RAJGARH	0.000	0.000	0.000	BELLARY	0.000	-41.011	0.070	BALAGHAT	2.147	1.310	0.927
SEONI	0.000	-1.905	1.784	DHAR	0.000	0.000	0.000	BHIND	2.131	1.550	0.551
BROACH	0.000	24.145	0.000	RAJGARH	0.000	-3.542	0.000	BELGAUM	2.106	15.263	-12.674
BHAVNAGAR	0.000	0.000	0.000	NANDED	0.000	0.000	0.250	BILASPUR	1.995	0.871	0.687
DHAR	0.000	0.000	0.000	CHITTOR	0.000	0.000	0.000	TUMKUR	1.948	6.047	-1.614
REWA	0.000	3.118	-6.245	BHIR	0.000	-2.821	0.208	MEDAK	1.936	5.555	3.910
WEST GODAVARI	0.000	0.000	0.000	MEDAK	0.000	0.000	0.000	SURGUJA	1.933	0.976	1.022
EAST GODAVARI	0.000	0.000	0.000	LAHAUL SPITI	0.000	0.000	0.000	BARMER	1.899	-2.240	0.149
CUDDAPH	0.000	22.485	0.000	KURNOOL	0.000	0.000	0.000	DHARWAR	1.886	6.067	-4.166
BANGLORE	0.000	5.893	-3.302	MAHASU	0.000	0.000	0.000	LALORE	1.770	0.544	-0.058
AHEMADNAGAR	0.000	0.000	0.000	BROACH	0.000	10.757	0.000	CHAMPARAN	1.727	-1.883	3.827
BHANDARA	0.000	0.000	0.000	ANANTPUR	0.000	0.000	0.000	SIDHI	1.721	1.890	0.079
ANANTPUR	0.000	0.000	0.000	MAHBUBNAGAR	0.000	0.000	0.000	KAPURTHALA	1.499	4.729	0.788
YEOTMAL	0.000	7.177	0.000	TIKAMGARH	0.000	5.922	0.417	SHIMOGA	1.425	4.831	-0.668
KURNOOL	0.000	0.000	0.000	NELLORE	0.000	0.000	0.000	KANPUR	1.268	1.092	0.224
BHIR	0.000	-0.643	4.138	CHANDA	0.000	0.000	0.000	SINGHBHUM	1.183	0.821	0.324
SOUTH ARCOT	0.000	43.097	0.000	BULSAR	0.000	0.000	0.000	LUDHIANA	0.959	-0.429	1.255
SHOLAPUR	0.000	0.000	0.000	BHANDARA	0.000	0.000	0.000	BASTAR	0.661	-1.191	1.960
LAHAUL SPITI	0.000	0.000	0.000	SRIKAKULAM	0.000	0.000	0.000	PALAMAU	0.245	0.075	-0.039
MEDAK	0.000	0.000	0.000	AMRELI	0.000	-19.726	0.000	RAMPUR	0.042	-1.080	1.275
BULSAR	0.000	0.000	0.000	JALGAON	0.000	0.000	0.000	BELLARY	0.000	-16.640	0.000
SRIKAKULAM	0.000	0.000	0.000	NASIK	0.000	21.058	0.583	DHAR	0.000	0.637	0.000
MAHASU	0.000	0.000	0.000	KAPURTHALA	0.000	0.000	0.000	TIKAMGARH	0.000	10.815	0.000
KAPURTHALA	0.000	0.000	0.000	ONGOLE	0.000	0.000	0.000	SHOLAPUR	0.000	0.000	0.000
COIMBATORE	0.000	-10.404	0.000	COIMBATORE	0.000	25.393	0.000	RAISEN	0.000	6.252	0.000
BHIND	0.000	-1.461	1.684	AHEMADNAGAR	0.000	0.000	0.000	WEST GODAVARI	0.000	0.000	0.000
TIRUCHIRAPALLI	0.000	0.000	0.000	TIRUCHIRAPALLI	0.000	0.000	0.000	MYSORE	0.000	0.000	0.000
AURANGABAD	0.000	0.804	4.138	EAST GODAVARI	0.000	0.000	0.000	KURNOOL	0.000	0.000	0.000
NILGIS	0.000	0.000	0.000	NILGIS	0.000	0.000	0.000	JALGAON	0.000	0.000	0.000
NIJAMABAD	0.000	-6.443	6.381	YEOTMAL	0.000	0.000	0.500	ANANTPUR	0.000	0.000	0.000
JALGAON	0.000	0.000	0.000	PARBHANI	0.000	-3.581	0.250	BANGLORE	0.000	4.191	-2.449
CHANDA	0.000	0.000	0.000	WEST GODAVARI	0.000	0.000	0.000	MAHBUBNAGAR	0.000	0.000	0.000
RAISEN	0.000	14.870	0.000	SHOLAPUR	0.000	0.000	0.100	CHANDA	0.000	0.000	0.000
MAHBUBNAGAR	0.000	0.000	0.000	SURAT	0.000	0.000	0.000	LAHAUL SPITI	0.000	0.000	0.000
NANDED	0.000	7.177	0.000	MYSORE	0.000	0.000	0.267	BHANDARA	0.000	0.000	0.000
ONGOLE	0.000	0.000	0.000	BHAVNAGAR	0.000	0.000	0.000	RAJGARH	0.000	-1.195	0.000
SURAT	0.000	0.000	0.000	POONA	0.000	0.000	0.000	YEOTMAL	0.000	4.729	0.000
DHARWAR	-0.118	6.192	-6.249	SAGAR	-0.059	1.212	0.478	EAST GODAVARI	0.000	0.000	0.000
PATNA	-0.161	3.327	-2.819	BALAGHAT	-0.177	4.357	0.675	AHEMADNAGAR	0.000	0.000	0.000
RAMPUR	-0.272	-0.189	0.102	GUNA	-0.232	-3.807	0.438	SOUTH ARCOT	0.000	19.570	0.000
ETWAH	-0.287	3.708	-4.225	SITAPUR	-0.339	1.214	0.375	POONA	0.000	-1.900	0.000
PATIALA	-0.797	-1.807	1.628	HASSAN	-0.353	10.630	0.274	BULSAR	0.000	0.000	0.000
SIMALA	-0.974	7.472	-10.517	SEHORE	-0.505	-5.675	0.467	BULDHANA	0.000	-1.900	0.000
WEST DINAJPUR	-1.122	-0.333	-1.297	NAGAUR	-0.579	-4.110	0.502	REWA	0.000	3.977	-8.647
JABALPUR	-1.352	-0.750	-0.414	SUNDERGARH	-0.579	2.963	0.510	NANDED	0.000	4.729	0.000
RAIGARH	-1.504	-1.905	0.373	DHARMPURI	-0.797	-12.034	0.143	CUDDAPH	0.000	6.393	0.000
DHARMPURI	-1.612	3.952	-5.877	JODHPUR	-1.422	18.179	0.632	NELLORE	0.000	0.000	0.000
BAHRAICH	-1.620	2.043	-3.634	BAHRAICH	-1.556	-7.563	0.227	MAHASU	0.000	0.000	0.000

