GROWTH & INCOME INEQUALITIES IN INDIAN AGRICULTURE: AN INTER-STATE ANALYSIS FOR THE PERIOD 1975-76 TO 1989-90

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DECLARATION

I HEREBY CERTIFY THAT THE DISSERTATION ENTITLED " GROWTH & INCOME INEQUALITIES IN INDIAN AGRICULTURE : AN INTER-STATE ANALYSIS FOR THE PERIOD 1975-76 TO 1989-90 ", SUBMITTED BY ROHIT PARSHOTAM DAS IN FULFILLMENT 0F 9 CREDITS OUT OF TOTAL REQUIREMENTS OF 24 CREDITS FOR THE DEGREE OF MASTER OF PHILOPHOSHY (M. Phil) OF THIS UNIVERSITY IS HIS ORIGINAL WORK TO THE BEST OF MY KNOWLEDGE AND HAS NOT BEEN PEVIOUSLY SUBMITTED FOR ANY DEGREE OF THIS OR ANY OTHER UNIVERSITY AND THEREFORE BE PLACED BEFORE THE EXAMINERS FOR EVALUATION .

Prof. S . K. DAS

CHAIRPERSON & SUPERVISOR

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CONTENTS

TABLES

CHARTS

CHAPTER 1

AN INTRODUCTION

India is a country marked by widespread poverty, where inadequate and unstable agricultural production levels can have a devastating effect on a major segment of the population. Consequently, in the post-Independence era, high priority has been accorded to increasing agricultural production, with the aim of achieving food security.

In the first decade and a half of planning, this was achieved by increasing the area under cultivation. However, by the mid 60's, faced with the limited scope for expansion of agricultural lands, the government was left with no option but to introduce improved technology with the aim of sustaining agricultural growth through increases in productivity. This technological transformation of the agricultural sector is popularly known as the "Green Revolution".

The new technology which was based on the

increased use of new inputs, such as "High Yielding Variety" of seeds, as well as the increased use of traditional inputs such as fertilizers and pesticides, was critically dependent on the regular & adequate supply of water.

In the initial years of the "Green Revolution" due to the scarcity of resources, as well as the very nature of the technclogy involved, the "High Yielding Variety Programme" (H.Y.V.P.) was concentrated in a few agro-climatically favourable regions of the country which had well developed irrigation systems. This basically meant that the H.Y.V.P. was initially limited to the North-Western regions of the country and to a few regions in Southern India. This strategy of limited extension of the H.Y.V.P. was adopted despite the obvious adverse impact it would have on inter-regional inequalities, as over-riding priority was given to the objective of achieving 'self-sufficiency' in foodgrain production.

The growing inequalities in the initial phase of the "Green Revolution", consequent of following such a strategy has been clearly established by several researchers, of whom Prof. C.H. Hanumantha Rao is one of the most prominent. Prof. Rao showed that the

concentration of critical inputs in certain areas during the 60's resulted in growing regional inequalities in agricultural performance[1]. He says that given the prevailing regional differences in factor endowments, in physical and institutional infrastructure and in the quality of entrepreneurship, widening disparities in the initial phases of modernisation was to a certain extent inevitable, though he also states that there was considerable scope for reducing these disparities in the course of time through public policy. In fact, in his later works[2], Prof. Rao does claim that a decline in regional imbalances has actually taken place since the late 70's and early 80's. He says that this has happened because the new technology has spread to regions & crops, earlier ignored by the "Green Revolution". According to him, special development programmes for the backward regions (particularly in the East & in the dryland areas) as well as programmes for promoting rice and oilseed production has resulted in more broad-based as well as widespread growth with the East, particularly West Bengal performing well.

There is however very little unamity among scholars with regards to the pattern of inter-state

inequalities in the later phase of the "Green Revolution". Savant & Achuthan's paper[3] confirms that most of the Eastern States have performed considerably better since the early 80's. On the other hand[4], economists such as Pf. Das & Pf. Barua argue that the inter-state inequalities have not decreased and have actually increased. This, they say is mainly because the new technology has not spread adequately to all the different regions of the country. Misra & Puri[5] similarly show that while the Northern & Western States have increased their percentage share in the country's foodgrain production between 1970 and 1991, the Eastern & Southern States have witnessed a decline in their share, which indicates a rising trend in regional inequalities.

Given the widely conflicting views held by such prominent economists, it shall be the endeavour of this study to throw a little bit more light on this contentious issue. The basic approach of this study is similar to the method adopted by Prof. Rao in his above mentioned book. This has been done to enable one to obtain a long term perspective of the effect that the "New Agricultural Strategy" has had on inter-state inequalities in agricultural performance.

While Prof. Rao's work covers the 60's, this paper covers the period extending from the mid 70's to the end of the 80's. This paper will make a detailed analysis of inequalities (as measured by the Co-efficient of Variation) in two discrete time periods, 1975-77(T_1) and 1988-90 (T_2). The general trend in inequalities between these two time periods will also be analysed. For the discrete time period study, two year averages (1975-76/1976-77 and 1988-89/1989-90) are used, which is against the general practice of using triennum averages. This approach of using 2 year approaches has been adopted because the above mentioned sets of years have roughly similar rainfall patterns[6] (Chart 1.1), which will facilitate a more meaningful analysis of agricultural productivity changes.

The structure of this study is as follows:-

In Chapter 2, the spatial use of critical inputs will be examined to determine the spread of the H.Y.V.P. to the different parts of the country. In Chapter 3, inequalities in productivity, area cultivated & total output will be examined and links between these inequalities and the inequalities in H.Y.V.P. coverage will be analysed. In Chapter 4,

the pattern of inter-state inequalities for the agricultural sector as a whole will be analyzed. In the concluding chapter, the findings of this study will be summarised.

This study covers 20 States[7].

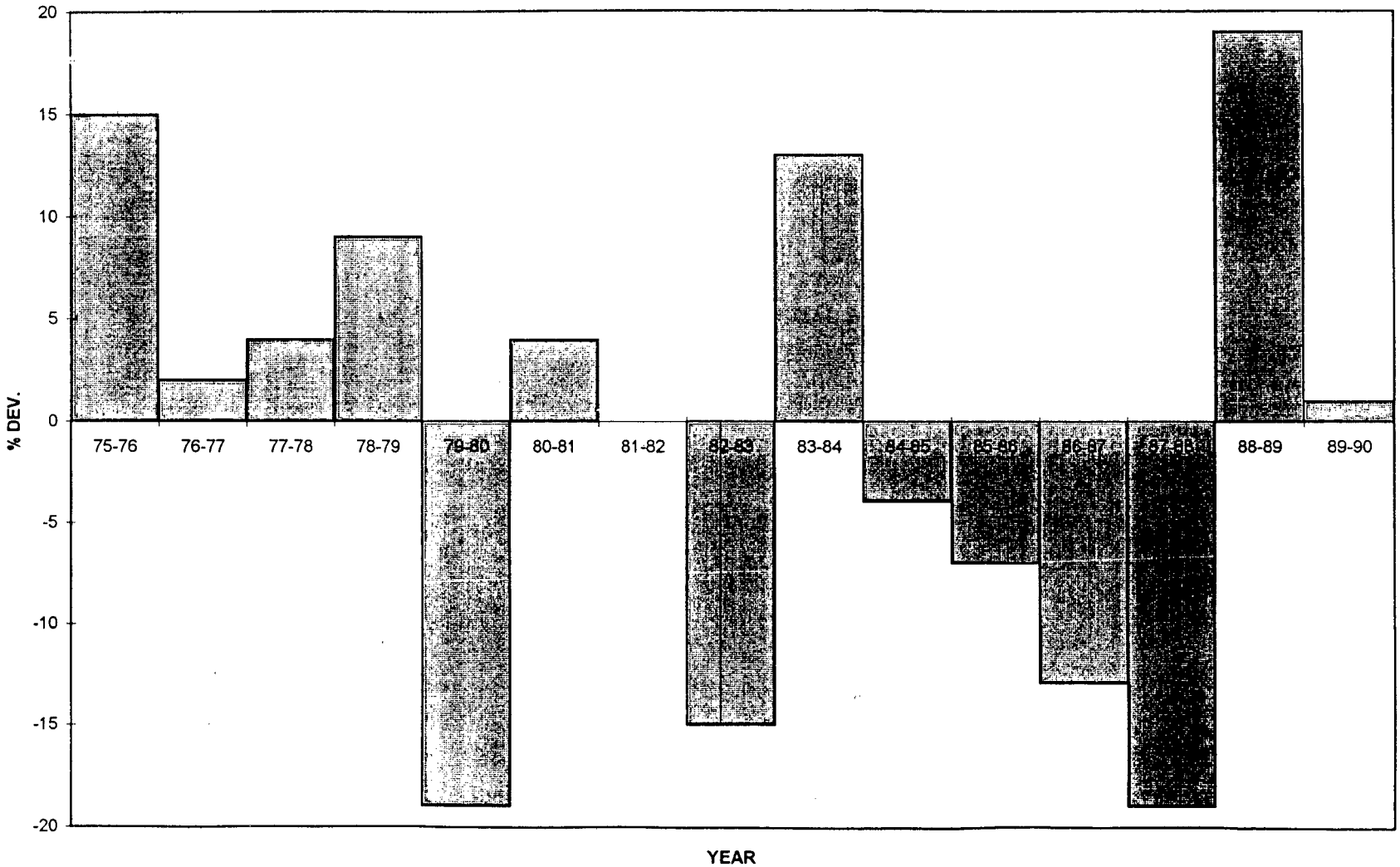
NOTES :

1. Hanumantha Rao (1975)
2. Hanumantha Rao (1989)
3. Sawant & Achuthan (1995)
4. Das & Barua (1996)
5. Misra & Puri (1983)
6. While 1975-76 & 1988-89 were years of excellent rainfall (more than 110% of normal annual rainfall), 1976-77 & 1989-90 were years of almost normal rainfall (101-102% of normal annual rainfall). The importance of choosing years with similar rainfall patterns will be highlighted within this paper, when one sees the extent to which inequalities in agriculture get affected by rainfall in a particular year.

7. The 20 States included are Andhra Pradesh,

Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Nagaland, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh & West Bengal. The other States have been excluded as important data for these States were unavailable. For example, while agricultural data for Sikkim become available only from the 80's, S.D.P. data for Meghalaya was not available for the latter part of the 70's.

Chart 1.1 % DEVIATION FROM NORMAL ANNUAL RAINFALL



CHAPTER 2

SPATIAL DIMENSIONS OF THE GREEN REVOLUTION : INTER-STATE INEQUALITIES IN THE USE OF CRITICAL INPUTS

In this Chapter, the extent to which the 'New Technology' has spread, will be examined, in order to check Prof. Rao's contention, that the H.Y.V.P. has over time, spread to the different regions of the country left out of its purview in the initial stages.

This study will examine inter-state inequalities in the use of the 3 'direct' inputs - H.Y.V. seeds, fertilizers & irrigation facilities [1].

HIGH YIELDING VARIETY SEEDS

The cornerstone of the 'New Agricultural Strategy' is the development and widespread use of H.Y.V.P. seeds. These seeds have yields which exceed yields of traditional seeds by as much as 25% to 100% [2]. First developed in Mexico, new hybrid varieties suitable for Indian conditions have been developed by the country's agricultural research network which comprises of the I.C.A.R., the

Agricultural Universities and various other research institutes. In 1975-77, an average of 35 million hectares (h.a.) was covered by the H.Y.V.P., which represented 21% of the country's Gross Cropped Area (G.C.A.). By 1988-90, the new technology had spread to 59 million h.a. which comprised 33% of the country's G.C.A.

The H.Y.V.P. is limited to the foodgrain sector only, with commercial crops being completely left out of its purview. Within the foodgrain segment itself, only 5 Crops - Wheat, Rice, Maize, Bajra & Jowar have been targetted[3], with pulses, other cereals & millets being left out of the programme. Even among these 5, outstanding success has been achieved only in the case of wheat, with much more moderate success being achieved in the case of rice (though its performance has been impressive since the 80's), while in the case of Bajra, Jowar & Maize, their performance has been disappointing.

The spread of the 'New Technology' to the different regions growing these 5 crops is studied below.

The Wheat Crop

This is the second most important crop after Rice, though with the introduction of the H.Y.V.P., it has become the basic plank of agricultural growth in the country. In fact, it would not be wrong to describe the 'Green Revolution' simply as a 'Wheat Revolution'. During the period of study while total foodgrain output grew at a rate of 2.8% p.a., Wheat production grew at a rate of 4.3% p.a. and this helped to increase its share in total foodgrain output from 25% to 31% between 1975-77 and 1988-90.

As can be seen from table 2.1, the H.Y.V.P. has covered a large portion of the country's Wheat crop. (In 1988-90, 85% of the Wheat growing area was using the H.Y.V.P. technology) The 3 most important Wheat producing States of Punjab, Haryana and U.P. had achieved 95% coverage. These 3 States alone accounted for 58% of the country's Wheat growing area and for 70% of the country's Wheat production in 1988-90. In fact, the sustained high growth of wheat production in these 3 States was the main source of agricultural growth in the "Post Green Revolution" period.