AMRITSAR	-1.659	-2.753	1.241	SHAHJANPUR	-1.674	-2.422	0.485	BHIR	0.000	-1.375	3.841
BASTAR	-1.905	-2.215	0.418	CHAMBA	-1.677	2.473	0.169	BHATINDA	-0.044	-1.763	1.853
RUPAR	-2.075	-5.472	4.471	VISAKHAPATNAM	-1.845	-9.319	0.185	VIDISHA	-0.112	-1.401	1.489
SAGAR	-2.279	-1.749	-0.403	UNNAO	-1.870	-0.359	0.375	JABALPUR	-0.279	0.136	-0.465
SANGRUR	-2.393	-2.128	1.220	GHAZIPUR	-1.885	-4.349	0.400	SEONI	-0.639	-1.557	0.750
ALWAR	-2.622	-12.078	18.569	SEONI	-1.905	-0.857	0.533	NORTH ARCOT	-0.700	-0.459	-0.409
DUNGARPUR	-2.644	-3.317	0.305	GAYA	-1.926	-3.657	0.740	RAIGARH	-0.720	-1.033	0.319
VIDISHA	-2.678	-3.113	0.617	BOLANGIR	-1.937	-1.421	0.480	GURDASPUR	-1.060	-3.984	3.077
MALDA	-2.799	-5.517	3.004	PURI	-1.946	-3.103	0.435	BIJNOR	-1.062	-1.971	1.278
MIDNAPORE	-3.042	-2.364	-0.882	JALAUN	-2.064	-6.566	0.331	PILIBHIT	-1.307	-0.433	-0.379
SIDHI	-3.064	-2.412	-0.554	NORTH ARCOT	-2.085	10.310	0.167	GWALIOR	-1.332	-3.372	4.045
GUNA	-3.184	-2.939	-0.061	GANJAM	-2.166	-3.353	0.520	DHARMPURI	-1.341	-1.676	0.429
BHATINDA	-3.847	-1.887	-0.745	N.C. HILLS	-2.355	6.646	0.413	ETWAH	-1.383	0.574	-2.180
NAINITAL	-4.061	-3.774	-0.395	RAISEN	-2.971	-9.093	0.467	SIRMAUR	-1.440	2.426	-3.874
COOCH BIHAR	-4.892	-3.868	-1.171	ETWAH	-3.539	-5.412	0.598	COIMBATORE	-1.477	0.219	146.474
SALEM	-4.980	-3.390	-1.578	BANSWARA	-3.963	0.971	0.706	SAGAR	-1.545	-0.772	-0.744
LUDHIANA	-5.352	-9.343	4.862	RAI BARELI	-4.254	-2.802	0.375	CHICKMANGLUR	-1.553	5.811	-3.073
BIJNOR	-5.432	-5.925	1.036	REWA	-4.699	5.717	0.507	HOSHIARPUR	-1.564	-3.538	2.443
CHAMPARAN	-5.703	-2.020	-3.632	COOCH BIHAR	-5.398	-3.846	0.288	BAHRAICH	-1.599	-1.265	-0.172
ALLAHABAD	-5.855	-4.523	-1.485	KANPUR	-5.754	-7.652	0.612	PURNEA	-1.913	-1.684	-0.111
HOSHIARPUR	-6.217	-16.007	19.104	SAHASA	-5.945	4.467	0.650	RANCHI	-1.990	-2.849	1.046
KARNAL	-6.299	-4.657	-0.520	MANDI	-6.004	-1.875	0.207	MANDI	-2.029	3.963	-5.702
SHIMOGA	-6.363	-7.020	0.972	PAL	-6.204	-9.138	0.619	GUNA	-2.210	-3.229	0.687
PALAMAU	-6.398	-1.436	-5.048	FATEHPUR	-6.237	-8.435	0.499	PURULIA	-2.247	-3.450	2.976
DARJEELING	-6.400	-6.693	0.153	SIRMAUR	-6.595	3.495	0.563	AKOLA	-2.667	-1.900	1.936
CHAMBA	-6.507	0.369	-5.056	MAYURBHANJ	-7.403	-1.285	0.585	KOLAR	-2.863	2.999	-4.656
DATIA	-6.697	-8.398	1.268	SALEM	-8.255	-11.049	0.236	DHENKANAL	-2.973	4.436	-6.934
CHINDWARA	-6.697	1.185	11.612	UDAIPUR	-8.407	-6.227	0.706	DARJEELING	-3.441	-6.041	2.748
RANCHI	-6.832	-2.272	-4.065	DHENKANAL	-9.154	-7.801	0.540	SAHABAD	-3.657	-4.100	0.555
SAHABAD	-7.228	-9.009	2.133	SIMALA	-9.687	10.584	0.149	SIMALA	-3.968	8.500	-13.402
SINGHBHUM	-7.514	-2.545	-4.747	LALORE	-10.589	-14.185	0.590	DATIA	-4.141	-5.598	1.070
PURNEA	-8.357	-2.667	-5.667	BILASPUR	-12.471	-10.306	0.471	S.PARGANA	-4.367	-2.900	-1.101
PURULIA	-8.567	-14.604	6.178	BULDHANA	-12.945	-7.789	0.667	CHAMBA	-4.924	1.066	-5.927
JHANSI	-9.172	-10.245	1.037	AKOLA	-12.945	-3.036	0.583	COOCH BIHAR	-5.061	-3.861	-1.374
HASSAN	-9.222	-8.738	-0.442	HYDERABAD	-12.945	-30.736	0.043	SIROHI	-6.038	2.466	-8.583
SIROHI	-9.307	6.807	-16.026	JHUNJHUN	-13.037	-2.978	0.706	SALEM	-6.084	-6.013	-0.115
GURDASPUR	-10.203	-7.992	-2.358	NAINITAL	-13.461	-9.058	0.615	HASSAN	-6.357	-2.692	-1.916
KOLAR	-10.223	-7.228	-2.501	S.PARGANA	-13.493	-3.434	0.730	NAINITAL	-7.303	-5.569	-2.010
TUMKUR	-10.613	-10.160	-0.449	SOUTH ARCOT	-14.690	-16.515	0.127	TIRUCHIRAPALLI	-7.713	-3.622	-3.662
CHICKMANGLUR	-10.939	-6.967	-3.964	PILIBHIT	-15.206	-12.885	0.485	KULU	-8.074	5.024	-10.732
BELLARY	-14.277	-0.906	-13.703	CUDDAPH	-16.062	-19.726	0.211	ADILABAD	-8.435	-15.593	5.683
HISAR	-16.488	-20.567	4.614	KINNAUR	-21.595	11.496	0.507	SRIKAKULAM	-10.560	-12.331	2.021
N.C. HILLS	-18.029	-13.681	-5.507	BARMER	-22.728	-24.304	0.706	NILGIS	-11.259	-7.713	139.403
DHANBAD	-19.024	-19.198	-0.227	GWALIOR	-24.582	-22.194	0.742	NIJAMABAD	-11.259	-15.981	5.286
HYDERABAD	-19.266	-7.471	-12.401	BARA BANKI	-24.701	12.256	2.980	GULBARGA	-11.598	-7.037	-2.960
BELGAUM	-19.472	-3.874	-17.811	KULU	-28.168	22.220	1.686	DHANBAD	-12.887	-15.428	2.936
MYSORE	-20.088	-20.585	0.416	NIJAMABAD	-30.117	-32.239	0.214	N.C. HILLS	-13.106	-7.377	-6.523
BIDAR	-21.328	-11.506	-6.035	BIDAR	-42.199	-37.842	0.079	HYDERABAD	-17.211	-15.986	-5.902
GULBARGA	-23.120	-16.390	-5.235	ADILABAD	-50.307	-61.062	0.169	BIDAR	-29.011	-21.336	-5.574

GROWTH RATE OF PRODUCTION, AREA AND YIELD OF SESAMUM

DISTT.NAME	GROWTH RATE 1971-81 PRODUCTION	AREA	YIELD	DISTT.NAME	GROWTH RATE 1981-86 PRODUCTION	AREA	YIELD	DISTT. NAME	GROWTH RATE 1971-86 PRODUCTION	AREA	YIELD
UJJAIN	0.000	-14.277	0.000	JAUNPUR	110.236	112.580	19.537	24-PARGANA	31.830	26.180	0.000
MORADABAD	44.370	53.177	-13.354	HARDOI	76.647	99.658	4.565	BADNAUN	31.672	43.121	0.993
BURDWAN	43.657	40.774	0.000	BADNAUN	73.008	79.064	20.305	MORADABAD	30.025	38.791	-7.836
24-PARGANA	41.369	41.367	0.000	PURULIA	32.217	20.887	0.000	JAUNPUR	28.740	35.911	-2.151
WEST DINAJPUR	36.902	41.294	0.000	VARANSI	30.846	24.177	18.127	BAREILLY	26.946	30.369	-0.189
RAMPUR	33.514	44.443	0.000	BAREILLY	29.514	29.151	20.801	WEST DINAJPUR	20.915	23.359	0.000
BIDAR	27.313	21.289	-2.203	GHAZIPUR	27.542	21.817	19.571	HARDOI	19.424	27.429	-3.788
JAISALMER	26.893	34.056	-10.297	SHAHJANPUR	26.838	22.299	20.134	BANKURA	19.112	15.466	0.000
NAINITAL	26.628	35.588	-12.625	SRIKAKULAM	25.897	13.810	24.531	BIDAR	18.790	13.782	4.021
BAREILLY	25.681	30.982	-9.274	KEONJHAR	25.020	12.635	23.020	FARRUKHABAD	18.632	16.368	2.999
BANKURA	25.254	25.909	0.000	RAICHUR	24.715	9.707	19.718	BURDWAN	18.308	16.878	0.000
FARRUKHABAD	24.650	24.450	-2.426	ALLAHABAD	24.597	20.221	14.822	BALASORE	17.745	15.610	1.532
HOOGHLY	22.954	27.307	0.000	ETAWAH	23.731	16.739	13.386	NADIA	17.251	14.496	0.000
SIMALA	21.334	9.536	31.998	KHERI	23.399	33.955	1.748	GULBARGA	14.932	11.963	2.220
MIDNAPORE	20.963	21.573	0.000	WARDHA	23.333	24.443	-16.687	NAINITAL	14.478	22.488	-6.672
BIRBHUM	20.322	26.147	0.000	THAJAVUR	23.033	15.202	19.104	JALPAIGURI	14.308	22.743	0.000
BHARTPUR	19.936	8.008	9.325	JALPAIGURI	22.585	30.879	0.000	PHULBANI	13.390	9.675	2.881
NADIA	19.732	20.700	0.000	BELGAUM	22.132	15.281	12.967	HOOGHLY	13.225	12.150	0.000
GULBARGA	19.533	14.948	-1.175	AMRAWATI	21.418	6.812	21.566	KOTTAYAM	13.043	15.579	-2.179
KOTTAYAM	19.165	14.801	1.591	RAJGARH	21.201	20.967	10.990	RAMPUR	12.688	22.240	0.000
MURSIDABAD	19.031	19.613	0.000	BULDHANA	21.058	11.234	15.028	GURGAON	12.688	10.058	6.698
BALASORE	18.962	17.739	-2.975	SHIMOGA	20.782	6.252	22.419	FEROZPUR	12.130	10.040	1.659
PHULBANI	18.613	14.640	-1.014	SITAPUR	19.859	29.680	1.453	SUNDERGARH	12.053	10.786	1.019
GURGAON	18.222	6.147	0.000	KOLAR	19.517	17.992	13.637	KEONJHAR	11.736	13.469	-1.588
BULSAR	17.861	9.062	0.000	FAIZABAD	18.466	22.176	4.017	PARBHANI	11.460	8.584	2.572
BIJNOR	17.517	22.119	-9.798	SOUTH KANARA	18.132	16.497	11.072	PURULIA	11.312	7.748	0.000
BOLANGIR	17.464	6.632	6.859	VIDISHA	17.979	7.443	17.350	BIRBHUM	11.025	10.287	0.000
KOTAH	17.277	15.052	-1.268	EAST NIMAR	17.979	13.908	16.006	AKOLA	10.175	7.625	2.325
POONA	17.265	18.010	-6.546	DATIA	17.080	1.836	21.067	JALGAON	10.047	10.127	0.245
CHURU	15.596	0.126	13.438	AKOLA	17.080	8.646	13.787	VARANSI	9.911	12.461	-1.871
SUNDERGARH	14.993	13.867	-3.104	KANYAKUMARI	15.873	16.938	0.000	SOUTH KANARA	9.891	8.803	1.007
PILIBHIT	14.983	20.427	-9.806	BALASORE	15.349	11.466	11.203	MIDNAPORE	9.716	14.645	0.000
BADNAUN	14.870	27.954	-7.468	ADILABAD	14.870	-2.980	28.775	PILIBHIT	9.473	7.697	0.523
PARBHANI	14.870	11.946	-0.085	24-PARGANA	14.639	0.524	0.000	RAICHUR	9.411	6.356	1.903
JHUNJHUN	14.870	14.233	-1.592	MIRZAPUR	14.321	1.067	19.132	POONA	9.212	11.397	-3.540
BIKANER	14.676	14.297	3.874	BARA BANKI	14.186	24.482	1.638	SAMBALPUR	9.124	9.860	-0.748
FEROZPUR	12.651	12.335	-3.004	ALIGARH	14.111	22.573	5.055	THANA	9.048	9.212	-0.643
SAHARANPUR	11.715	15.870	-9.832	MAYURBHANJ	13.592	11.343	11.319	AMRAWATI	8.749	5.819	2.741
THANA	11.612	10.645	-3.550	DHARWAR	13.435	4.533	17.419	BULDHANA	8.710	11.790	-2.814
COOCH BIHAR	11.316	13.323	0.000	AURANGABAD	12.996	11.341	6.365	CUTTACK	8.702	8.416	0.302
CANNANORE	11.156	3.995	2.632	KANPUR	12.737	7.903	14.822	BIJNOR	8.547	13.992	-5.299
CUTTACK	11.012	10.614	-3.560	BIJAPUR	12.696	8.758	10.330	BOLANGIR	8.369	8.065	-0.077
ERNAKULAM	10.508	11.294	-4.789	JALGAON	12.562	8.990	12.168	THAJAVUR	8.216	9.164	-0.601
JALPAIGURI	10.381	18.867	0.000	NADIA	12.441	3.029	0.000	SHAHJANPUR	8.194	9.933	-0.760
SAMBALPUR	9.926	10.693	-1.987	FATEHPUR	12.348	6.819	14.851	KALAHANDI	7.911	-2.515	2.812
OSMANABAD	9.662	9.982	-3.739	FEROZPUR	11.095	5.589	11.669	KANPUR	7.782	4.002	3.064
KALAHANDI	9.050	-5.809	-0.260	YEOTMAL	10.757	2.022	16.703	KORAPUT	7.687	7.202	0.095
KORAPUT	8.966	8.592	-4.038	KAMRUP	10.691	9.912	9.202	SRIKAKULAM	7.652	5.069	3.573
JALGAON	8.811	10.700	-5.233	BHANDARA	10.351	3.778	13.744	JHUNJHUN	7.599	14.634	-7.587
CHITRADURGA	8.612	7.577	-3.491	MALDA	9.792	9.309	0.000	PURNEA	7.467	5.422	1.591
BUNDI	8.276	6.106	-4.863	SAHABAD	9.189	2.897	16.627	FATEHPUR	7.399	4.019	3.102
PURNEA	8.026	6.873	-2.593	TRIVENDRUM	9.097	3.398	12.904	KAPURTHALA	7.250	9.682	0.000
DHENKANAL	7.917	8.549	-4.867	SIDHI	8.869	2.238	18.536	DHARWAR	7.224	8.209	-1.492
KUTCH	7.601	9.239	-4.539	DARANG	8.864	8.335	9.015	KAMRUP	6.769	5.014	1.827
JHALWAR	7.275	9.536	-3.010	SOUTH ARCOT	8.747	4.562	9.206	OSMANABAD	6.757	7.455	-1.582
SULTANPUR	7.177	12.421	-9.769	BANDA	8.700	17.991	18.714	GHAZIPUR	6.499	12.599	2.809
SIBSAGAR	7.153	5.871	-2.774	CHANDA	8.589	4.308	13.345	DHENKANAL	6.423	7.429	-0.941
BILASPUR	6.886	4.867	-2.544	HISAR	8.447	12.196	0.000	CHITRADURGA	6.247	4.640	0.449
AKOLA	6.876	7.118	-2.965	MUZZAFFARNAGAR	8.447	40.911	2.316	COOCH BIHAR	6.206	9.912	0.000
KOLABA	6.680	6.386	0.000	NALGONDA	8.447	2.997	9.362	MURSIDABAD	6.163	7.743	0.000
AHEMADNAGAR	6.629	9.367	-6.546	TIRUCHIRAPALLI	8.094	3.806	19.417	SULTANPUR	6.094	12.560	-6.341
DHULIA	6.505	6.255	-3.126	SURGUJA	8.064	4.498	13.634	YEOTMAL	5.762	2.798	2.860
JIND	6.488	7.177	0.000	CHINDWARA	7.885	-0.738	22.485	VIDISHA	5.666	3.249	0.825