Most of the other States included in this study[4] also have a large portion of their Wheat crop under the H.Y.V.P. The main exceptions to this are Madhya Pradesh, Karnataka and to a lesser extent Rajasthan. Out of these, the most serious point of concern is Madhya Pradesh which with 3.4 million h.a. devoted to wheat cultivation, is the state with the 2nd largest area growing Wheat. The low coverage of H.Y.V.P. in the State has resulted in Madhya Pradesh having one of the lowest productivity levels in the country. Extension of the H.Y.V.P. to a major portion of the Wheat growing areas here, could result in a substantial rise in production levels, as this State has demonstrated the ability to sustain large increase in productivity levels. (Table 3.2)

The Co-efficient of Variation (C.V.) indicating inter-state inequalities in the coverage of the H.Y.V.P. is not only relatively low but has declined considerably over the period of study. This would normally have been a welcome development but in this case, this decline has actually been brought about by negative rather than positive factors. Ideally the decline in the C.V. should have been brought about by an acceleration in the extension of the H.Y.V.P. to the backward States. This unfortunately has not

happened with most of the States which were lagging behind in terms of H.Y.V.P. coverage, demonstrating slow growth rates in respect to the area under the H.Y.V.P. (the only exception to this being Madhya Pradesh). The more advanced States have been able to register marginally higher growth rates in the area covered by the H.Y.V.P. Such a situation would normally bring about an increase in the C.V. The factor however which causes a decline in the C.V. is that, while most of the 'advanced' states have seen a moderate increase in the G.C.A. growing wheat, most of the states which are lagging behind have seen a decline in their G.C.A.'s. The above factor resulted in a sharper rise in the percentage of G.C.A. covered by the H.Y.V.P. in the case of the lagging States than in the advanced States, which in turn resulted in the decline of the C.V.

Another point to note is that both Karnataka and Maharashtra have seen a rise in the percentage of the G.C.A. covered by the H.Y.V.P., even though the actual area covered by the H.Y.V.P. declined in both States. This has happened because the G.C.A. growing Wheat in these States also declined and declined at a faster rate. Thus here too, like in the case of the decline in the C.V., progress has been mainly due to

the play of numbers rather than real progress in the fields.

Graph 2.1 shows that while inequalities in the coverage of the H.Y.V.P. has shown an inter-temporal tendency to decline, this decline is small when compared to the decline in inequalities achieved in the case of Rice.

The Rice Crop

Though the H.Y.V.P. has not covered Rice as extensively as it has in the case of Wheat, there has been a quantum jump in the percentage of the G.C.A. growing rice covered by the H.Y.V.P., from 33.1% in 1975-77 to 61.5% in 1988-90. This is due to the fact that the area under H.Y.V.P. grew at an impressive rate of 5.1% p.a. which compares very favourably to 2.7% p.a. which is the corresponding figure for the Wheat crop. Of course, this is partly due to the fact that the Wheat crop in the important producing areas have already been extensively covered by the H.Y.V.P. & extension of such a programme to the lesser important producing areas is usually more difficult. Table 2.2, shows that there has been a sharp decline in the C.V. and what is an actual

positive achievement, is that this decline in the C.V., unlike in the case of Wheat, has been brought about by a more extensive coverage of the rice crop by the H.Y.V.P. in the 'backward' States. A major segment of the 'backward' States - Manipur, West Bengal, Orissa, Assam & Nagaland have demonstrated particularly impressive growth rates in the acreage covered by the H.Y.V.P. The two conspicuous exceptions are Rajasthan and Kerala, of which the situation in Kerala is much more worrying because while the rice crop is of only marginal importance to the agricultural economy of Rajasthan, in the case of Kerala, it accounted for around 93% of the total area under foodgrains in 1988-90.

Another major point of concern is that we find a low level of coverage of rice-growing areas by the H.Y.V.P. in the Eastern region. All the States in this region, with the exception of Tripura, have remained below the All India average throughout the period of study. Urgent steps need to be taken to rectify this situation, as not only is rice the most important foodcrop in these regions (with States such as West Bengal and Assam having approximately 85% to 90% of their respective 'G.C.A.'s growing foodgrains' devoted to rice cultivation) but this region alone

accounts for approximately 43% of the country's G.C.A. growing rice.

Coarse Cereals

This paper looks at the 3 inferior cereals of Bajra, Maize & Jowar together as a group. This has been done for 2 reasons:-

1. Many States are very small producers of these crops when considered individually and small fluctuations in any value causes disproportionately large fluctuations in the C.V. By considering all 3 Crops together this problem is overcome to a large extent.

2. It helps to bring about a certain degree of conciseness to the study.

Of course, tables indicating the performance of the 3 Crops are also included, so that the individual behavioural patterns of each of the 3 Crops can be analysed.

Table 2.3 shows a sharp decline in the inter-

state inequality in the coverage of the 'inferior cereals' by the H.Y.V.P. This has been achieved because of the rapid dissemination of the new technology to States which had very low levels of H.Y.V.P. coverage in 1975-77 - Uttar Pradesh, Rajasthan, Madhya Pradesh and Jammu & Kashmir. Graph 2.1 shows that though the C.V. has declined over time this decline is not a continuous trend as it is in the case of other foodcrops, but is actually achieved in fits and starts. With the introduction of the H.Y.V.P., these inferior cereals have seen a decline in their importance, as is shown by the decline in the total G.C.A. growing these 3 crops. (This is because of a definite shift in the cropping pattern away from the inferior cereals and in favour of the "superior cereals"). Despite this decline in importance, the H.Y.V.P. has spread at a much faster rate for the inferior cereals (6.7% p.a.) than in the case of the superior cereals (3.9% p.a.). The rapid spread of the new technology in the 3 States of Rajasthan, Madhya Pradesh & Maharashtra is an important achievement because these three States alone account for 57% of the total acreage under coarse foodgrains. However, despite this rapid spread of the new technology, in 1988-90 less than half of the total G.C.A. devoted to growing these 3

crops was covered by the H.Y.V.P. In fact after a quarter century of it's initiation the H.Y.V.P.'s coverage of "coarse cereals" in Uttar Pradesh was a mere 9.9%. Thus, though progress was good, it needed to be much better. Table 2.4 shows the coverage of the 3 crops individually. The decline in the C.V. is sharpest in the case of Bajra while the decline in the case of Maize & Jowar has been much more moderate. In fact, in the case of Jowar, the C.V. continues to be high because even though the Northern region had approximately 0.7 million h.a. growing Jowar in 1988-90, not a single acre was covered by the H.Y.V.P., thus resulting in wide inter-regional disparities.

With regards to the coverage of the H.Y.V.P. in 1988-90, the most extensive coverage was achieved for Bajra (49.9%) while the corresponding figures for Jowar & Maize were 44.4% & 40.7%.

FERTILIZERS

Indian soils though varied and generally fertile, are deficient in nitrogen & phosphorus. Despite this, the use of fertilizers in the country

is totally inadequate relative to actual requirements.

With the introduction of the H.Y.V.P., however it became imperative to increase fertilizer consumption in the country as the successful implementation of the H.Y.V.P. depended crucially on the increased use of fertilizers. The government sought to encourage fertilizer use through a policy of subsidisation of prices and costs, a policy which finally ran aground in the early 90's due to fiscal constraints. Of course, it cannot be denied either that the policy, despite its heavy costs, did manage to bring about a substantial increase in fertilizer use. For example, during the period of this study, fertilizer consumption per hectare of G.C.A. went up from 18.6 kg./h.a. to 63.9 kg./h.a. (which represents a very impressive growth rate of 9.1% p.a.)

Of course, it must also be said that the pattern of fertilizer consumption is marked by sharp inequalities whether it is between States, or between Rabi and Kharif crops or between rainfed and irrigated areas. For example while rainfed areas constitute 67% of total cultivated area, it accounted for only around 20% of fertilizer consumption.

Similarly while Rabi Crops form 1/3 of total output, they account for 2/3 of total fertilizer consumption[5]. There also appears to be a considerable degree of concentration in fertilizer consumption. The 4 major States of Punjab, Andhra Pradesh, Tamil Nadu and Uttar Pradesh alone account for almost half the country's total fertilizer consumption.

It is basically with the aim of cutting down on these inequalities that the government initiated the "National Project for development of fertilizer use in low consumption Rainfed areas". Table 2.5 shows us that the inequalities in fertilizer use (as indicated by the C.V.) has declined considerably over the period of study. Prof. Hanumantha Rao claims that inequality in fertilizer consumption in the 80's declined because of faster growth of consumption in the Eastern & Western regions relative to the Northern and Southern regions and also because of faster growth of consumption in the Kharif crops than in the Rabi crops[6]. This he says, indicates the spread of the new technology to rainfed and enviromentally unfavourable areas. A look through Table 2.5 does confirm Prof. Rao's statement especially regarding the Eastern region, which with

the exception of Nagaland & Orissa saw a growth rate of around 11% p.a. in the consumption of fertilizer. Most impressive is of course, Tripura's performance which managed to increase fertilizer consumption at an astounding rate of 22.6% p.a. The Central & Western regions also (particularly Gujarat and Madhya Pradesh) performed commendably. However, despite this positive trend of declining inequalities it is a matter of concern that wide inter-regional disparities continue to exist. This can be seen from the fact that the entire Western, Central & Eastern regions of the country, with the exception of West Bengal, had "per/hectare" consumption figures which were below the All India average throughout the period of study. Orissa and Nagaland are particular points of concern because they not only have low levels of consumption, but they also have not been able to increase their consumption at any significant rate. Inequalities in fertilizer consumption has shown a fluctuating trend over time. While Prof. Rao found a decline in the C.V. in 'per h.a.' consumption between 1964-65 and 1971-72, the inequalities had started rising again by 1976-77 and it is only in 1983-84, that the inequalities started declining again (Chart 2.2), reflecting steps taken by the government to reduce these inequalities.

Irrigation

Indian Agriculture is cripplingly dependent on the monsoons for supply of water for cultivation purposes. The uncertainty and irregularlity of the monsoons, as well as its inability to bring sufficient rainfall to many portions of the country, has resulted in instability in agricultural production as well as under achievement of agricultural growth vis-a-vis their potential in many regions of the country. These factors make "irrigation facilities" an extremely important input in Indian Agriculture. Irrigation by providing a regular supply of water throughout the year, not only helps in expanding the country's Net Cropped Area but also in raising it's the cropping intensity.

The role of irrigation in agricultural development became even more important after the introduction of the H.Y.V.P., as the 'new technology' required a regular and adequate supply of water to be successful. The presence of a well developed irrigation system was one of the main reasons for the introduction of the H.Y.V.P. first in the North-Western region.

During the period of study, the net irrigated area went up from 34.8 million h.a. in 1975-77 to 44.1 million h.a. in 1989-90, which represented approximately a third of the total 'N.C.A.' Table 2.6 shows that there is great variability among States with regards to the percentage of 'N.C.A.' irrigated. In 1988-90, this ranged from 90.2% in the case of Punjab to 11.3% in the case of Maharashtra. As in the case of 'fertilizer consumption', there is a marked concentration in the case of 'irrigated area' as well, as the 4 'Northern States' of Punjab, Haryana, Uttar Pradesh and Bihar and the 3 Southern States of Tamil Nadu, Andhra Pradesh and Karnataka together account for almost 70% of the total 'net irrigated area' in the country, though they together cover only 42% of the country's N.C.A. From Table 2.6 we see that there is only a marginal decrease in the C.V. and graph 2.2 shows that the C.V. has been almost constant throughout the period of study. This is actually the continuation of a trend found by Prof. Hanumantha Rao, who showed the C.V. in 1961-62 and 1969-70 to the exactly the same. Though this is a very worrying trend, given the importance of irrigation to Agriculture, atleast in the case of the H.Y.V.P. crops, definite progress has been made. Table 2.7 shows that there is a sharp decline in the

C.V. in respect of all the 5 H.Y.V.P. crops. Most extensive irrigation facilities are provided for in the case of Wheat. Though irrigation coverage for rice has increased during the period of study, much more needs to be done. In the case of Maize, Jowar & Bajra, the picture is dismal especially in the case of the latter two. The extremely low provision of irrigation to these crops causes their production to be extremely vulnerable to the vagaries of the monsoons. Urgent steps need to be taken to provide atleast a minimum of irrigation facilities to these crops.

Thus in this Chapter, we have seen that there has been a general dissemination of the 'New technology' to the different regions of the country which has been accompanied by an increased use of fertilizer in the backward regions as well as increased coverage of irrigation facilities (atleast in the case of Rice & Wheat). What effect these developments will have on agricultural performance of the individual crops will be studied in the next chapter.

NOTES:-

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1. While Prof. Rao looks into the inequalities in the use of fertilizers, provision of irrigation facilities and disbursement of credit, he does not look into the coverage of the area using the H.Y.V. seeds, which I feel is essential to this study. I do not look into the inequalities in the distribution of Institutional Credit, even though many feel that it is an essential component of the 'New Agricultural Strategy', because it is an indirect input whose inequalities will anyway to an extent get reflected in the inequalities in the use of the direct inputs.

2. Misra & Puri (1983)

3. A 6th Crop Ragi has been brought under the H.Y.V.P. in 1990-91. This however falls out of the purview of this study due to its late introduction.

4. Though Bihar, West Bengal and Assam are also

important Wheat producing States, they could not be included in this study due to lack of accurate information. For several years, the area under the H.Y.V.P. has been greater than the actual G.C.A. growing the concerned crops. In the case of Assam, this has happened because due to the lack of data on actual coverage, targets set by the Working Group have been taken as "achievements". This is probably what has happened in the other 2 States as well. The exclusion of Bihar from this study is a major loss as it is important Wheat Growing State.

5. Datt & Sundaram (1995)

6. Hanumantha Rao (1975)

7. Haryana has been excluded from this estimate because even though it accounts for less than 0.1% of the total G.C.A. growing Jowar, large fluctuations in the percentage of its area irrigated causes very large variations in the C.V. and distorts the picture for the other, much more important Jowar growing States.