AGARA	6.485	12.223	-11.082	HASSAN	7.725	2.936	16.690	ETWAH	5.495	2.096	2.873
SOUTH KANARA	5.989	5.149	-3.678	BANKURA	7.715	-2.893	0.000	MAHASU	5.124	12.628	0.000
SHOLAPUR	5.827	6.858	-3.857	WARANGAL	7.600	6.922	8.492	ALIGARH	4.969	10.750	-5.516
KEONJHAR	5.633	13.888	-11.980	SAMBALPUR	7.538	8.213	1.778	ALLAHABAD	4.777	1.738	3.088
LUDHIANA	5.576	5.450	-3.899	FARRUKHABAD	7.453	1.745	14.770	SIBSAGAR	4.713	3.848	0.843
NOWGONG	5.452	5.664	-4.161	RAIPUR	7.215	2.529	16.146	SITAPUR	4.583	11.447	-5.893
KANPUR	5.387	2.105	-2.326	PURI	7.138	6.943	7.793	BHIR	4.561	4.919	-0.418
FATEHPUR	5.007	2.647	-2.313	GWALIOR	7.100	5.922	-21.510	SAHARANPUR	4.534	9.859	-5.324
BHIR	4.936	5.739	-3.037	MANDYA	7.082	6.185	12.778	WARANGAL	4.456	7.978	-5.970
JAMNAGAR	4.877	2.958	0.000	ETAH	6.785	17.155	6.200	GANJAM	4.221	3.645	0.549
LAKHIMPUR	4.861	8.401	-8.011	RAJKOT	6.740	26.327	-15.349	RAJKOT	4.160	10.096	-8.093
KAMRUP	4.860	2.648	-1.671	RAIGARH	6.576	4.841	11.509	DATIA	4.124	-1.184	4.725
BHAGLPUR	4.805	2.688	-0.982	BETUL	6.576	3.466	10.631	WARDHA	4.104	4.788	-0.970
MUZAFFARPUR	4.437	1.920	-2.910	SUNDERGARH	6.398	4.871	9.800	NASIK	3.996	3.801	0.431
GANGANAGAR	4.302	-10.799	12.759	PURNEA	6.359	2.579	10.505	JIND	3.801	3.910	0.165
DHARWAR	4.247	10.096	-9.773	GULBARGA	6.255	6.224	9.364	MAYURBHANJ	3.780	4.300	-0.624
RANCHI	3.709	0.375	0.030	GANJAM	6.031	4.223	10.586	ERNAKULAM	3.730	5.830	-2.042
NASIK	3.422	4.975	-4.878	KURNOOL	5.922	4.364	23.465	SOUTH ARCOT	3.727	2.512	1.195
YEOTMAL	3.350	3.188	-3.433	SATNA	5.922	1.282	19.555	MAINPURI	3.681	10.653	-5.650
GANJAM	3.327	3.357	-4.122	BHILWARA	5.693	10.686	8.368	BALAGHAT	3.464	2.740	0.857
KARNAL	3.150	-3.423	0.000	KALAHANDI	5.668	4.422	9.243	BHARTPUR	3.281	4.717	-1.723
HYDERABAD	3.101	-1.035	1.293	PALAMAU	5.626	0.242	13.107	PURI	3.168	4.005	-0.777
MAINPURI	3.101	9.119	-11.052	NARSIMHPUR	5.534	-0.132	16.357	AGARA	3.124	8.572	-5.652
BULDHANA	3.017	12.069	-10.670	MORADABAD	5.470	13.944	4.277	BIJAPUR	3.113	0.452	2.341
RATNAGIRI	3.017	1.161	1.507	MANDALA	5.387	1.031	14.852	CANNANORE	2.937	0.819	1.825
BALAGHAT	2.919	3.544	-6.897	PRATPGARH	5.194	13.773	1.775	MATHURA	2.902	7.934	-5.661
RAISEN	2.919	3.398	-5.013	KORAPUT	5.174	4.475	8.904	AURANGABAD	2.839	1.791	1.368
AMBALA	2.919	-0.363	0.000	NASIK	5.155	1.493	11.955	RANCHI	2.807	-1.429	4.471
AMRAWATI	2.919	5.327	-5.549	BASTAR	5.155	-1.516	18.246	DHULIA	2.795	4.890	-2.090
WARANGAL	2.919	8.510	-12.462	MATHURA	5.059	10.130	6.226	MUZAFFARPUR	2.718	2.436	0.070
RAJKOT	2.894	2.780	-4.235	KHAMAM	5.025	2.639	6.303	RATNAGIRI	2.681	3.533	-0.818
GORAKHPUR	2.854	7.470	-9.629	PARBHANI	4.941	2.160	8.099	RAJGARH	2.640	4.220	-1.371
NANDED	2.843	0.373	0.204	MAINPURI	4.850	13.786	6.158	CHINDWARA	2.562	-0.125	2.442
BARODA	2.684	0.726	-3.563	BALAGHAT	4.564	1.150	18.356	KARNAL	2.529	-0.403	3.534
BULANDSAHAR	2.612	9.154	0.000	CHITTOR	4.564	-6.122	30.030	NARSIMHPUR	2.461	1.081	1.384
KRISHNA	2.545	-0.327	1.217	SHAJAPUR	4.564	4.396	8.029	LAKHIMPUR	2.376	5.262	-2.813
RAICHUR	2.478	4.720	-5.985	SINGHBHUM	4.393	-6.647	19.931	SURGUJA	2.268	0.967	1.306
DARBHANGA	2.460	2.432	-3.426	CUTTACK	4.224	4.151	8.497	KHERI	2.268	9.241	-6.188
HOSHANGABAD	2.413	2.382	-4.789	BILASPUR	4.095	1.285	11.075	NANDED	2.182	0.934	1.474
CHITOR	2.339	-0.719	-2.219	THANA	4.095	6.400	5.438	NAGPUR	2.173	1.383	0.768
AHMEDABAD	2.310	1.651	-3.671	SEHORE	4.013	-1.064	16.762	BARA BANKI	2.146	9.008	-6.125
PALGHAT	2.302	1.759	-3.374	SHADOL	3.993	-0.504	15.924	KOLAR	2.075	1.767	0.871
MYSORE	2.185	-0.374	-2.046	SULTANPUR	3.959	12.838	0.912	BELGAUM	2.022	3.101	-1.264
HOSHIARPUR	2.172	-2.270	-2.741	BHIR	3.815	3.297	5.035	NOWGONG	2.000	1.663	0.286
COIMBATORE	2.159	1.020	-2.253	PHULBANI	3.624	0.381	11.137	RAISEN	1.936	0.458	1.515
PURULIA	2.133	1.724	0.000	NELLORE	3.602	-10.589	26.371	KOTAH	1.765	1.770	0.485
RUPAR	2.130	4.718	0.000	DHENKANAL	3.496	5.224	7.403	MYSORE	1.695	0.078	1.266
BELLARY	2.052	-0.341	-2.864	BIDAR	3.417	0.134	17.684	HYDERABAD	1.690	-3.843	5.379
SIKAR	1.982	1.924	-3.341	NAGPUR	3.294	-0.156	11.504	PALAMAU	1.551	-2.521	4.450
KANGARA	1.973	-1.393	-0.868	MOHINDERGARH	3.131	3.131	0.000	GOALPARA	1.451	1.269	0.152
AMRITSAR	1.960	1.920	-3.353	BHIND	3.131	-2.328	13.631	JAMNAGAR	1.413	4.665	0.000
MATHURA	1.840	6.852	-11.096	RAI BARELI	3.131	12.159	1.532	CHICKMANGLUR	1.326	0.047	0.000
SIRMAUR	1.833	6.030	-5.028	BASTI	2.662	0.985	14.695	SEHORE	1.320	0.262	0.912
SALEM	1.827	2.717	-3.777	TIKAMGARH	2.535	0.437	13.546	AHEMADNAGAR	1.223	4.608	-2.775
CACHAR	1.780	1.446	-3.614	GURGAON	2.384	18.319	0.000	NELLORE	1.187	-5.113	0.000
GOALPARA	1.775	0.710	-2.748	GURDASPUR	2.352	-3.325	13.873	EAST NIMAR	1.139	0.124	1.107
JUNAGARH	1.721	0.130	-3.602	CHHATARPUR	2.292	-0.285	13.879	MALDA	1.126	4.580	0.000
CHICKMANGLUR	1.686	0.687	0.000	RAMNATHPURAM	2.263	7.571	4.842	ETAH	1.100	8.107	-5.635
NAGPUR	1.616	2.162	-4.205	DHARMPURI	2.148	-8.002	16.946	CACHAR	1.050	0.000	1.054
THAJAVUR	1.490	6.264	-9.195	SAGAR	2.130	2.301	11.682	HASSAN	1.038	1.160	0.482
SOUTH ARCOT	1.305	1.503	-2.587	ANANTPUR	2.130	-20.952	75.716	CHURU	0.962	-3.345	8.955
PURI	1.238	2.566	-4.802	RATNAGIRI	2.013	8.447	-5.309	GORAKHPUR	0.863	2.877	-2.267
NARSIMHPUR	0.958	1.694	-5.364	PANNA	1.808	0.694	12.468	HOSHANGABAD	0.846	-0.392	1.233
ALLEPPEY	0.898	3.537	-6.494	N.C. HILLS	1.808	1.776	8.472	RAIPUR	0.838	-0.554	1.437
S.PARGANA	0.746	1.652	-2.850	DEORIA	1.755	0.283	14.904	DARBHANGA	0.837	2.536	-1.988
JAUNPUR	0.744	8.673	-11.472	KOTTAYAM	1.727	17.151	-9.303	BUNDI	0.796	2.654	-2.819
VARANSI	0.735	7.024	-10.562	CHITRADURGA	1.671	-0.996	8.819	BHAGLPUR	0.631	-0.365	0.494
ALIGARH	0.677	5.273	-10.395	KARNAL	1.299	5.922	0.000	CHANDA	0.472	0.744	-0.174
BROACH	0.600	-0.657	-3.931	TIRUNELVELI	1.295	-4.422	14.276	GANGANAGAR	0.311	-6.570	8.265