Table 2.1 **PERCENTAGE OF G.C.A. GROWING WHEAT COVERED BY THE H.Y.V.P. IN IMPORTANT WHEAT GROWING STATES**

STATE	% COVERED IN 1988-90 (T-2)	% COVERED IN1975-76 (T-1)	R.0.G. OF AREA UNDER H.Y.V.P.	R.O.G. OF G.C.A.
PUNJAB	99.8	90.2	2.4	1.7
HARYANA	88.8	88.8	3.3	2.6
MAHARASHTRA	96.4	85.4	-2.3	-3.2
J & K	95.2	77.7	3	1.4
UTTAR P.	93.6	73	3.9	2.5
HIMACHAL P.	90.3	61.1	2.6	-0.3
GUJRAT	83.6	79.5	0.7	0.3
RAJASTHAN	73.1	48.7	2.6	-0.3
MADHYA P.	50.6	40.2	5.4	3.7
KARNATAKA	33.2	27.2	-1.8	-3.2
ALL-INDIA	**85.5**	**61.1**	**2.7**	**1**
C.V.	.263	.310		

Source: Calculated from tables contained in ' FERTILIZER STATISTICS' (Various Issues).

NOTE : An Important Wheat growing state has been defined as one which either has more than 100,000 h.a. or 5% of it's G.C.A. growing the wheat crop. A similar definition holds for the other crops.

Table 2.2 : PERCENTAGE OF G.C.A. GROWING RICE COVERED BY THE H.Y.V.P.

STATE	% OF G.C.A. COVERED BY H.Y.V.P. 1988-90	% OF G.C.A. COVERED BY H.Y.V.P. 1975-77	R.O.G. OF AREA COVERED BY H.Y.V.P.	R.O.G. OF G.C.A. GROWING RICE
HIMACHAL. P.	99	67	2.3	-0.5
J & K	98	74	3.7	0.5
TAMIL NADU	95	83	-0.7	-1.6
PUNJAB	95	88	8.6	8.0
ANDHRA. P.	89	60	3.7	0.9
GUJRAT	85	38	7.8	1.6
UTTAR. P.	79	35	7.1	1.1
KARNATAKA	78	45	4.8	0.9
MAHARASHTRA	75	48	3.7	1.8
TRIPURA	70	35	4.1	-1.0
HARYANA	67	57	6.1	4.9
MANIPUR	52	20	6.6	-0.5
WEST BENGAL	51	22	6.6	0.4
ORISSA	49	11	10.6	-0.3
MADHYA. P.	48	26	5.2	0.6
KERALA	35	30	-2.0	-3.1
RAJASTHAN	32	26	0	-1.6
BIHAR	30	17	4.4	0.9
NAGALAND	19	4	16.7	5.2
ALL INDIA	**61**	**33**	**5.1**	**0.5**
C.V.	**.376**	**.590**		

Source : Calculated from tables contained in "FERTILIZER STATISTICS."

Table 2.3 : PERCENTAGE OF G.C.A. GROWING COARSE CEREALS COVERED BY THE H.Y.V.P.

STATE	% OF G.C.A. COVERED 1988-90 (T2)	% OF G.C.A. COVERED 1975-77 (T1)	R.O.G. OF AREA UNDER H.Y.V.P.. B/W T1 & T2	R.O.G. AT WHICH G.C.A. GREW B/W T1 & T2
TAMIL NADU	74.6	20.2	7	-2.5
GUJRAT	67.9	46	2.4	-1.3
MAHARASHTRA	61.7	18.1	9.3	0.2
BIHAR	57	34.8	1.4	-2.1
HARYANA	54.7	21	4.2	-2.7
MADHYA P.	54.7	13.6	10..8	0.1
PUNJAB	54.3	22	-1.6	-7.6
ANDHRA P.	48.3	14.1	5.3	-3.5
ORISSA	44.1	22.4	7	1.9
J & K	43.5	10.5	11.9	0.4
KARNATAKA	33	31.1	2	1.7
HIMACHAL P.	31.1	23.9	2.8	0.8
NAGALAND	26.1	17	8.1	6.1
RAJASTHAN	23.7	6.1	12.8	2.4
UTTAR P.	9.9	2.5	8.9	-1.3
ALL INDIA	**43.5**	**17.5**	**6.7**	
C.V.	.379	.530		

Source : Calculated from Fertilizer Statistics . (Various Issues)

Table 2.4 : COVERAGE OF THE G.C.A. GROWING JOWAR, BAJRA & MAIZE BY H.Y.V.P.

C.V.	C.V. INDICATING INEQUALITIES OF H.Y.V.P. 1988-90(T1)	C.V.INDICATING INEQUALITIES OF H.Y.V.P. 1975-77(T1)	% OF G.C.A. COVERED BY H.Y.V.P. 1988-90	% OF G.C.A. COVERED BY H.Y.V.P. 1975-77	R.O.G. OF G.C.A. UNDER H.Y.V.P. B/W T1 & T2	R.O.G. OF G.C.A. B/W T1 & T2
JOWAR	.811	.880	44.4	13.6	8.2	-0.6
BAJRA	.438	.734	49.9	23	5.9	0.2
MAIZE	.519	.593	40.7	18.5	5.7	0.5

Source : Calculated from tables contained in "FERTILIZER STATISTICS."

Note : The above data has been calculated only for the major states growing the above 3 crops . These include :-

Jowar :- A.P., Gujrat, Haryana, Karnataka, M.P., Maharashtra, Rajasthan, T.N., U.P.

Maize :- A.P., Gujrat, H.P., J & K, M.P., Nagaland, Orissa, Punjab, Rajasthan & U.P.

Bajra :- A.P., Gujrat, Haryana, Karnataka, M.P., Maharashtra, M.P., Rajasthan, U.P. & T.N.

Table 2.5 PER HECTARE CONSUMPTION OF FERTILIZERS.

STATE	CONSUMPTION IN 1988-90 (T2)	CONSUMPTION IN 1975-77 (T1)	R.O.G. OF PER HECTARE CONSUMPTION B/W T1&T2
PUNJAB	156.7	56.6	7.5
ANDHRA. P.	123.6	30.7	10.5
TAMIL NADU	118.9	37.8	8.5
HARYANA	92.2	22.7	10.5
UTTAR. P.	83.8	26.4	8.6
WEST BENGAL	79.5	18.9	10.8
KERALA	74.6	22.4	9
KARNATAKA	66.9	19.6	9.2
GUJRAT	60.5	14.3	10.8
BIHAR	56.2	12.5	11.3
J & K	52.9	12.5	10.8
MAHARASHTRA	52.3	14.3	9.7
MANIPUR	38	8.8	11
HIMACHAL.	33.8	9.8	9.2
MADHYA. P.	30.5	5.8	12.6
TRIPURA	24.4	1.4	22.6
ORISSA	18.1	7.5	6.5
RAJASTHAN	17.5	5	9.4
ASSAM	6.6	1.6	10.6
NAGALAND	1.3	1.1	1.2
ALL INDIA	**63.9**	**18.6**	**9.2**
C.V.	**.677**	**.815**	

Source : FERTILIZER STATISTICS , 1978 & 1991

Table 2.6 : PERCENTAGE OF NET CROPPED AREA IRRIATED

STATE	% OF N.C.A. IRRIGATED (T2) 1988-90	% OF N.C.A. IRRIGATED (T1) 1975-77	C.R.O.G. B/W T1 & T2	R.O.G. B/W T1 & T2
PUNJAB	90.2	75.9	1.7	0
HARYANA	75.4	48.9	3.0	-0.4
UTTAR. P.	58.8	46.7	1.8	-0.1
MANIPUR	46.4	46.4	0	0
BIHAR	44.3	33.5	1.2	-0.9
J & K	43	43	0	0.1
TAMIL NADU	42.5	40.8	-0.5	-0.6
WEST BENGAL	35.8	26.6	2.1	-0.4
ANDHRA. P.	35.5	31.6	1.4	0
NAGALAND	31	33	2.4	3
ORISSA	28.6	17.1	4.4	0.2
GUJRAT	25.6	16.1	1.7	-0.5
RAJASTHAN	25.3	17.1	4.5	0.2
ASSAM	21.1	21.7	0	0.2
KARNATAKA	18.6	13.2	3.6	0.6
MADHYA. P.	18.1	10.2	5	.3
HIMACHAL P.	17	16.2	0.8	0.4
TRIPURA	16	13.7	2.4	0.1
KERALA	14.1	10.2	2.9	0.1
MAHARASHTRA	11.3	10	0.1	-0.1
ALL INDIA	**34.1**	**24.8**	**2**	**-0.1**
C.V.	**.582**	**.596**		

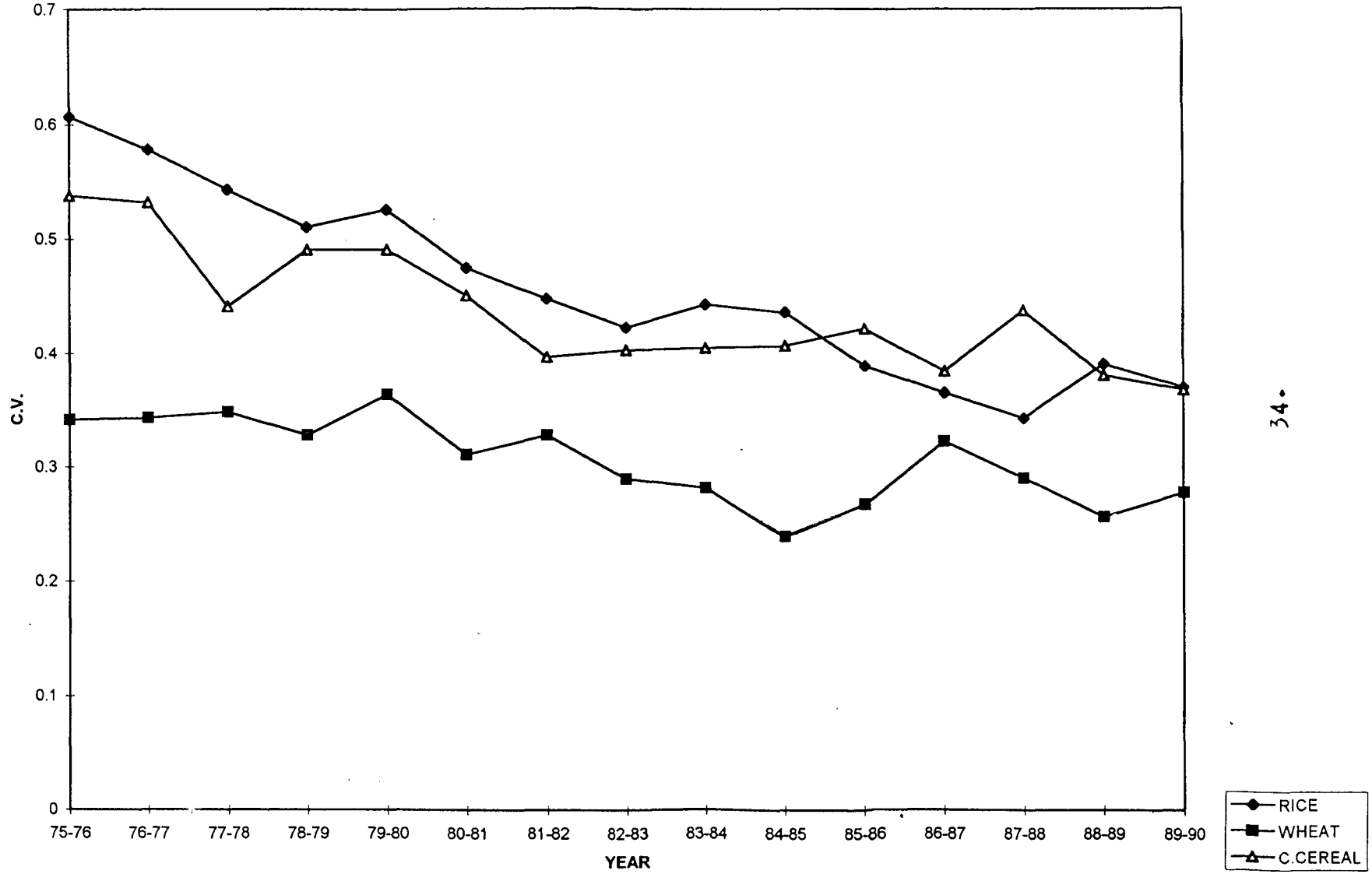
Source : INDIAN AGRICULTURE IN BRIEF (Various Issues)

TABLE 2.7 IRRIGATION COVERAGE OF INDIVIDUAL H.Y.V.P. CROPS

CROP	% G.C.A. IRRIGATED 1988-90	% G.C.A. IRRIGATED 1975-77	C.V. 1988-90	C.V. 1975-77
WHEAT	79.5	63.5	.487	.524
RICE	46.2	38.2	.54	.602
JOWAR (7)	5.3	4.7	.793	1.104
BAJRA	5.8	5.4	.673	.749
MAIZE	20.8	16.9	1.133	1.62