SEHORE	0.000	0.931	-6.187	OSMANABAD	1.177	2.575	2.879	GURDASPUR	0.232	0.059	0.038
PATIALA	0.000	1.000	0.000	JABALPUR	1.087	0.341	12.452	BASTI	0.103	2.568	-2.241
KULU	0.000	12.935	0.000	CHINGELPUT	1.052	4.141	5.243	NILGIS	0.000	0.000	0.000
MOHINDERGARH	0.000	0.000	0.000	RANCHI	1.027	-4.941	13.951	BULANDSAHAR	0.000	6.319	-5.476
ROHTAK	0.000	0.000	0.000	NANDED	0.873	1.763	4.063	MOHINDERGARH	0.000	0.000	0.000
NELLORE	0.000	-2.251	-2.119	GOALPARA	0.805	2.395	6.215	FAIZABAD	0.000	0.000	0.000
CHINDWARA	0.000	0.184	-6.314	MYSORE	0.723	0.988	8.229	JHABUA	0.000	-12.864	0.000
MEERUT	0.000	6.054	0.000	CHICKMANGLUR	0.608	-1.220	9.602	RATLAM	0.000	-11.534	0.000
INDORE	0.000	0.000	0.000	UNNAO	0.326	7.854	1.380	KULU	0.000	10.547	0.000
VIDISHA	0.000	1.214	-6.543	DANGS	0.000	0.000	0.000	SATARA	0.000	-2.667	0.000
KAPURTHALA	0.000	7.177	0.000	WEST NIMAR	0.000	3.895	5.079	COORG	0.000	0.000	0.000
FAIZABAD	0.000	0.000	0.000	BULSAR	0.000	0.000	0.000	BHATINDA	0.000	0.000	0.000
BHATINDA	0.000	0.000	0.000	NILGIS	0.000	0.000	0.000	KOLABA	0.000	0.000	0.000
SANGRUR	0.000	0.000	0.000	BHATINDA	0.000	0.000	0.000	AMBALA	0.000	-3.662	-0.927
BALIA	0.000	46.648	0.000	INDORE	0.000	0.000	0.000	PATIALA	0.000	-5.492	0.000
ONGOLE	0.000	0.000	0.000	DHAR	0.000	0.000	-0.017	MEERUT	0.000	24.449	0.000
NILGIS	0.000	0.000	0.000	JULLULANDHAR	0.000	-12.945	14.812	BALIA	0.000	23.249	0.000
SATARA	0.000	7.177	0.000	ROHTAK	0.000	21.673	0.000	ROHTAK	0.000	6.757	0.000
MAHASU	0.000	0.000	0.000	SANGALI	0.000	0.000	0.000	DANGS	0.000	0.000	0.000
COORG	0.000	0.000	0.000	UJJAIN	0.000	0.000	0.000	SANGRUR	0.000	0.000	0.000
SHAHJANPUR	-0.074	4.228	-9.802	ONGOLE	0.000	0.000	0.000	BULSAR	0.000	0.000	0.000
GONDA	-0.180	4.082	-8.975	RAISEN	0.000	-5.173	15.947	ONGOLE	0.000	0.000	0.000
GANDHI NAGAR	-0.404	-0.391	-6.036	MEERUT	0.000	71.365	0.000	UJJAIN	0.000	-9.760	0.000
PALAMAU	-0.427	-3.874	0.374	MAHASU	0.000	0.000	0.000	SANGALI	0.000	0.000	0.000
SRIKAKULAM	-0.454	0.954	-5.544	SATARA	0.000	-19.726	0.000	INDORE	0.000	0.000	0.000
SURGUJA	-0.512	-0.753	-4.347	SIBSAGAR	0.000	-0.082	8.485	SIKAR	-0.081	7.757	-8.180
GUNTUR	-0.549	-4.277	-1.605	KAPURTHALA	0.000	14.870	0.000	DEORIA	-0.164	2.144	-2.235
DEWAS	-0.570	-0.746	-4.912	RATLAM	0.000	-4.902	0.000	BILASPUR	-0.367	1.679	-2.054
MAYURBHANJ	-0.803	0.948	-6.106	SANGRUR	0.000	0.000	0.000	S.PARGANA	-0.587	-1.790	1.864
GURDASPUR	-0.812	1.795	-6.235	KULU	0.000	5.922	0.000	HISAR	-0.700	-2.101	-3.399
DEHRADUN	-0.953	2.164	-9.159	PATIALA	0.000	-12.945	0.000	DARANG	-0.719	-1.975	1.270
DEORIA	-1.111	3.087	-9.821	JHABUA	0.000	-8.457	0.000	PALGHAT	-0.736	1.595	-2.261
MADURAI	-1.111	-0.434	-4.817	KARIMNAGAR	0.000	-9.408	21.732	DEWAS	-0.782	-1.034	0.115
UDAIPUR	-1.120	-2.303	-4.100	COORG	0.000	0.000	0.000	TIKAMGARH	-0.911	-1.366	0.559
BASTI	-1.152	3.368	-9.746	KOLABA	0.000	0.000	0.000	SHIMOGA	-1.011	-3.996	2.893
CUDDAPH	-1.219	2.733	-7.711	CACHAR	-0.395	-2.830	11.080	SIDHI	-1.166	-1.499	0.282
SAHASA	-1.288	-2.025	-2.227	MUZAFFARPUR	-0.637	3.476	6.306	SAHASA	-1.173	-2.757	2.051
NORTH ARCOT	-1.311	0.600	-6.830	DURG	-0.725	-2.949	11.796	KANGARA	-1.203	-1.203	0.102
BIJAPUR	-1.369	-3.460	-1.433	PILIBHIT	-0.768	-13.868	24.866	BELLARY	-1.220	-1.177	-0.914
ETAH	-1.628	3.848	-11.048	SEONI	-0.885	-1.205	11.034	RAMNATHPURAM	-1.280	1.783	-3.079
WEST GODAVARI	-1.664	-2.675	-3.256	SAHASA	-0.941	-4.204	11.175	BASTAR	-1.329	-3.348	1.999
HARDOI	-1.807	1.803	-7.711	HYDERABAD	-1.076	-9.223	14.052	ALLEPPEY	-1.350	0.907	-2.232
DATIA	-1.807	-2.661	-2.599	DEWAS	-1.205	-1.606	10.979	MANDALA	-1.375	-3.588	2.391
BANGLORE	-1.819	3.819	-8.288	VISAKHAPATNAM	-1.340	2.049	10.338	SALEM	-1.449	-1.036	-0.530
AURANGABAD	-1.892	-2.672	-1.042	JIND	-1.370	-2.328	0.000	DEHRADUN	-1.522	1.822	0.000
EAST GODAVARI	-1.945	-2.676	-3.591	GUNA	-1.588	-7.001	19.044	SEONI	-1.595	-1.881	0.343
SEONI	-1.948	-2.217	-4.610	HAZARIBAGH	-2.014	0.931	5.556	PRATPGARH	-1.613	4.671	-6.131
DUNGARPUR	-1.970	-2.792	-1.083	HOSHAMNGABAD	-2.217	-5.717	14.442	CHINGELPUT	-1.777	-1.460	-0.263
MEDAK	-2.055	-1.048	-2.870	DARBHANGA	-2.334	2.745	0.953	TIRUCHIRAPALLI	-1.870	-1.842	-0.274
HASSAN	-2.148	0.283	-6.758	LAKHIMPUR	-2.418	-0.746	8.480	SHADOL	-1.900	-3.058	1.262
BAHRAICH	-2.175	2.481	-9.860	DAMOH	-2.635	-3.967	13.670	DURG	-1.900	-2.256	0.320
RAIPUR	-2.207	-2.061	-5.204	DEHRADUN	-2.649	1.142	0.000	WEST NIMAR	-1.900	-1.533	-3.864
SITAPUR	-2.309	3.315	-9.363	GORAKHPUR	-3.006	-5.727	14.307	AMRITSAR	-2.044	-2.026	-0.055
AMRELI	-2.344	2.766	-5.551	MAHBUBNAGAR	-3.036	-1.121	5.983	BILASPUR	-2.046	-1.571	-0.696
DURG	-2.482	-1.907	-4.968	S.PARGANA	-3.202	-8.328	11.988	PANNA	-2.084	-2.343	-0.046
BHAVNAGAR	-2.541	1.466	-8.174	AGARA	-3.283	1.623	6.222	MIRZAPUR	-2.141	-1.977	-1.624
ETWAH	-2.590	-4.521	-2.012	TONK	-3.319	14.457	3.528	SHOLAPUR	-2.218	0.474	-1.879
TIKAMGARH	-2.590	-2.255	-5.367	COOCH BIHAR	-3.320	3.394	0.000	SAGAR	-2.218	-2.158	-0.128
GHAZIPUR	-2.683	8.255	-4.669	NIJAMABAD	-3.581	-9.146	15.927	JABALPUR	-2.315	-3.505	1.116
HAZARIBAGH	-2.730	-5.305	-0.456	HOOGHLY	-3.985	-12.965	0.000	GANDHI NAGAR	-2.356	-3.156	0.000
WEST NIMAR	-2.836	-4.140	-8.046	SIKAR	-4.082	20.443	-17.143	JULLULANDHAR	-2.447	-8.297	3.678
MALDA	-2.947	2.292	0.000	DHULIA	-4.241	2.211	0.016	BETUL	-2.467	-3.651	0.843
RAMNATHPURAM	-3.006	-0.994	-6.812	REWA	-4.365	-8.147	15.498	HAZARIBAGH	-2.492	-3.270	1.509
CHINGELPUT	-3.162	-4.146	-2.907	WEST GODAVARI	-4.411	-5.423	9.012	NORTH ARCOT	-2.534	-2.332	-0.310
CHANDA	-3.356	-0.991	-6.316	NOWGONG	-4.569	-5.890	9.810	WEST GODAVARI	-2.588	-3.600	0.672
BARA BANKI	-3.390	2.008	-9.782	NORTH KANARA	-4.618	6.413	3.579	BHILWARA	-2.648	-1.245	-1.841
SARAN	-3.393	-2.715	-5.002	ALWAR	-4.649	2.099	-9.800	KURNOOL	-2.667	-1.375	-0.392
DAMOH	-3.564	-5.555	-3.808	NORTH ARCOT	-4.936	-7.942	14.129	CHITTOR	-2.667	-5.817	4.496
TRICHUR	-3.588	3.000	-10.069	BULANDSAHAR	-5.026	0.867	3.868	HOSHIARPUR	-2.721	-2.921	0.217