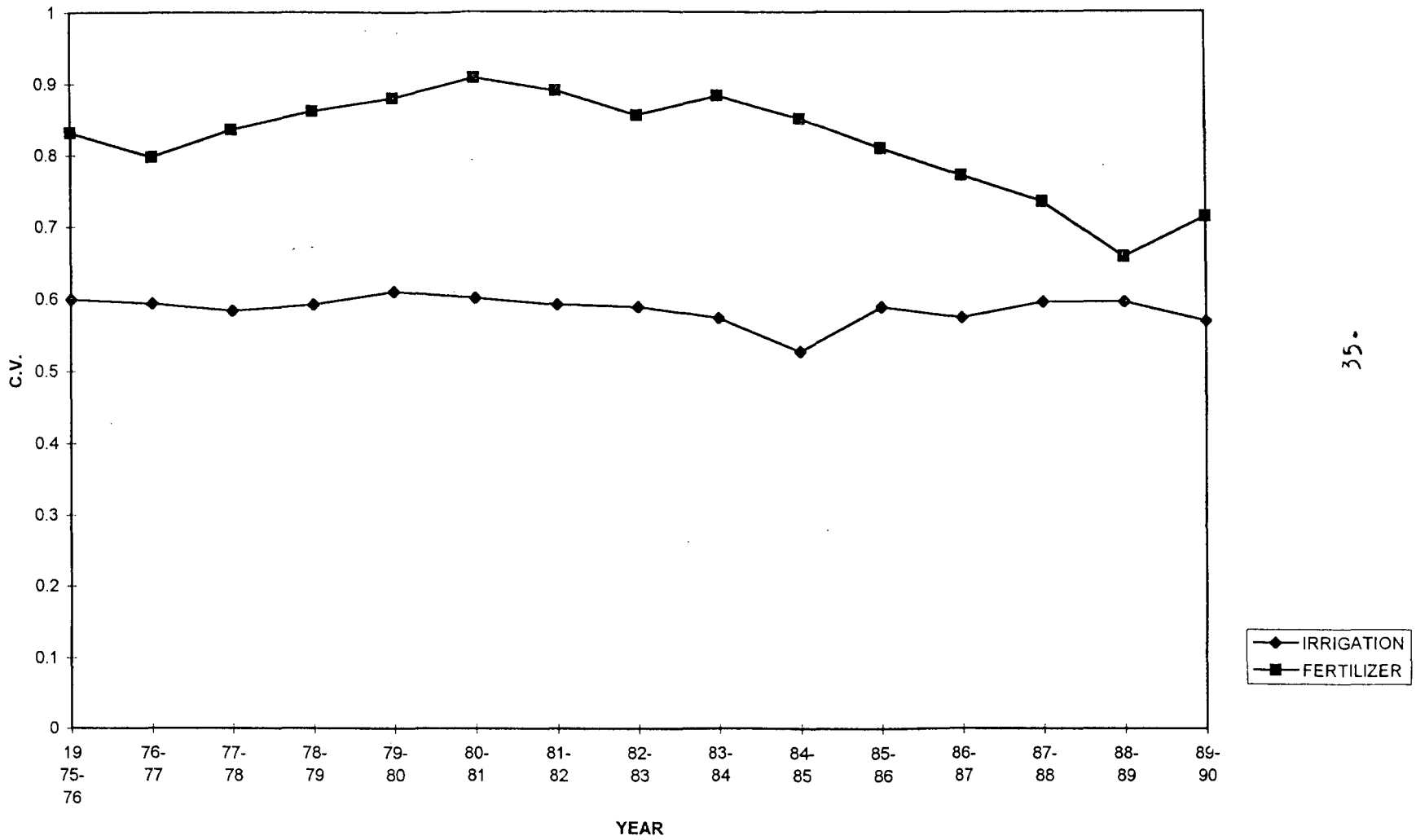
Source : Area & Production of Principal Crops in India 1989-90 & 1979-80

Chart 2.1 INEQUALITIES IN COVERAGE OF THE H.Y.V.P.



34

Chart 2.2 INEQALITIES IN FERTILIZER CONSUMPTION & IN PROVISION OF IRRIGATION FACILITIES



CHAPTER 3

SPATIAL DISTRIBUTION OF THE GAINS FROM THE H.Y.V.P. : AN INTER-STATE ANALYSIS

Given the fact that, the H.Y.V.P., over time has spread to many regions of the country which were initially left out of the purview of the programme, the crucial question that now arises is whether the spread of the 'new technology' has helped to bring about a more equitable distribution of gains among the different regions of the country. After all, we know that the H.Y.V. Technology is very 'conditions - specific', with it requiring an adequate and regular supply of water as well as advanced agronomic practises for optimum results. However, these conditions are rarely found in most regions of the country. We shall therefore, now try to determine whether the extension of the H.Y.V.P. to the rainfed and agriculturally backward regions of the country has helped to bring about the same nature of gains to these regions, as the programme brought to the North Western parts of the country.

The basic approach here will be to study the trend in inter-state inequalities in productivity[1],

area cultivated and total production of the concerned crops and try to establish a link between these trends and the trends in inter-state inequalities in the coverage of the H.Y.V.P.

The Wheat Crop

A glance through tables 3.1 to 3.3 shows that there is a tendency towards growing inequalities in terms of productivity levels, total area growing wheat as well as in total production levels. This is a basic continuation of the trend found by Prof. Hanumantha Rao in his study[2], where he showed that there was a sharp increase in productivity inequalities and a more moderate increase in inequality in area cultivated between 1964-65 and 1970-71. However, inequality in total output during this period had stagnated. My study, as already stated, finds an increase in inequality in all three aspects. This is basically due to the fact that the Wheat crop is over time getting concentrated in Northern India particularly in Punjab, Haryana and Uttar Pradesh. It is these States, specially Haryana and Uttar Pradesh, which have achieved some of the

largest growth rates in productivity as well as in total output levels.

In fact, outside the Northern region, with the exception of M.P. where the G.C.A. growing wheat almost stagnated, all other States have seen a decline in their G.C.A.'s. While in Gujarat, this represents a shift in cropping pattern away from wheat and in favour of oilseeds, in the case of Karnataka and Rajasthan it is a shift in favour of the coarse cereals.

A comparison between Table 2.1 and 3.2 shows us that there is a certain positive relationship between the rate of extension of the H.Y.V.P. and the growth in productivity levels of the Wheat Crop, as the 3 States of Madhya Pradesh, Haryana and Uttar Pradesh which had the fastest growth rates in the area covered by the H.Y.V.P., also demonstrated the fastest growth in productivity levels. Given such a positive relation, one would, at first, find it strange that during the period of study, while the C.V. indicating inequalities in the coverage of the H.Y.V.P. has declined, the C.V. indicating inequalities in productivity has risen. One would normally have expected the inequality in productivity

levels to decline as the H.Y.V.P. spread across less developed States. However, it must remembered that the decline in the C.V. indicating the inequality of coverage of the Wheat crop by the H.Y.V.P., as is shown in Chapter 2, was only due to the play of numbers, with the States which already had a higher percentage of the G.C.A. covered by the H.Y.V.P., being able to extend the H.Y.V.P. at a faster rate than the relatively backward States. This in turn has resulted in the increasing inequalities in productivity.

It is interesting to make a comparison of the changes in the productivity levels in the 2 States of Maharashtra and Karnataka between 1975-77 and 1988-90. Both States saw a decline in the area covered by the H.Y.V.P. (with the decline being much steeper in the case of Maharasthra). While Karnataka saw a decline in productivity, Maharashtra managed to register a modest growth rate of 1.4% p.a. This is indicative of the important role local factors such as soil, irrigation[3] etc. play in determining agricultural performance.

From Graph 3.1, we see that the inequality in productivity level shows a relatively steady upward

trend and that there is a tendency for inequalities to increase more rapidly in the years of poor rainfall. This is quite understandable because the important wheat growing states have relatively better developed irrigation systems[4] than the less important states which means that they are less dependent on rainfall and do not get as adversely affected in years of poor rain, as the States with less developed irrigation systems. Chart 3.2 and 3.3 show that both inequalities in area cultivated as well as in total production show a steady tendency to rise over time.

Rice

The 'rice' crop is also marked by increasing inequalities. Prof. Hanumantha Rao found that during the late 60's while there was an increase in inequalities in the productivity levels, the decline in the inequalities in total area growing rice was able to offset this, resulting in a decline in inequalities in total production[2]. However, between 1975-77 and 1988-90, this study finds that though there was a decline in inequalities in total area cultivated (Table 3.5), inequalities in both productivity (Table 3.4) and total production (Table 3.6) showed an increase. The increase in C.V. in

productivity levels has been caused by the fact that the states of Andhra Pradesh, West Bengal and Tamil Nadu which anyway have relatively high productivity levels, were able to outperform the rest of the country as a whole. Uttar Pradesh and Orissa too have demonstrated impressive growth rates in productivity levels. These 5 States of West Bengal, Tamil Nadu, Andhra Pradesh, Orissa and Uttar Pradesh (particularly Eastern U.P.) constitute some of the traditionally important rice growing areas of the country. It may be noted from table 2.2, that these States either have a large portion of their rice crop under the H.Y.V.P. (Tamil Nadu, Andhra Pradesh and Uttar Pradesh) or the area covered by the H.Y.V.P. is growing rapidly (West Bengal and Orissa). The impact of the H.Y.V.P. on these States have been substantial, specially in the case of West Bengal which has achieved some of the highest productivity levels for the High Yielding Varieties of rice.

There are of course other traditionally important rice growing States such as Madhya Pradesh and Assam where the H.Y.V.P. has not had much of an impact even though these States too have seen a rapid growth in the area covered by the H.Y.V.P. The unsuitability of local conditions for the successful

adoption of the H.Y.V.P. could be an explanation for this. Similar explanations could hold for States such as Himachal Pradesh and Maharashtra which despite having a substantial part of the rice crop covered by the H.Y.V.P. not only have low levels of productivity but also have not been able to increase productivity by any substantial level. Himachal Pradesh is of course the extreme example, which despite having almost its entire rice crop covered by the H.Y.V.P., it not only has the second lowest productivity levels in the country, but also, productivity in the state has actually seen a decline during the period of study.

Punjab and Haryana, which are non-traditional rice growing areas, have seen an extremely large increase in the G.C.A. devoted to rice cultivation. However, despite the growing importance of the rice crop in these two States, neither have been able to bring about any substantial increase in productivity levels. No doubt these 2 States have relatively high productivity levels compared to the rest of the country but when compared to the potential yield of 4000 to 5810 kg./h.a.[5] their performance appears only as moderate. Therefore there is ample scope and need

for increasing productivity levels in these States as well.

Graph 3.1 shows us that the inequalities in productivity exhibit a rising trend during the period of study. One can also see that there is a certain degree of similarity between the trends in inequalities in the wheat and rice crops, though the fluctuations in inequalities caused by variations in rainfall is much more marked in the case of rice. This is only to be expected given the fact that the rice crop is much more dependent on rainfall than the wheat crop as only 46% of the rice crop is irrigated as against 80% in the case of wheat. The inequalities in productivity have shown a tendency to rise in almost all years with rainfall levels ranging from 'deficient' to 'good' (from -20% to +10% of normal annual rainfall). There is of course a tendency for the C.V. to increase more sharply in years of poor rainfall. This is because in years of poor rainfall states such as Punjab and Andhra Pradesh which have a very substantial portion of their rice crop under irrigation[6], do not get as adversely as states such as Madhya Pradesh and Bihar which do not have adequate irrigation cover for the

rice crop. This helps to accentuate the inequalities in productivity.

As stated earlier, the C.V. has a general tendency to rise. It is only in years of 'excellent' rainfall (more than 110% of normal annual rainfall) that the C.V. falls substantially. We can see that only in 4 years did the C.V. either take a low value or decline sharply - 1975-76, 1980-81, 1983-84 and 1988-89. Of these, 3 years (1975-76, 1983-84 and 1988-89) received excellent rainfall (113% to 119% of normal annual rainfall). The reason for this declining inequalities is not hard to find. In years of plentiful rainfall, there is a sharp rise in productivity in states which have a low percentage of rice crop under irrigation and this helps to bring down the C.V. For example in 1983-84, the low productivity Statesof Bihar, Madhya Pradesh, Orissa and Rajasthan which had irrigation coverage of the rice crop ranging from 19% to 35%, saw a sharp rise in their productivity levels (37% to 84%) and this helped to bring down inequalities in productivity sharply.

Table 3.5 shows that there is a marginal decline in C.V. regarding inequalities in area cultivated.

There is no definite regional trend in the changes in G.C.A. and the factor which caused the decline in the C.V. is that Punjab, Haryana and Nagaland which had low levels of G.C.A. growing rice in 1975-77 saw a sharp rise in their corresponding G.C.A.'s by 1988-90 (4.6% - 8.1% p.a. growth). Graph 3.3 shows that the decline in the C.V. was almost continuous till 1984-85, after which the C.V. has shown a tendency to rise again.

Table 3.6 shows that there has been a moderate rise in the inequalities in total production. This is mainly because of the rapid growth in output of the 3 largest states of West Bengal, Andhra Pradesh and Uttar Pradesh. Punjab, Haryana and Nagaland too were able to bring about substantial increases in their total outputs.