JULLULANDHAR	-3.647	-5.881	-1.477	JAMNAGAR	-5.176	8.165	-17.152	JUNAGARH	-2.825	1.157	-3.698
PATNA	-3.739	-0.229	-6.933	POONA	-5.273	-0.738	2.765	GWALIOR	-2.873	-4.027	-1.826
ALLAHABAD	-3.918	-6.409	-2.321	BIRBHUM	-5.469	-15.703	0.000	LUDHIANA	-2.879	-7.713	0.000
PANNA	-3.974	-3.828	-5.771	JHUNJHUN	-5.591	15.439	-18.504	KUTCH	-2.945	4.426	-5.329
JABALPUR	-3.974	-5.373	-4.116	AMBALA	-5.591	-9.936	0.000	RAIGARH	-3.230	-2.644	-1.002
MONGHYR	-4.009	-5.581	-1.854	MANDSAUR	-5.591	-4.271	5.396	DAMOH	-3.255	-5.029	1.697
MORENA	-4.199	-1.504	-11.646	WEST DINAJPUR	-5.675	-5.969	0.000	GONDA	-3.272	2.826	-5.633
SAGAR	-4.322	-4.314	-5.555	ALLEPPEY	-5.698	-4.156	6.883	BANDA	-3.481	-2.808	0.186
WARDHA	-4.355	-3.842	7.968	TRICHUR	-5.742	-5.280	7.805	CUDDAPH	-3.601	0.824	-4.663
BASTAR	-4.419	-4.252	-5.268	GANDHI NAGAR	-6.148	-8.457	0.000	RUPAR	-3.609	-4.700	1.522
TUMKUR	-4.543	-7.172	-3.612	NAINITAL	-6.438	-0.038	6.478	VISAKHAPATNAM	-3.683	-1.084	-2.219
MANDALA	-4.591	-5.818	-3.323	QUILON	-6.474	-8.866	11.646	TIRUNELVELI	-3.688	-4.467	-0.735
SURAT	-4.647	-4.801	-4.518	PALGHAT	-6.545	1.269	0.004	MUZZAFFARNAGAR	-3.763	4.591	-8.944
SHADOL	-4.719	-4.310	-5.358	MANDI	-6.685	-9.456	0.389	MEDAK	-3.763	-4.445	1.565
QUILON	-4.744	-1.775	-6.917	MEDAK	-7.091	-10.894	11.049	COIMBATORE	-3.797	-3.958	1.621
NAGAUR	-4.784	-0.941	-9.094	GANGANAGAR	-7.220	2.499	-0.194	BANGLORE	-3.904	-2.973	-1.538
VISAKHAPATNAM	-4.834	-2.615	-7.951	BHAGLPUR	-7.226	-6.200	3.513	MADURAI	-4.055	-3.242	-0.721
PRATPGARH	-4.850	0.396	-9.850	KANGARA	-7.260	-0.822	2.069	KANYAKUMARI	-4.239	-3.946	-0.359
RATLAM	-4.980	-14.674	-0.194	BIJNOR	-7.391	-0.676	4.411	TRICHUR	-4.311	0.163	-4.467
HISAR	-4.980	-8.550	0.000	BELLARY	-7.453	-2.828	3.104	SINGHBHUM	-4.423	-7.699	3.911
BILASPUR	-4.980	-2.968	-6.105	SALEM	-7.689	-8.136	6.295	AMRELI	-4.443	2.775	-6.729
DARANG	-5.190	-6.756	-2.394	BOLANGIR	-7.762	10.991	-12.627	EAST GODAVARI	-4.565	-2.487	-2.184
PANCHMAHAL	-5.210	-6.822	-4.619	BANGLORE	-7.941	-15.253	13.491	KHAMAM	-4.653	-2.913	-1.528
MANDSAUR	-5.442	-4.160	-5.478	CUDDAPH	-8.194	-2.890	1.739	MANDYA	-4.768	-4.295	-0.745
RAJGARH	-5.546	-3.263	-7.025	TUMKUR	-8.312	-13.773	12.096	ADILABAD	-4.835	-3.095	-1.773
KAIRA	-5.623	-4.206	-4.957	SAHARANPUR	-8.471	-1.243	4.380	BHANDARA	-4.859	6.032	-10.284
LUCKNOW	-5.636	0.137	-9.826	AMRELI	-8.507	2.793	-9.042	CHHATARPUR	-4.919	-3.933	-1.058
CHAMPARAN	-5.638	-3.715	-4.647	ERNAKULAM	-8.605	-4.306	3.693	MAHBUBNAGAR	-5.024	-3.675	-0.869
KOLAR	-5.666	-5.489	-4.963	DHANBAD	-8.750	-5.412	6.747	SIRMAUR	-5.054	2.791	-7.606
SIDHI	-5.831	-3.315	-7.762	AHEMADNAGAR	-8.781	-4.297	5.230	DHARMPURI	-5.108	-3.767	-2.406
MAHBUBNAGAR	-6.003	-4.928	-4.127	GONDA	-9.171	0.360	0.780	UNNAO	-5.171	0.678	-6.238
TIRUNELVELI	-6.087	-4.489	-7.484	AMRITSAR	-9.587	-9.465	6.884	SATNA	-5.263	-4.785	-0.372
CHITTOR	-6.093	-5.665	-6.324	EAST GODAVARI	-9.599	-2.108	0.692	QUILON	-5.324	-4.198	-1.100
EAST NIMAR	-6.357	-6.129	-5.609	SURENDERNAGAR	-9.656	6.797	-5.735	JHALWAR	-5.354	-1.246	-5.160
TIRUCHIRAPALLI	-6.502	-4.549	-8.866	MADURAI	-9.683	-8.623	8.006	AHMEDABAD	-5.450	-0.358	-1.909
BHILWARA	-6.569	-6.719	-6.579	AZAMGARH	-9.712	-13.931	14.626	MANDSAUR	-5.492	-4.197	-1.984
KURNOOL	-6.697	-4.125	-10.532	MIDNAPORE	-9.739	1.952	0.000	DHAR	-5.492	-6.121	-2.168
REWA	-6.697	-6.141	-4.604	KOZHIKODE	-10.397	-12.669	11.260	KRISHNA	-5.492	-6.674	1.528
BETUL	-6.697	-7.024	-3.721	AJMER	-10.411	2.368	-5.354	BARODA	-5.590	-2.157	-3.191
BELGAUM	-6.754	-2.497	-7.693	CHAMPARAN	-10.441	-11.392	6.825	SHAJAPUR	-5.669	-4.618	-1.330
BANASKANTHA	-6.862	-4.489	-10.604	SHIVPURI	-10.971	-8.775	8.139	TUMKUR	-5.816	-9.427	1.363
KHERI	-6.899	-1.349	-9.921	JUNAGARH	-11.317	3.241	-3.888	REWA	-5.926	-6.814	1.674
SHIVPURI	-7.007	-6.646	-4.476	JAIPUR	-11.422	-5.776	5.765	RAI BARELI	-5.949	-0.016	-6.213
GAYA	-7.169	-2.140	-8.345	CANNANORE	-11.722	-5.246	0.229	SAHABAD	-6.117	-3.184	-2.670
NIJAMABAD	-7.441	-9.396	-2.722	HOSHIARPUR	-11.814	-4.211	6.407	NIJAMABAD	-6.171	-9.313	3.135
GWALIOR	-7.505	-8.645	9.796	MONGHYR	-11.998	8.867	-2.302	BIKANER	-6.226	4.103	-12.235
SURENDERNAGAR	-7.581	-2.800	-9.846	BUNDI	-12.649	-3.917	1.402	TRIVENDRUM	-6.421	-3.938	-2.595
RAIGARH	-7.789	-6.184	-6.721	BILASPUR	-13.430	-4.408	-1.065	NALGONDA	-6.522	-4.820	1.595
UNNAO	-7.806	-2.728	-9.829	JHANSI	-13.677	-6.258	7.034	JAISALMER	-6.707	0.632	-7.806
CHAMBA	-7.838	-6.379	-5.659	RUPAR	-14.138	-21.072	0.000	MONGHYR	-6.750	-0.991	-2.004
ALWAR	-7.963	-10.514	-3.884	MORENA	-14.226	-12.015	9.984	BHIND	-6.760	-6.798	-0.565
DHAR	-8.124	-9.039	-3.227	SABARKANTHA	-14.360	-1.894	-0.214	ALWAR	-6.871	-6.493	-5.898
SABARKANTHA	-8.222	-5.992	-8.733	COIMBATORE	-14.687	-13.191	9.834	TONK	-6.930	-4.398	-0.899
MEHASANA	-8.331	-8.166	-5.646	HAMIRPUR	-14.806	-17.136	34.330	CHHITOR	-6.964	-2.840	-4.120
CHHATARPUR	-8.331	-5.706	-7.774	MURSIDABAD	-15.550	-12.580	0.000	GUNA	-7.232	-6.696	0.651
DHARMPURI	-8.540	-1.576	-10.845	GAYA	-15.905	-8.244	-0.840	CHAMPARAN	-7.267	-6.345	-0.967
SINGHBHUM	-8.548	-8.221	-3.278	SARAN	-16.046	-15.373	7.787	GUNTUR	-7.461	-9.602	1.091
TONK	-8.685	-12.626	-3.040	SHOLAPUR	-16.521	-11.172	2.198	MORENA	-7.665	-5.140	-4.956
KOZHIKODE	-8.850	-9.786	-3.192	BALIA	-16.745	-12.945	0.000	SARAN	-7.810	-7.132	-0.917
BANDA	-9.050	-11.790	-7.963	BANASKANTHA	-17.080	-5.095	-11.693	N.C. HILLS	-7.838	-6.830	-1.082
JHANSI	-9.122	-4.972	-10.073	SAWAI MADHOPUR	-17.235	-11.497	-2.676	BROACH	-8.084	-3.030	-4.954
KHAMAM	-9.152	-5.576	-5.225	SIRMAUR	-17.463	-3.394	-12.553	SURENDERNAGAR	-8.278	0.299	-8.496
MUZZAFFARNAGAR	-9.343	-9.891	-14.100	CHAMBA	-17.553	-1.852	-8.873	SHIVPURI	-8.348	-7.361	-0.444
MIRZAPUR	-9.460	-3.465	-10.604	SURAT	-17.730	-16.597	0.929	ANANTPUR	-8.828	-13.549	5.606
JAIPUR	-9.461	-6.724	-8.349	LUDHIANA	-17.812	-29.314	0.000	SURAT	-9.224	-8.908	-2.736
GUNA	-9.931	-6.543	-7.451	AHMEDABAD	-19.248	-4.258	1.712	KOZHIKODE	-9.368	-10.757	1.404
SAWAI MADHOPUR	-9.939	-2.991	-9.546	KRISHNA	-19.726	-18.181	2.151	JAIPUR	-10.119	-6.409	-3.367
BANSWARA	-9.940	-9.959	0.272	RAMPUR	-19.726	-12.451	3.115	GAYA	-10.178	-4.218	-5.909
RAI BARELI	-10.185	-5.599	-9.861	BURDWAN	-19.761	-19.435	0.000	UDAIPUR	-10.178	-4.366	-6.192