Coarse Cereals

Table 3.7 to 3.9 shows us that despite a decline in inter-state inequalities in productivity, inequalities in total production increased due to a rise in the inter-state differences in area cultivated. The overall productivity gains in coarse

cereals were relatively low compared to the productivity increases in wheat and rice. One of the factors behind this could be the low coverage of areas growing 'coarse cereals' by the H.Y.V.P., specially in some large States such as Rajasthan & Uttar Pradesh. Only a few States - Bihar, Andhra Pradesh and to a lesser extent, Haryana and Madhya Pradesh have been able to register relatively satisfactory growth rates in productivity . In most States, the largest gains have been recorded in the case of Maize. With regards to the C.V. of productivity for the 3 crops individually, Table 3.10 shows that while the C.V. increased slightly for Bajra, it almost stagnated for Jowar and for Maize it declined considerably. Graph 3.4 shows there is tendency for the C.V. for coarse cereals as a whole to decline, though variations in rainfall can play havoc with the C.V., with it shooting up sharply in years of poor rainfall. The large effect that rainfall has on inequalities is quite understandable given the low percentage of area irrigated. (Table 2.9) The sharpest fluctuations in productivity are to be found in States with minimal irrigation for the 3 crops. These are basically Madhya Pradesh, Uttar Pradesh and Rajasthan. Of these 3, while Uttar Pradesh and Rajasthan have virtually no irrigation

for Jowar and Bajra, in the case of Madhya Pradesh, there is virtually no irrigation facilities for any of the 3 crops. These sharp fluctuation in productivity levels and consequently in total output, are bound to have an adverse effect on the poorer sections of society as these crops form a major portion of their dietary habits.

Graph 3.3 shows that there is an almost continuous rising trend in the inequality in the area growing these cereals. This is because as Table 3.9 shows, the production of coarse cereals is getting concentrated in the 4 large states of Maharasthra, Rajasthan, Karnataka and Madhya Pradesh, which together saw an increase in the total acreage of around 2.9 million h.a. This is in contrast to the other large and medium 'coarse cereal' growing states, which saw a decline in their corresponding G.C.A.'s. Of course, the smallest states also registered an increase in their G.C.A.'s but this increase was marginal and amounted to only 0.1 million hectates. With regard to the three crops individually while Jowar and Maize saw a decline in their total G.C.A., Bajra saw a marginal increase in it's G.C.A. This is mainly because of a huge

increase of 1.7 million h.a.in G.C.A. growing Bajra in Rajasthan.

There is a marked increase in the C.V. indicating inequalities in total output. This is once again due to the relatively large increases in output in the 3 big States of Maharashtra, Rajasthan and Madhya Pradesh. Most of the other States (with the exceptions of Orissa and Nagaland) show growth rates ranging from near about 1% to negative values. Graph 3.5 shows the C.V. has a similar pattern of fluctuations to the fluctuations in the C.V. of productivity levels which shows the large effect variations in rainfall has on total output as well.

Foodgrains

As we have shown in the previous sections, the period of study (1975-76 to 1989-90) has witnessed rising inequalities. In the case of productivity, inequalities has risen for all H.Y.V.P. crops with the exception of Maize, while in the case of inequalities in total output, all the 5 H.Y.V.P. crops have witnessed increasing inequalities.

Having established rising inequalities among the H.Y.V.P. crops, let us now examine how these affected inequalities in the foodgrain sector as a whole. The trend in the H.Y.V.P. crops are bound to have a large effect on the foodgrain sector, as these crops account for around 90% of total foodgrain production in the country.

Table 3.11 shows us that the highest productivity gains were achieved in Punjab, Haryana, Uttar Pradesh, Andhra Pradesh and West Bengal. Barring Andhra Pradesh, all other States initially had high levels of productivity and this naturally resulted in increasing inequalities. While in the case of West Bengal and Andhra Pradesh, the productivity gains have been achieved in the 'rice crop', in the case of Uttar Pradesh and Haryana the gains have come from the wheat crop (though Uttar Pradesh has been able to substantially increase it rice productivity as well). In the case of Punjab, a substantial portion of the productivity gains has come from the shift in the cropping pattern away from the 'low productivity' inferior cereals to the high productivity 'superior cereals'. In fact, this study has shown that Punjab's agricultural growth is slowly beginning to level out and other States such as

Haryana, Uttar Pradesh and West Bengal are beginning to show superior growth rates.

What is a disturbing trend is that many of the low productivity States such as Gujarat, Nagaland, Karnataka, Maharashtra and Rajasthan have not been able to bring any substantial increase in their productivity levels. In States such as Karnataka and Rajasthan, this is partly because of the increased cultivation of 'inferior cereals' in place of the 'superior cereals'.

While Table 3.12 shows that there has been a marginal increase in inequalities in areas cultivated, Table 3.13 shows a more substantial increase in inequalities in total production. This is once again due to the fact that the large foodgrain producing states of Uttar Pradesh, Punjab, Andhra Pradesh and to an extent Madhya Pradesh have grown at a faster rate than the rest of the country as a whole. Other fast growing states are Haryana, Nagaland, Orissa and to an extent West Bengal. (In West Bengal, total output did not grow as fast as productivity, because the state witnessed a decline in it's G.C.A.)

Graph 3.1 to 3.3 show that the inequalities in productivity, area cultivated and total output of foodgrains all show upward trends which are closely determined by trends in the rice and wheat inequalities, which is hardly surprising given that these are the 2 largest foodgrops in the country.

To conclude we can say that the 'total foodgrain' sector too is marked by increasing inequalities and this has been clearly brought about by the increasing inequalities in the H.Y.V.P. crops.

NOTES

1. Productivity in this study has been defined as productivity of the land. In this chapter, productivity has been defined as -

$$\frac{\text{Total Output of a Crop}}{\text{G.C.A. Growing that Crop}}$$

2. Hanumantha Rao (1975)

3. While Maharashtra has approximately 45% of it's wheat crop under irrigation, Karnataka has around 30%.

4. While states as such Punjab and Haryana have 95 to 98% of their wheat crop irrigated, states such as Madhya Pradesh and Maharashtra have only 40 to 45% of their G.C.A. irrigated.

5. Gangadharan (1992)

Table 3.1 : TOTAL G.C.A. CULTIVATING THE WHEAT CROP: STATEWISE
('000 h.a)

STATE	G.C.A. IN 1988-90 (T2)	G.C.A. IN 1975-77 (T1)	R.O.G. OF PRODUCTION B/W T1 & T2
UTTAR. P.	8683	6463	2.1
MADHYA. P.	3435	3252	0.4
PUNJAB	3204	2508	1.8
HARYANA	1843	1287	2.6
RAJASTHAN	1710	1781	-0.3
MAHARASHTRA	860	1186	-2.3
GUJRAT	634	706	-0.8
HIMACHAL. P.	378	310	1.4
J & K	243	181	2.1
KARNATAKA	243	386	-3.3
ALL INDIA	**23783**	**20688**	**1.0**
C.V.	**1.155**	**1.006**	

Source: Area & Production of Principal Crops in India. (1979-80 & 1989-90)

Table 3.2 : **PRODUCTIVITY OF THE WHEAT CROP : STATEWISE**
(Kg. / h.a.)

STATE	PRODUCTIVITY IN 1988-90 (T2)	PRODUCTIVITY IN 1975-77 (T1)	GROWTH RATE OF PRODUCTIVITY B/W T1 & T2
PUNJAB	3363	2404	2.4
HARYANA	3293	2006	3.6
UTTAR. P.	2153	1353	3.4
RAJASTHAN	2153	1289	3.7
GUJRAT	2062	1573	2.0
HIMACHAL. P.	1470	985	2.9
MADHYA. P.	1260	778	3.5
MAHARASHTRA	1134	929	1.4
J & K	1012	857	1.2
KARNATAKA	603	665	-0.7
ALL INDIA	**2181**	**1398**	**3.2**
C.V.	**.479**	**.420**	

Source : Estimates of Area & Production of Principal Crops in India .(1979-80 , 1989-90)

Table 3.3 : **PRODUCTION LEVELS OF THE WHEAT CROP : STATEWISE.**
('000 tonnes)

STATE	PRODUCTION IN 1988-90 (T2)	PRODUCTION IN 1975-77 (T1).	R.O.G. OF PRODUCTION B/W T1 & T2
UTTAR. P.	18698	8746	5.6
PUNJAB	11630	6030	4.8
HARYANA	6069	2581	6.3
MADHYA. P.	4334	2529	3.9
RAJASTHAN	3682	2295	3.4
GUJRAT	1307	1111	1.2
MAHARASHTRA	975	1099	-0.9
HIMACHAL. P.	556	306	4.4
J & K	246	155	3.4
KARNATAKA	146	257	-4.0
ALL INDIA	**51881**	**28928**	**4.3**
C.V.	**1.206**	**1.059**	

Source : **Area & Production of Principal Crops in India. (1979-80 & 1989-90)**

Table 3.4 : **PRODUCTIVITY OF RICE CROP : STATEWISE.**
(Kg. / h.a.)

STATE	PRODUCTIVITY IN 1988-90. (Kg/h.a.)	PRODUCTIVITY IN 1975-77. (Kg/h.a.)	PRODUCTIVITY GROWTH B/W T1 &T2 (%)
PUNJAB	3153	2571	1.6
TAMIL NADU	3030	1943	3.5
HARYANA	2569	2271	0.9
ANDHRA. P.	2468	1504	3.9
J & K	2197	1526	2.8
KARNATAKA	2197	1526	2.8
WEST BENGAL	1912	1206	3.6
KERALA	1866	1505	1.7
UTTAR. P.	1737	926	4.6
TRIPURA	1735	1168	2.9
MAHARASHTRA	1622	1468	0.8
MANIPUR	1576	1537	0.2
GUJRAT	1482	1231	1.4
RAJASTHAN	1344	1388	-0.2
ORISSA	1335	855	3.5
BIHAR	1201	909	2.2
NAGALAND	1120	1015	0.8
ASSAM	1105	977	0.9
HIMACHAL. P.	1046	1206	-1.1
MADHYA. P.	930	720	2.0
ALL INDIA	**1722**	**1162**	**3.1**
C.V.	**.353**	**.335**	

Source : **Area & Production of Principal Crops in India. (1979-80 & 1989-90)**

TABLE 3.5 : GROSS CROPPED AREA UNDER THE RICE CROP : STATEWISE
('000 h. a.)

STATE	G.C.A. GROWING RICE. (1988-90)	G.C.A. GROWING RICE. (1975-77)	R.O.G. AT WHICH G.C.A. INCREASED B/W T1 & T2 (%)
WEST BENGAL	5618	5350	0.4
UTTAR. P.	5368	4636	1.1
BIHAR	5318	5284	Neg
MADHYA. P.	5022	4610	0.6
ORISSA	4336	4532	-0.3
ANDHRA. P.	4204	2730	0.9
ASSAM	2368	2262	0.3
TAMIL NADU	1950	2424	-1.5
PUNJAB	1842	620	8.1
MAHARASHTRA	1532	1450	0.4
KARNATAKA	1210	1078	0.9
HARYANA	1610	316	4.8
GUJRAT	568	461	1.5
KERALA	550	870	-3.2
TRIPURA	164	176	-0.5
J & K	264	252	0.3
MANIPUR	164	176	-0.5
NAGALAND	124	66	4.6
RAJASTHAN	124	156	-1.6
HIMACHAL. P.	86	92	-0.5
ALL INDIA	**41956**	**38992**	**0.5**
C.V.	**.975**	**1.001**	

Source : Area & Production of Principal Crops in India . (1979-80 , 1989-90)

Table 3.6 : TOTAL PRODUCTION OF RICE : STATEWISE
('000 tonnes)

STATE	TOTAL PRODUCTION 1988-90	TOTAL PRODUCTION 1975-77	R.O.G. OF PRODUCTION B/W T1 & T2 (%)
WEST BENGAL	10742	6408	3.8
ANDHRA. P.	10374	5608	4.5
UTTAR. P.	9322	4292	5.7
BIHAR	6488	4802	2.2
TAMIL NADU	5990	4708	1.7
PUNJAB	5810	1594	9.7
ORISSA	5790	3874	2.9
MADHYA P.	4670	3320	2.5
ASSAM	2616	2212	1.2
MAHARASHTRA	2484	2128	1.1
KARNATAKA	2442	2868	-1.1
HARAYANA	1566	720	5.7
KERALA	1028	1208	-1.1
GUJRAT	842	570	2.8
J & K	580	386	3
TRIPURA	458	354	1.9
MANIPUR	260	272	-0.3
RAJASTHAN	164	168	-0.2
NAGALAND	140	64	5.8
HIMACHAL P.	90	110	-1.4
ALL-INDIA	**72270**	**45328**	**3.4**
C.V.	**.970**	**.880**	

Source : Estimates of Area & Production of Principal Crops in India. (1979-80 , 1989-90)

Table 3.7 : PRODUCTIVITY OF COARSE CEREALS : STATEWISE
(Kg. / h.a.)

STATE	PRODUCTIVITY 1988-90	PRODUCTIVITY 1975-77	R.O.G. B/W 1975-77 &1988-90
HIMACHAL. P.	1870	1814	0.2
BIHAR	1605	1017	3.3
PUNJAB	1471	1231	1.3
J & K	1455	1310	0.7
MADHYA. P.	1119	778	2.6
UTTAR. P.	1107	741	2.9
ORISSA	1098	833	1.2
TAMIL NADU	1021	899	0.9
GUJRAT	897	731	1.5
HARYANA	886	594	2.9
NAGALAND	862	685	1.7
ANDHRA. P.	812	517	3.3
KARNATAKA	788	856	-0.6
MAHARASHTRA	794	590	2.1
RAJASTHAN	553	422	1.9
ALL INDIA	**862**	**683**	**1.7**
C.V.	.321	.399	

Source : Area & Production of Principal Crops in India. (1979-80 & 1989-90)

Table 3.8 : G.C.A. GROWING COARSE CEREALS : STATEWISE
('000 h. a.)