MANDYA	-10.191	-9.141	-6.886	GUNTUR	-19.878	-19.380	6.707	SABARKANTHA	-10.315	-4.646	-5.977
SIROHI	-10.377	-4.146	-14.241	BARODA	-20.193	-7.677	-2.444	BANASKANTHA	-10.401	-4.691	-10.968
SHIMOGA	-10.386	-8.743	-5.669	SIROHI	-20.898	-5.092	-0.736	AZAMGARH	-10.409	-2.930	0.000
SHAJAPUR	-10.404	-8.828	-5.701	KUTCH	-21.036	-4.574	-6.889	JHANSI	-10.666	-5.403	-4.698
SATNA	-10.404	-7.681	-9.054	KAIRA	-21.606	-9.446	-7.469	BHAVNAGAR	-11.157	2.095	-13.162
AZAMGARH	-10.755	3.088	0.000	PANCHMAHAL	-22.283	-7.660	-4.135	CHAMBA	-11.197	-4.893	-6.743
BHIND	-11.343	-8.956	-7.404	CHURU	-22.982	-9.932	0.513	PANCHMAHAL	-11.282	-7.103	-4.458
BARMER	-11.419	-3.246	-10.789	CHHITOR	-23.111	-6.947	-7.813	KAIRA	-11.284	-5.986	-5.802
BHANDARA	-11.659	7.177	-20.322	BROACH	-23.267	-7.607	-6.968	BAHRAICH	-11.444	-5.689	-6.173
SANGALI	-11.775	-7.582	0.000	KOTAH	-23.376	-20.370	4.085	SAWAI MADHOPUR	-12.440	-5.913	-7.312
PAL	-12.054	-3.671	-11.795	BHARTPUR	-23.412	-1.567	-20.582	DHANBAD	-12.827	-9.990	-2.318
N.C. HILLS	-12.312	-10.856	-5.538	LUCKNOW	-25.625	-20.237	2.552	LUCKNOW	-12.834	-7.175	-5.876
SAHABAD	-12.945	-6.089	-11.086	UDAIPUR	-25.879	-8.364	-10.239	MANDI	-12.945	-3.041	-12.511
JHABUA	-12.945	-14.987	-0.961	BHAVNAGAR	-26.172	3.364	-22.341	NAGAUR	-13.204	-0.560	-14.443
KANYAKUMARI	-12.945	-12.945	0.000	JHALWAR	-26.326	-19.732	-9.318	KARIMNAGAR	-13.518	-14.257	0.809
NALGONDA	-13.212	-8.503	-2.079	BAHRAICH	-27.430	-20.127	1.661	SIROHI	-14.031	-4.463	-9.957
TRIVENDRUM	-13.331	-7.408	-9.528	NAGAUR	-27.877	0.206	-24.216	DUNGARPUR	-14.357	-7.451	-7.583
ADILABAD	-13.381	-3.153	-14.211	MEHASANA	-29.801	-15.702	-4.142	SIMALA	-15.172	-4.887	-10.669
DANGS	-13.639	-9.996	0.000	PAL	-29.964	-1.199	-28.805	HAMIRPUR	-15.811	-11.809	-4.126
ANANTPUR	-13.857	-9.591	-18.130	DUNGARPUR	-34.632	-16.111	-19.329	PATNA	-15.816	-11.282	-3.201
DHANBAD	-14.796	-12.196	-6.557	PATNA	-35.616	-29.850	4.719	MEHASANA	-16.133	-10.750	-5.147
MANDI	-15.916	0.335	-18.325	BANSWARA	-36.732	-19.856	-19.504	AJMER	-17.905	-8.450	-9.710
HAMIRPUR	-16.309	-9.019	-19.004	BIKANER	-37.294	-13.639	-37.345	PAL	-18.483	-2.854	-17.875
JODHPUR	-18.204	-1.582	-17.800	BARMER	-37.551	-14.219	-24.899	BANSWARA	-19.940	-13.387	-6.808
LALORE	-18.431	-3.421	-20.192	LALORE	-38.614	-6.279	-29.341	BARMER	-21.162	-7.051	-15.765
KARIMNAGAR	-19.576	-16.583	-8.263	JODHPUR	-41.725	-5.549	-38.576	LALORE	-25.806	-4.383	-23.366
AJMER	-21.413	-13.423	-11.812	JAISALMER	-49.573	-43.292	-2.613	JODHPUR	-26.946	-2.922	-25.407
NORTH KANARA	-39.596	-37.527	0.000	SIMALA	-58.537	-28.287	-59.086	NORTH KANARA	-29.661	-25.391	0.000

APPENDIX - III

CODE	DISTT NAME	CODE	DISTT NAME	CODE	DISTT NAME	CODE	DISTT NAME
101	SRIKAKUAM	403	VADODARA	718	TUMKUR	937	SHADOL
102	VISAKHAPATNAM	404	BRDACH	719	NORTH KANARA	938	DATIA
103	EAST GODAVARI	405	VALSAD	801	TRIVENDRUM	939	TIKAMGARH
104	WEST GODAVARI	406	DANGS	802	QUILON	940	CHHATARPUR
105	KRISHNA	407	GANDHI NAGAR	803	ALLEPPEY	941	PANNA
106	GUNTUR	408	KAIRA	804	KOTTAYAM	942	SEHORE
107	ONGOLE	409	MEHASANA	805	ERNAKULAM	943	RAISEN
108	NELLORE	410	PANCHMAHAL	806	TRICHUR	1001	THANA
109	KURNOOL	411	SABARKANTHA	807	PALGHAT	1002	RATNAGIRI
110	ANANTPUR	412	SURAT	808	MALAPURAM	1003	NASIK
111	CUDDAPH	413	AMRELI	809	KOZHIKODE	1004	DHULIA
112	CHITTOR	414	BHAVNAGAR	810	CANNANORE	1005	JALGAON
113	HYDERABAD	415	JAMNAGAR	901	SAGAR	1006	AHEMADNAGAR
114	NIJAMABAD	416	JUNAGARH	902	DAMOH	1007	POONA
115	MEDAK	417	KUTCH	903	JABALPUR	1008	SATARA
116	MAHBUBNAGAR	418	RAJKOT	904	MANDALA	1009	SANGALI
117	NALGONDA	419	SURENDERNAGAR	905	HOSHAMNGABAD	1010	SHOLAPUR
118	WARANGAL	501	HISAR	906	NARSIMHPUR	1011	KOLHAPUR
119	KHAMAM	502	ROHTAK	907	EAST NIMAR	1012	AURANGABAD
120	KARIMNAGAR	503	GURGAON	908	BALAGHAT	1013	PARBHANI
121	ADILABAD	504	KARNAL	909	BETUL	1014	BHIR
201	CACHAR	505	AMBALA	910	CHINDWARA	1015	NANDED
202	GOALPARA	506	JIND	911	SEONI	1016	OSMANABAD
203	KAMRUP	507	MOHINDERGARH	912	DURG	1017	BULDHANA
204	DARANG	601	BILASPUR	913	RAIPUR	1018	AKOLA
205	NOWGONG	602	CHAMBA	914	BILASPUR	1019	AMRAWATI
206	SIBSAGAR	603	KANGARA	915	SURGUJA	1020	YEOTMAL
207	LAKHIMPUR	604	KINNAUR	916	RAIGARH	1021	WARDHA
208	N.C. HILLS	605	KULU	917	BASTAR	1022	NAGPUR
209	MIKIR HILLS	606	MANDI	918	BHIND	1023	BHANDARA
301	PATNA	607	SHIMLA	919	GWALIOR	1024	CHANDA
302	SAHABAD	608	LAHAUL & SPITI	920	SHIVPURI	1025	KOLABA
303	GAYA	701	BANGLORE	921	GUNA	1101	BALASORE
304	SARAN	702	BELGAUM	922	VIDISHA	1102	BOLANGIR
305	CHAMPARAN	703	BELLARY	923	RAJGARH	1103	CUTTACK
306	MUZAFFARPUR	704	BIDAR	924	MORENA	1104	DHENKANAL
307	DARBHANGA	705	BIJAPUR	925	SHAJAPUR	1105	GANJAM
308	MONGHYR	706	CHICKMANGLUR	926	UJJAIN	1106	KALAHANDI
309	BHAGLPUR	707	CHITRADURGA	927	RATLAM	1107	KEONJHAR
310	S.PARGANA	708	SOUTH KANARA	928	MANDSAUR	1108	KORAPUT
311	SAHARSA	709	DHARWAR	929	DEWAS	1109	MAYURBHANJ
312	PURNEA	710	GULBARGA	930	INDORE	1110	PHULBANI
313	HAZARIBAGH	711	HASSAN	931	WEST NIMAR	1111	PURI
314	DHANBAD	712	COORG	932	DHAR	1112	SAMBALPUR
315	RANCHI	713	KOLAR	933	JHABUA	1113	SUNDERGARH
316	PALAMAU	714	MANDYA	934	REWA	1201	HOSHIARPUR
317	SINGHBHUM	715	MYSORE	935	SATNA	1202	JULLULANDHAR
401	AHMEDABAD	716	RAICHUR	936	SIDHI	1203	LUDHIANA
402	BANASKANTHA	717	SHIMOGA			1204	FEROZPUR