STATE	G.C.A. 1988-90 (T2)	G.C.A. 1975-77 (T1)	R.O.G. AT WHICH G.C.A. INCREASED B/W T1 & T2 (%)
MAHARASHTRA	8349	8166	0.2
RAJASTHAN	7171	5167	2.4
KARNATAKA	3194	2528	1.2
MADHYA. P.	2821	2795	0.8
GUJRAT	2567	3090	-1.3
UTTAR. P.	2553	3076	-1.3
ANDHRA. P.	1879	3110	-3.5
TAMIL NADU	910	1304	-2.5
HARYANA	876	1279	-2.7
BIHAR	717	963	-2.1
HIMACHAL. P.	316	280	0.9
J & K	310	294	0.4
PUNJAB	244	737	-7.6
ORISSA	204	156	1.9
NAGALAND	23	10	6.1
ALL INDIA	**32134**	**33109**	**-0.2**
C.V.	**1.140**	**.975**	

Source : Area & Priduction of Principal Crops in India. (1979-80 & 1989-90)

Table 3.9 : STATE PRODUCTION LEVELS OF COARSE CEREALS.
('000 tonnes)

STATE	TOTAL PRODUCTION (1988-90)	TOTAL PRODUCTION (1975-77)	R.O.G. B/W 1975-77 &1988-90 (%)
MAHARASHTRA	6631	4814	2.3
RAJASTHAN	3964	2813	4.4
MADHYA. P.	3157	2174	2.7
UTTAR. P.	2825	2279	1.5
KARNATAKA	2517	2165	1.1
GUJRAT	2303	2258	Q0.1
ANDHRA. P.	1526	1609	-0.4
BIHAR	1151	979	1.2
TAMIL NADU	929	1172	-1.6
HARYANA	776	760	0.1
HIMACHAL. P.	591	508	1.1
J & K	451	385	1.1
PUNJAB	459	907	-4.7
ORISSA	224	130	4.0
NAGALAND	20	7	7.2
ALL INDIA	**27688**	**22616**	**1.45**
C.V.	**.941**	**.798**	

Source : Area & Production of Principal Crops in India. (1979-80 & 1989-90)

Table 3.10 : TRENDS IN PRODUCTIVITY , AREA CULTIVATED & TOTAL PRODUCTION IN JOWAR , BAJRA & MAIZE .

Productivity (Kg/ h.a.)

CROP	PRODUCTIV -ITY 1988-90	PRODUCTIV -ITY 1975-77	C.V. 1988-90	C.V. 1975-77	R.O.G. OF PRODUCTIV -ITY B/W T1 &T2
JOWAR	784	629	.352	.350	1.6
BAJRA	629	519	.309	.294	1.4
MAIZE	1514	1132	.219	.284	2.1

Area ('000 h.a.)

CROP	AREA 1988-90	AREA 1975-77	C.V. 1988-90	C.V. 1975- 77	R.O.G. OF AREA B/W T1 & T2
JOWAR	14719	15931	1.081	.978	-0.6
BAJRA	11473	11161	1.3	.835	0.2
MAIZE	5906	6015	.777	.807	-0.1

Total Output ('000 tonnes)

CROP	TOTAL OUTPUT 1988-90	TOTAL OUTPUT 1975-77	C.V. 1988-90	C.V. 1975-77	R.O.G. OF TOT. OUTPUT B/W T1&T2
JOWAR	11534	10014	1.224	1.027	1.0
BAJRA	7214	5794	.833	.639	1.6
MAIZE	8940	6808	.704	.600	2.0

Source : Calculated from tables contained in Estimates of Area & Production of Principal Crops in India , 1979-80 , 1989-90.

Table 3.11 : PRODUCTIVITY OF FOODGRAINS : STATEWISE

STATE	PRODUCTIVITY 1988-90 (T2)	PRODUCTIVITY 1975-77 (T1)	R.O.G. OF PRODUCTIVITY B/W T1 & T2
PUNJAB	3285	2060	3.4
HARYANA	2242	1233	4.4
WEST BENGAL	1842	1206	3.1
TAMIL NADU	1837	1355	2.2
KERALA	1731	1450	1.3
TRIPURA	1697	1167	2.7
UTTAR. P.	1692	1034	3.6
MANIPUR	1612	1528	0.4
ANDHRA. P.	1589	904	4.1
J & K	1492	1199	1.6
HIMACHAL. P.	1466	1245	1.2
BIHAR	1257	905	2.4
ORISSA	1076	770	2.4
GUJRAT	1072	874	1.5
NAGALAND	1071	892	1.3
ASSAM	1067	954	0.8
KARNATAKA	941	887	0.4
MADHYA. P.	883	624	2.5
MAHARASHTRA	843	671	1.6
RAJASTHAN	785	622	1.1
ALL INDIA	**1340**	**919**	**2.7**
C.V.	**.388**	**.317**	

Source : Area & Production of Principal Crops in India. 1979-80 , 1989-90

Table 3.12 : G.C.A. UNDER FOODGRAINS : STATEWISE ('000 h.a.)

STATE	G.C.A. 1988-90 (T2)	G.C.A. 1975-77 (T1)	R.O.G. OF G.C.A. B/W T1 & T2
UTTAR. P.	20386	19052	0.5
MADHYA. P.	17262	17278	Neg.
RAJASTHAN	12209	12234	Neg.
MAHARASHTRA	14142	14010	0.2
BIHAR	9462	10142	-0.5
ANDHRA. P.	8035	9347	-1.1
KARNATAKA	7417	6646	0.8
ORISSA	6892	6261	0.7
WEST BENGAL	6332	6655	-0.4
PUNJAB	5488	4374	1.0
GUJRAT	4718	4890	-0.2
TAMIL NADU	4211	4987	-1.2
HARYANA	4049	4172	-0.2
ASSAM	26142	2445	0.5
J & K	878	809	0.6
HIMACHAL. P.	871	828	0.4
KERALA	607	918	-3.0
TRIPURA	277	311	-0.8
MANIPUR	170	193	-0.9
NAGALAND	154	102	3.0
ALL INDIA	**127090**	**126268**	**Neg.**
C.V.	**.910**	**.892**	

Source : Area & Production of Principal Crops in India. 1979-80 , 1989-90.

Table 3.13 : TOTAL PRODUCTION OF FOODGRAINS : STATEWISE

STATE	TOTAL OUTPUT 1988-90 (T2)	TOTAL OUTPUT 1975-77 (T1)	R.O.G. OF TOT. OUTPUT B/W T1 & T2
UTTAR. P.	34485	19693	4.1
PUNJAB	18026	9012	5.1
MADHYA. P.	15235	10788	2.5
ANDHRA. P.	12765	8452	3.0
MAHARASHTRA	12163	9400	1.9
BIHAR	11892	9180	1.9
WEST BENGAL	11667	8023	2.7
RAJASTHAN	9594	7613	1.7
HARYANA	9077	5145	4.1
TAMIL NADU	7737	6760	1.0
ORISSA	7414	4823	3.1
KARNATAKA	6977	5894	1.2
GUJRAT	5056	4274	1.2
ASSAM	2790	2333	1.3
J & K	1310	970	2.2
HIMACHAL. P.	1277	1031	1.5
KERALA	1051	1331	-1.7
TRIPURA	470	363	1.9
MANIPUR	274	295	-0.5
NAGALAND	165	91	4.3
ALL INDIA	**170274**	**116100**	**2.8**
C.V.	**.943**	**.815**	

Source : Area & Production of Principal Crops in India. 1979-80 , 1989-90.

Chart 3.1 INEQUALITIES IN PRODUCTIVITY OF RICE, WHEAT & TOTAL FOODGRAINS

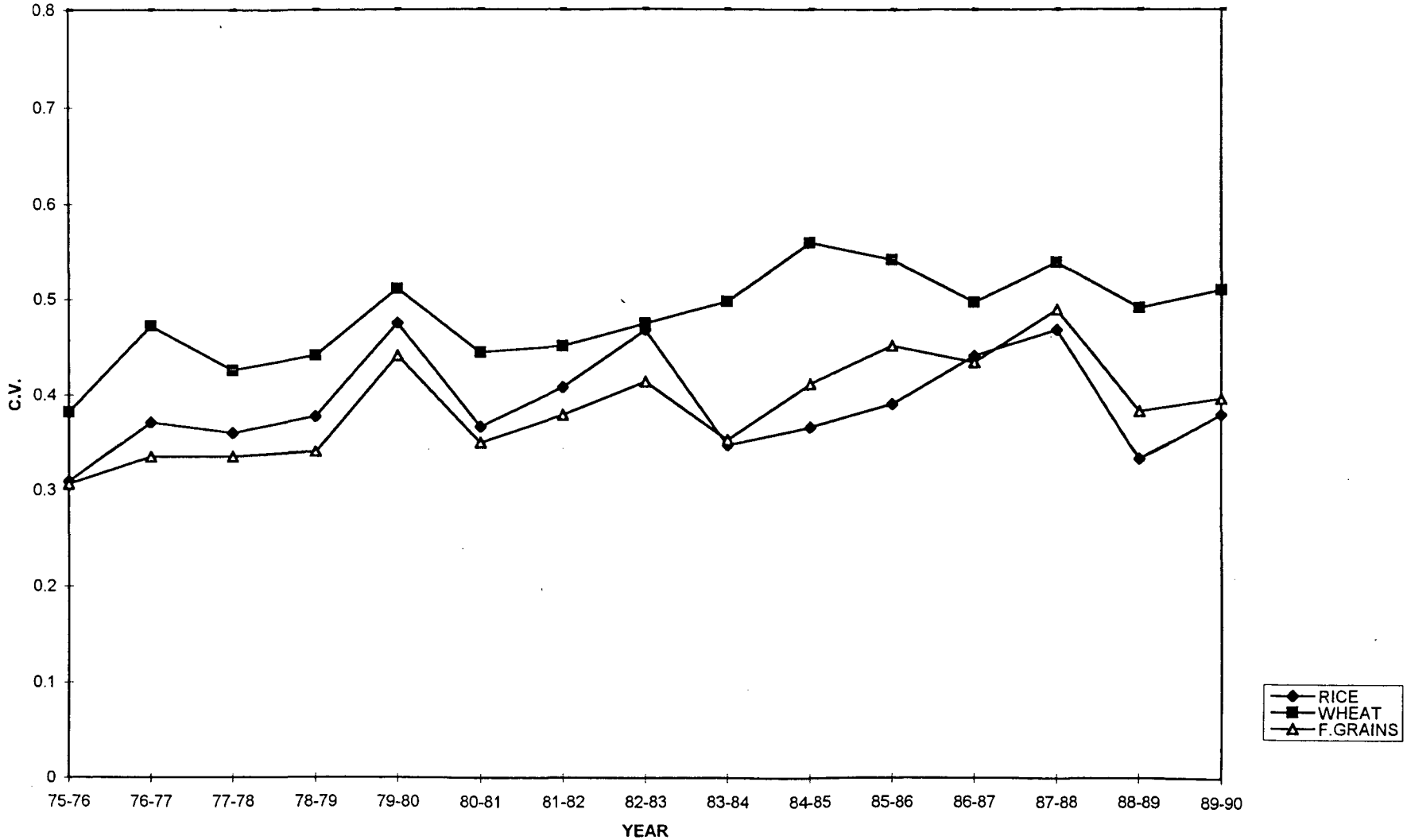


Chart 3.2 INEQUALITIES IN G.C.A. GROWING THE H.Y.V.P. CROPS & TOTAL FOODGRAINS

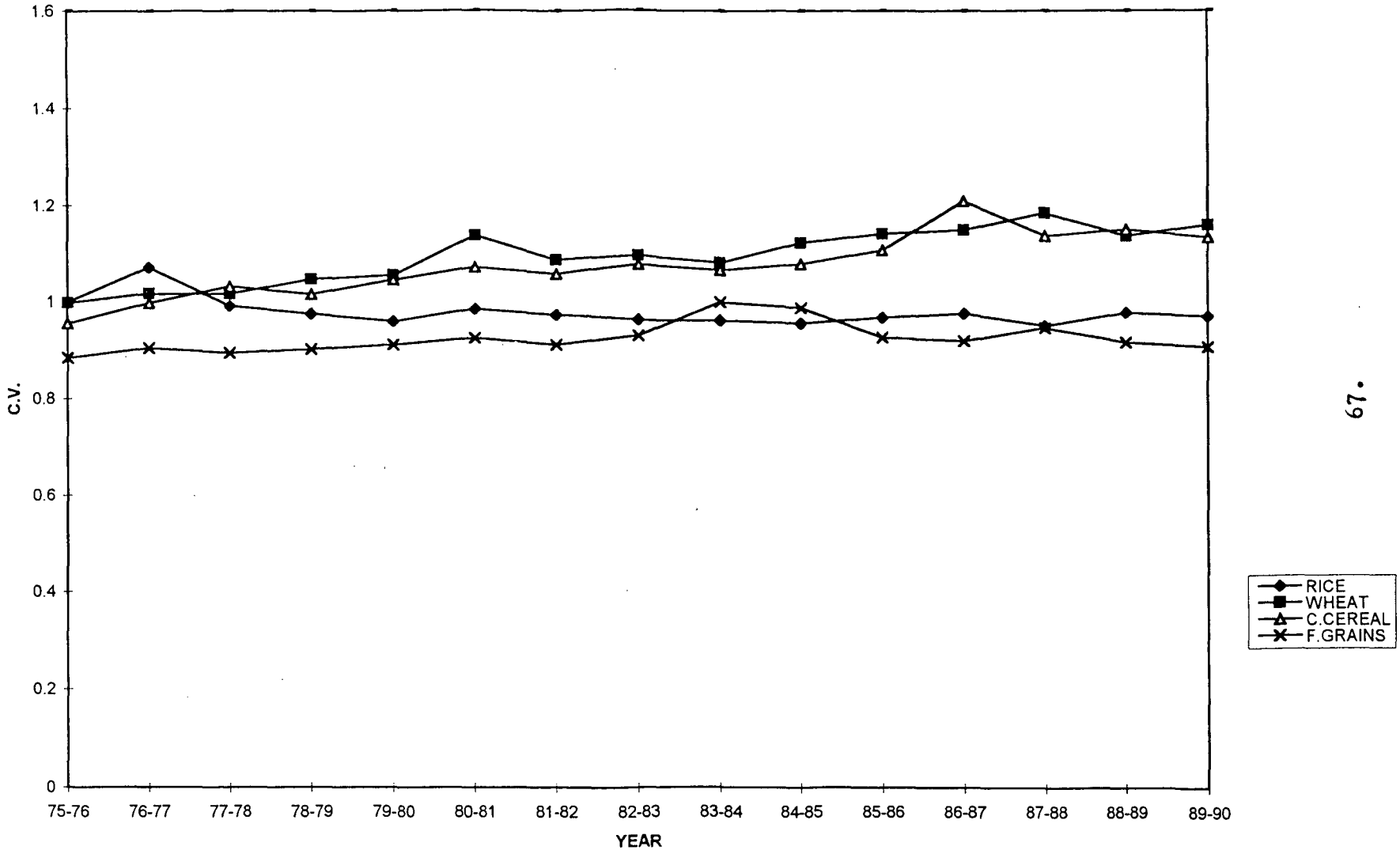


Chart 3.3 INEQUALITIES IN TOTAL OUTPUT OF RICE, WHEAT & TOTAL FOODGRAINS

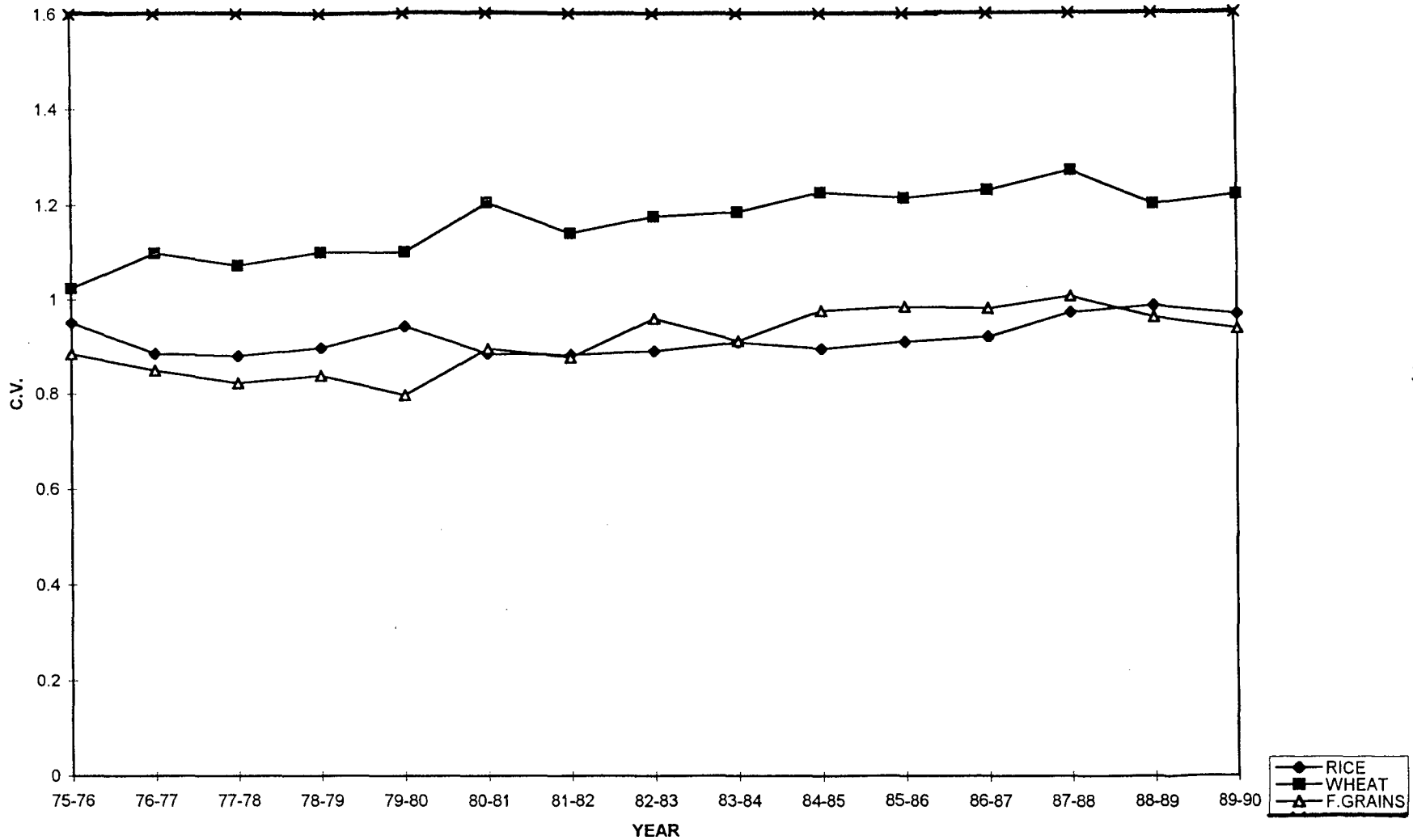


Chart 3.4 INEQUALITIES IN PRODUTIVITY OF COARSE CEREALS

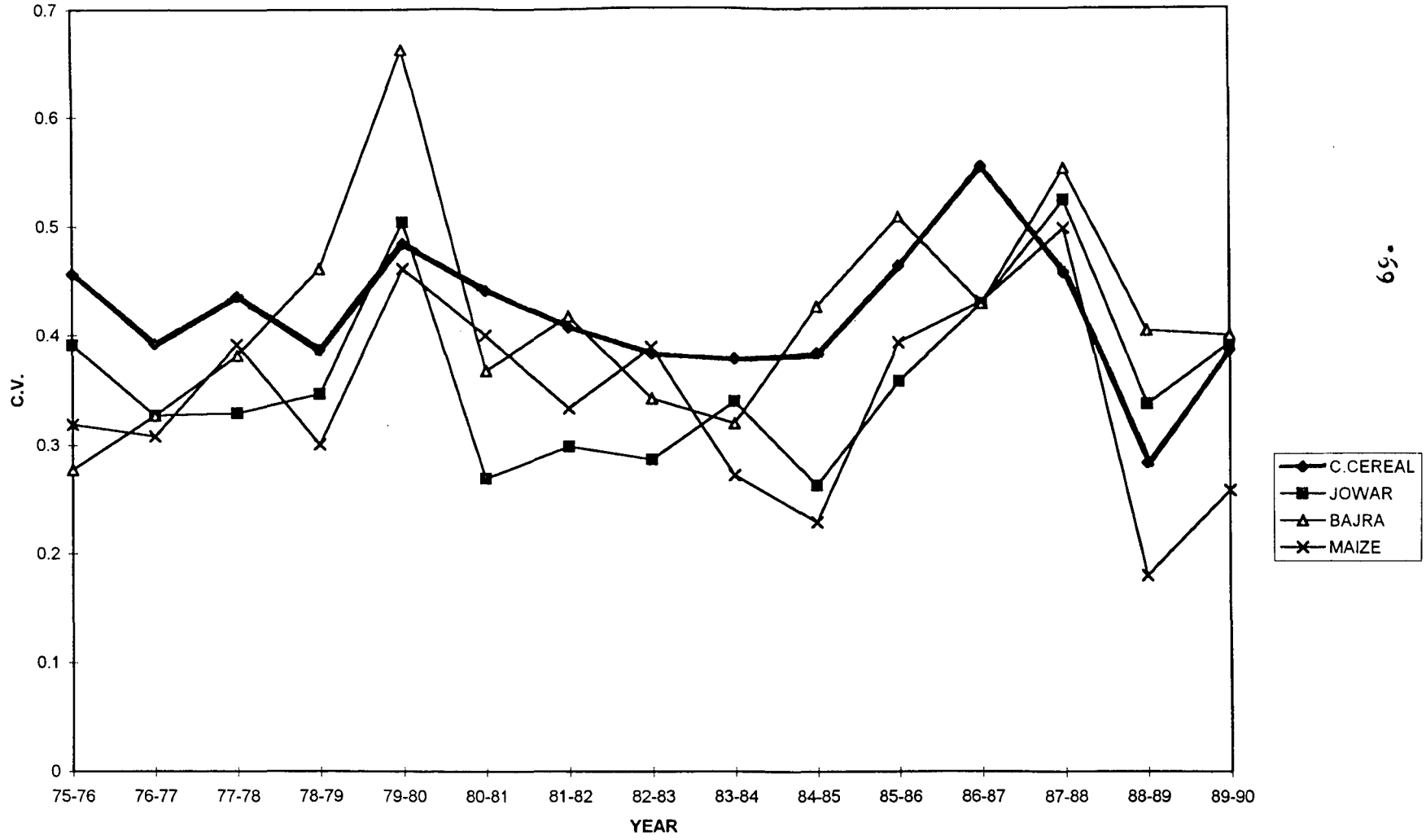
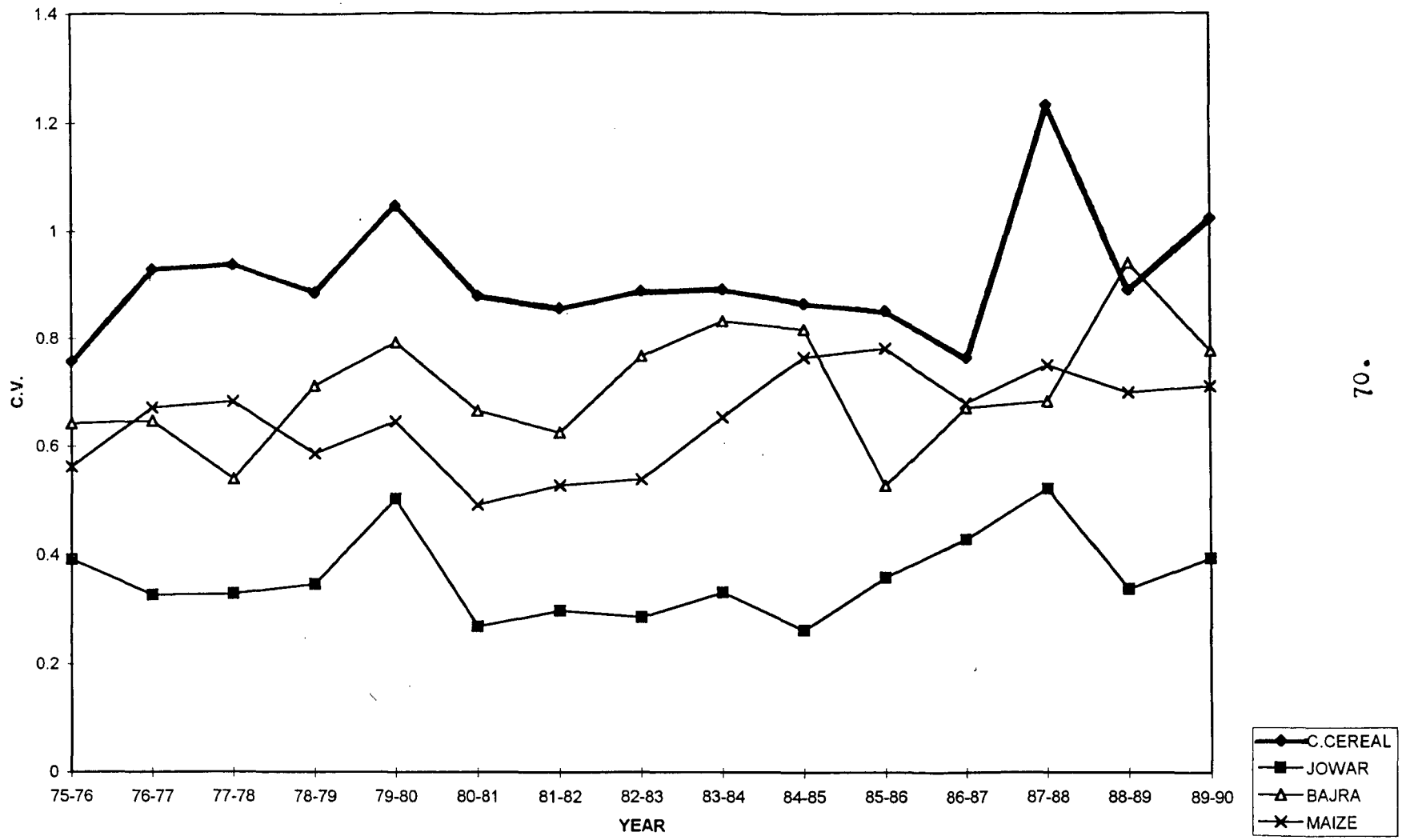


Chart 3.5 INEQUALITIES IN TOTAL OUTPUT OF COARSE CEREALS



CHAPTER 4

INEQUALITIES IN THE 'AGRICULTURAL SECTOR' : AN INTER STATE ANALYSIS

In the previous chapters we have shown that though the H.Y.V.P. has spread to a substantial portion of the country, inequalities in productivity and total output levels have continued to increase for most of the H.Y.V.P. crops and this has resulted in rising inequalities in the total foodgrain sector as well. We have however not yet looked at the inequalities in the 'Agricultural Sector' as a whole and in this chapter we shall do so.