CODE	DISTT NAME	CODE	DISTT NAME	CODE	DISTT NAME
1205	AMRITSAR	1506	MATHURA	1603	COOCH BIHAR
1206	GURDASPUR	1507	AGARA	1604	WEST DINAJPUR
1207	KAPURTHALA	1508	MAINPURI	1605	MALDA
1208	BHATINDA	1509	ETAH	1606	MURSIDABAD
1209	PATIALA	1510	BAREILLY	1607	NADIA
1210	SANGRUR	1511	BADNAUN	1608	24-PARGANA
1211	RUPAR	1512	SHAHJANPUR	1609	HOWRAH
1301	AJMER	1513	PILIBHIT	1610	HOOGHLY
1302	ALWAR	1514	BIJNOR	1611	BURDWAN
1303	BANSWARA	1515	MORADABAD	1612	BIRBHUM
1304	BARMER	1516	RAMPUR	1613	BANKURA
1305	BHARTPUR	1517	FARRUKHABAD	1614	PURULIA
1306	BHILWARA	1518	ETWAH	1615	MIDNAPORE
1307	BIKANER	1519	KANPUR		
1308	BUNDI	1520	FATEHPUR		
1309	CHHITOR	1521	ALLAHABAD		
1310	DUNGARPUR	1522	JHANSI		
1311	GANGANAGAR	1523	JALAUN		
1312	JAIPUR	1524	HAMIRPUR		
1313	JAISALMER	1525	BANDA		
1314	JALORE	1526	VARANSI		
1315	JHALWAR	1527	MIRZAPUR		
1316	JHUNJHUN	1528	JAUNPUR		
1317	JODHPUR	1529	GHAZIPUR		
1318	KOTAH	1530	BALIA		
1319	NAGAUR	1531	GORAKHPUR		
1320	PALI	1532	DEORIA		
1321	SAWAI MADHOPUR	1533	BASTI		
1322	SIKAR	1534	AZAMGARH		
1323	SIROHI	1535	LUCKNOW		
1324	TONK	1536	UNNAO		
1325	UDAIPUR	1537	RAI BARELI		
1326	CHURU	1538	SITAPUR		
1401	CHINGELPUT	1539	HARDOI		
1402	NORTH ARCOT	1540	KHERI		
1403	SOUTH ARCOT	1541	FAIZABAD		
1404	SALEM	1542	GONDA		
1405	DHARMPURI	1543	BAHRAICH		
1406	COIMBATORE	1544	SULTANPUR		
1407	TIRUCHIRAPALLI	1545	PRATPGARH		
1408	THAJAVUR	1546	BARA BANKI		
1409	MADURAI	1547	NAINITAL		
1410	RAMNATHPURAM	1548	ALMORAH		
1411	TIRUNELVELI	1549	PITHORAGARH		
1412	NILGIRIS	1550	DEHRADUN		
1413	KANYAKUMARI	1551	TEHRIGARHWAL		
1501	SAHARANPUR	1552	UTTARKASHI		
1502	MUZZAFFARNAGAR	1553	GARHWAL		
1503	MEERUT	1554	CHAMOLI		
1504	BULANDSAHAR	1601	DARJEELING		
1505	ALIGARH	1602	JALPAIGURI		

BIBLIOGRAPHY

1. Acharya S.S., "Oilseeds and pulses - price policy and production Performance," Indian Journal of Agricultural Economics, vol. 48, No. 3, July - September 1973.

2. Alagh, Y.K., "Regional Disparities in Rates of Growth and Productivity in Indian Agriculture : Causes and Remedies," Anvesak, vol. 10 (1).

3. Bhalla G.S. and Alagh, Y.K., "Performance of Indian Agriculture : A District wise study," Planning commision, Govt. of India, Sterling Publishers Pvt. Ltd., New Delhi 1979.

4. Bhatnagar O.P., Sen D., Das P.K., "Increasing oilseed production through Rural Development Programmes - A case study for Extension and Transfer of Technology," Oilseed Production : Constraints and Opportunities, Oxford and IBH Publishing Co. New Delhi 1985.

5. Chamola S.D. and Hasija R.C., "Oilseeds Production", Yojana 1- 15 April,1981.

6. Chhatrapati A.C., "Trends in oilseeds Production," Research and Development Strategies for oilseed Production in India, Publication and Information Divison ICAR, New Delhi 1979.

7. Chauhan S.S., "Constraints and opportunities of oilseed production in India - An overview", Oilseed production: constraints and opportunities, Oxford and IBH Publishing Co., New Delhi 1985.

8. Das Prafulla K., "The Trends in oilseeds Production and Utilization in India", Oilseed Production : Constraints and Opportunities, Oxford and IBH Publishing Co., New Delhi 1985.

9. Dharam Narain, "Growth of Productivity in Indian Agriculture", IJAE, XXXII, No.I, January-March 1977.

10. Gandhi N.K., "A Strategy for Oilseeds Production," Yojana, June 1-15, 1984.

11. Gangwar A.C. and Rai K.N., "Retrospect and Prospect of Edible Oilseeds in India", National Seminar on Strategies for making India self - reliant in Vegetable oils, Indian Society of Oilseed Research ICAR, hyderabad 1991.

12. George P.S., Srivastva Uma, Desai B.M., "The Oilseeds Economy of India: An Analysis of Part Supply and Projections for 1985", The Macmillan Co. of India Ltd, Bombay 1978.

13. Ghosh D.C., "Increase of Oilseed Production Through Weed Control", Farmer and Parliament, March 1982.

14. Hazell, Peter B.R., "Instability in Indian Agriculture Foodgrain Production," Research Report 30, International Food Policy Research Institute, May 1982.

15. Jayaswal Himanshu, "Achieving Higher Oilseeds and Pulses Production", Yojana 1-15, 1988.

16. Kapila Uma, "Oilseeds Economy of India : A case study of Groundnut", Agricole Publishing Academy, New Delhi, 1982.

17. Kaushik Krishan Kant, "Growth and Instability of Oilseeds Production," Indian Journal of Agricultural Economics, vol. 48, No. 3, July -Sept., 1993.

18. Malik R.P., "Boosting Oilseeds Production", Haryana Review (12) - 21 (1) December 86 - January 1987.

19. Mariwala H.V., "Role of Public, Private and Co-operative sector in oilseeds production", National Seminar on Strategies for making India self reliant in vegatable oils, Indian Society of Oilseed Research, Directorate of Oilseeds Research ICAR, Hyderabad, 1991.

20. Mehra, Sakuntala, "Instability in Indian Agriculture in the Context of the New Technology", Research Report 25, International Food Policy Research Institute, July 1981.

21. Mondal N.N., "Recent advances in production of oilseeds", Farmer and parliament, January 1989.

22. Ninan, K.N., "Edible oilseeds : Growth and Area Responses", EPW, September 26, 1987.

23. Ninan, K.N., "Edible oilseeds : Growth, area responses and prospectus in India", IBH, oxford Publishing Co., New Delhi 1989.

24. Rai B., "Challenges in oilseeds production", Farmer and Parliament, December 1985.

25. Rai B., "New Perspectives in Increasing Oilseeds Production", Farmer and Parliament, March 1989.

26. Ramanamurthy G.V., "Oilseeds Production : Perspective and Policies," National Seminar on Strategies for making India self-reliant in vegetable oils, Indian Society of oilseed Research. Directorate of Oilseed Research ICAR, Hyderabad, 1991.

27. Rao C. Mohana et.al, "Bees can boost Oilseeds Production", Indian Fmg. 29 (11) February 1980.

28. Rao J.V. et.al, "Boost up Edible Oilseeds Production through better Management", Indian Fmg. 35 (5), August 1985.

29. Sen D. and Das P.K., "Factors Influencing Improvement in Oilseeds Production by Small landholders", Rural Development 5 (1), January 1986.

30. Shanti Sarup and Pandey R.K., "Productivity Trends of Major Oilseeds", Yojana 16-31, December 1983.

31. Shetty S. Vasudeva and Rao V.L. Narshima, "Role of Public, Private and Co-operative sectors in Oilseeds Production", National Seminar on Strategies for making India self-reliant in vegetable oils, Indian Society of Oilseed Research, Directorate of Oilseeds Research, ICAR, Hyderabad, 1991.

32. Singh A.J. And Dhaliwal Sarbjit, "Production performance, Potentials and Prospectus for Oilseeds in India", Indian Journal of Agricultural Economics, vol. 48, No. 3, July-September 1993.

33. Singh R.P. and Das P.K., "Constranints and Opportunities of Oilseeds Production in India with Particular reference to Dryland situation," oilseed production : constraints and opportunities, Oxford and IBH Publishing Co. New Delhi 1985.

34. Singh R.P. and Satapathy C., "Maximising oilseed Production - A strong case," Farmer and Parliament, June 1981.

35. Singh S.P., "Ways to Increase Oilseeds Production from Drylands", National Seminar on Strategies for making India self-reliant in vegetable oils, Indian Society of oilseed Research, Derectorate of Oilseeds Research ICAR, Hyderabad, 1991.

36. Srivastava H.C.et al, "Oilseed Production : Constraints and Opportunities", Oxford and IBH Publishing Co. 1985.