Traditionally, the Agricultural Sector has been classified into 2 main sub-sectors - 'foodgrains' and 'commercial crops' (though with the growing marketable surplus of foodgrains, this classification is slowly breaking down). Given the fact that the foodgrain sector has seen rising inequalities, the important question is whether this has resulted in rising inequalities in the 'Agricultural Sector' too or whether the inequalities in the 'Commercial Crops' affected these inequalities substantially and brought about a different trend.

Performance of commercial crops can greatly affect inter-state inequalities. Take the example of Assam, which despite having a very low level of productivity for the foodgrain sector, it has a relatively high level of productivity for the Agricultural Sector because of the high value of its 'tea crop'. Similarly Kerala has a very high level of productivity for its Agricultural sector mainly because of the large volume of spices grown in the State.

It is important to note that total output and productivity levels for the 'Agricultural Sector' as a whole cannot be measured in physical terms due to the heterogeneous nature of agricultural produce and will have to be measured in monetary terms. For this purpose C.S.O.'s data on N.S.D.P. will be used. One must also remember that the figures for the 70's (1975-76 to 1979-80) and the 80's (1980-81 to 1989-90) are strictly not comparable as they belong to different time series. This study uses N.S.D.P. estimates at 'current prices because the estimates for the 70's (at constant prices) use 1970-71 as base while the estimates for the 80's uses 1980-81 as base. Given this, the comparison of figures for 1975-77 and 1988-90 at constant prices would become

meaningless. Of course, constant price estimates for 1981-82 and 1989-90[1] have been included so that agricultural growth in real terms can be assessed atleast for the 80's.

In this chapter not only will we look at the inequalities in productivity[2], area cultivated and total value of output but we will also analyse the trends in inequalities in per capita incomes of agricultural workers.

Tables 4.1 to 4.8 show increasing trend in inequalities in the 'agricultural sector' as well.

Table 4.1 shows that there has been a relatively sharp rise in inequalities in productivity levels (measured in current prices) during the period of study. The rise in inequalities is mainly because of the large increase in productivity levels recorded by states such as Manipur and Bihar. Of course, it must be remembered that the unrealistically high growth rates shown in Table 4.1 are mainly due to the effects of inflation. Table 4.2 shows that inequalities in productivity (constant price) has also increased, atleast during the 80's. This is because the states of West Bengal, Haryana, Manipur

and Himachal Pradesh which anyway had high productivity levels, recorded very healthy growth rates. On the other hand, among the low productivity states, only Rajasthan and Maharashtra were able to record relatively high growth rates. Regionwise, the south's performance (with the exception of Kerala) was extremely disappointing as none of the States recorded any significant growth rates in real terms.

It is interesting to take note of Bihar's growth performance. It recorded one of the highest growth rates in productivity levels (current prices). In fact according to Table 4.1, Bihar actually had a higher productivity level than Haryana in 1988-90 - an obviously unbelievable proposition. However as is clearly shown by Table 4.2, most of these productivity increases were due to inflationary pressures as productivity levels (in real terms) almost stagnated. Chart 4.1 shows that inequalities in productivity (current prices) demonstrates a steady rising trend.

Table 4.3 shows that inequalities in total G.C.A. has stagnated as only the states of Punjab, Orissa and Nagaland have been able to bring about significant increases in their G.C.A.'s. This

clearly shows the inefficiency in utilising irrigation facilities on the part of the states, as most of them have seen an increase in their net irrigated areas and the fact that they have not been able to increase their G.C.A.'s indicates their inability in increasing their cropping intensities.

Table 4.4 and 4.5 show that there is an increasing trend in inequalities in total value of output both at constant as well as current prices[3]. The fastest growing state in real terms, is clearly West Bengal, which has a much higher growth rate than even states such as Punjab and Haryana. This helps to underline the changes in the regional distribution of growth that has been taking place since the 80's. No doubt, the North-Western region of the country (Punjab, Haryana and Uttar Pradesh) is still by far the most important agricultural region but the Eastern sector (particularly West Bengal, Orissa and Assam) has also grown at an impressive rate, which is in sharp contrast to the first decade of the H.Y.V.P. when its performance was extremely poor. It is important to note that while West Bengal and Orissa have benefitted from the H.Y.V.P., the main source of growth for Assam has been its commercial crops. The performance of the Southern region (with the

exception of Kerala) has been extremely disappointing, as a result of which the souths share in the country's 'Net Domestic Product' arising out of agriculture has declined (Table 4.8). The share of the Eastern and Northern regions has increased while that of the Central-Western regions have declined. Chart 4.1 shows that the inequalities in 'N.S.D.P.' arising out of agriculture exhibits a gradual increase.

Table 4.6 and 4.7 shows that there is marked increased in inequalities in the "per capita income of the agricultural worker" which in this study has been defined as:-

$$\frac{\textbf{NET STATE DOMESTIC PRODUCT ARISING FROM AGRICULTURE}}{\textbf{TOTAL AGRICULTURAL WORKFORCE IN THE STATE}}$$

Table 4.7 shows that the only 2 States which had a high growth rate of "per capita income" in real terms were West Bengal and Punjab. In the other States, rapid growth in the agricultural workforce has eaten away most of the benefits of the increase in N.S.D.P. In fact most of the Southern and North-Eastern States (with the exception of Kerala and Assam) have either seen a stagnation or a decline in

the per capita incomes. Other states which have performed poorly with respect to growth of per capita incomes are Jammu & Kashmir, Uttar Pradesh, Madhya Pradesh & Bihar. Graph 4.1 shows that the inequalities in income exhibits a sharp tendency to rise specially since the mid 80's. The reason why the inequalities in per capita incomes have risen faster than the inequalities in the NSDP, is that most of the states with low per capita incomes - Madhya Pradesh, Tamil Nadu and Andhra Pradesh have very large annual additions to the workforce and these additions have become larger over time due to the lack of adequate employment opportunities outside the agricultural sector. This has greatly retarded the growth of per capita incomes in these States, which in turn has led to rising inequalities in per capita incomes.

Thus we have seen that the Agricultural Sector as a whole is also characterised by increasing inequalities. These inequalities have increased irrespective of whether constant or current cost estimates are used. I feel that if we were able to obtain comparable 'constant price' estimates right from the mid 70's to the end of the 80's, the C.V. for constant price estimates would be much higher

than the C.V. using current cost estimates. This is because inflationary pressures in states such as Bihar and Madhya Pradesh have played a major role in artifically inflating their agricultural performances (measured in terms of 'current prices').

NOTES :

1. 1981-82 AND 1989-90 have been chosen because both received approximately equal amount of rainfall (Chart 1.1)

2. Productivity has been defined as

$$= \frac{\text{N.S.D.P.}}{\text{State's G.C.A.}}$$

3. As N.S.D.P. figures for Rajasthan are not available for 1989-90, an average of the N.S.D.P. estimate for 1987-88 and 1988-89 has been taken instead. This is against the normal practise adopted in this paper of taking a preceding year's figure if a particular year's estimates are not available. We have done this because 1988-89 being a year of excellent rainfall, saw an extremely large increase in Rajasthan's N.S.D.P. and as 1989-90 was a year of normal

rainfall, adopting 1988-89 for N.S.D.P. estimate alone would surely have resulted in an extremely large exagerration of Rajasthan's performance.

Table 4.1 **PRODUCTIVITY OF AGRICULTURAL SECTOR (AT CURRENT PRICES)**
(Rs. / h.a)

STATE	PRODUCTIVITY 1988-90	PRODUCTIVITY 1975-77	R.O.G. OF PRODUCTIVITY
MANIPUR	12717	2505	12.3
KERALA	10037	3236	8.4
WEST BENGAL	8175	2713	8.1
PUNJAB	8090	2329	9.3
J & K	8040	2493	8.7
ASSAM	7290	2343	8.5
BIHAR	7225	1838	10.3
HARYANA	6947	1925	9.6
TRIPURA	6414	2907	5.8
UTTAR. P.	6197	1727	9.6
HIMACHAL. P.	5911	1935	8.3
ANDHRA. P.	5762	1537	9.9
TAMIL NADU	5446	1814	8.2
GUJRAT	5121	1473	9
KARNATAKA	4800	1340	9.5
MAHARASHTRA	4344	1179	9.8
ORISSA	4176	1335	8.5
NAGALAND	3312	2148	3.1
RAJASTHAN	3235	918	9.4
MADHYA. P.	3062	866	9.4
C.V.	**.370**	**.331**	

Source : Calculated from data contained in " C.S.O. estimates of N.S.D.P. ." & "Area & Production of Principal crops in India ." (Various Issues.)

Table 4.2 PRODUCTIVITY OF THE AGRICULTURAL SECTOR (AT 1980-81 PRICES)
(Rs. / h.a.)

STATE	PRODUCTIVITY 1981-82	PRODUCTIVITY 1989-90	R.O.G. OF PRODUCTIVITY IN REAL TERMS	R.O.G. OF PRODUCTIVITY AT CURRENT PRICES
KERALA	5454	4499	2.4	10.9
MANIPUR	5217	3890	3.7	13.8
PUNJAB	4862	3873	2.9	10.1
WEST BENGAL	4832	3086	5.8	10.9
J & K	4611	4198	1.2	7.1
HARYANA	4128	2756	5.2	12.5
ASSAM	4081	3364	2.4	10.9
HIMACHAL. P.	4034	3044	3.6	9.3
TRIPURA	3835	3052	2.9	12.2
UTTAR. P.	3514	2887	2.5	10.8
ANDHRA. P.	3191	2967	0.9	8.4
BIHAR	2929	2670	1.2	11.2
TAMIL NADU	2927	3263	-1.4	6.0
KARNATAKA	2700	2392	1.5	7.6
MAHARASHTRA	2499	1975	3.0	10.6
GUJRAT	2481	2581	-0.5	7.6Q
ORISSA	2309	1902	2.4	9.2
NAGALAND	1926	2016	-0.6	5.0
RAJASTHAN	1564	1235	3.0	9.5
MADHYA. P.	662	588	1.5	10.2
C.V.	**.363**	**.345**		

Source : Calculated from data contained in "C.S.O. estimates of N.S.D.P. ." & "Area & Production of Principal Crops in India."

Table 4.3 : TOTAL GROSS CROPPED AREA : STATEWISE ('00,000 h.a.)

STATE	G.C.A. 1988-90	G.C.A. 1975-77	R.O.G. OF G.C.A.
UTTAR. P.	253	231	.64
MADHYA. P.	226	211	.48
MAHARASHTRA	203	197	.21
RAJASTHAN	188	170	.72
ANDHRA. P.	133	124	4.49
KARNATAKA	120	105	.93
GUJRAT	106	104	.15
BIHAR	105	113	-0.5
ORISSA	92	72	1.8
WEST BENGAL	83	79	.85
PUNJAB	74	63	1.2
TAMIL NADU	66	72	-0.6
HARYANA	58	54	.59
ASSAM	37	32	.97
KERALA	30	29	.09
J & K	10	9	.37
HIMACHAL. P.	10	9	.37
TRIPURA	4.3	3.8	.89
NAGALAND	2	1	3.9
MANIPUR	1.8	2.1	-1.1
C.V.	**.839**	**.84**	

Source : " Area & Production of Principal Crops in India." 1979-80 , 1989-90

Table 4.4 : NET STATE DOMESTIC PRODUCT (AT 1980-81 PRICES) ARISING FROM THE AGRICULTURAL SECTOR (Rs. Lakhs)

STATE	N.S.D.P. 1989-90	N.S.D.P. 1981-82	R.O.G. OF N.S.D.P. AT CONSTANT PRICES	R.O.G. OF N.S.D.P. AT CURRENT PRICES
UTTAR. P.	890395	715005	2.8	11.1
MAHARASHTRA	507840	395160	3.2	10.8
ANDHRA. P.	423061	387229	1.1	8.6
WEST BENGAL	403486	228022	7.4	12.6
PUNJAB	359810	241263	5.1	12.5
KARNATAKA	326997	268631	2.5	9.9
BIHAR	305202	283810	0.9	11.4
RAJASTHAN	279878	229715	2.5	9.0
GUJRAT	264271	281275	-0.8	7.2
HARYANA	233234	160672	4.8	12.1
ORISSA	215190	166255	3.3	10.1
TAMIL NADU	199691	225491	-1.5	5.8
KERALA	164717	130483	3.0	11.4
ASSAM	153441	116380	3.5	12.1
MADHYA. P.	148720	127920	1.9	10.6
J & K	47497	41144	1.8	7.7
HIMACHAL. P.	39130	28917	3.9	9.5
TRIPURA	16109	12818	2.9	12.2
MANIPUR	9391	9335	Neg	9.7
NAGALAND	3851	3226	2.2	7.3
C.V.	**.824**	**.816**		

Source : C.S.O. Estimates of N.S.D.P.

Table 4. 5 : NET STATE DOMESTIC PRODUCTS ARISING FROM AGRICULTURE. (CURRENT PRICES) (Rs Lakhs)

STATE	N.S.D.P. 1988-90	N.S.D.P. 1975-77	R.O.G. OF N.S.D.P.
UTTAR. P.	1567498	399380	10.2
MAHARASHTRA	882681	232512	10
ANDHRA. P.	764048	190762	10.4
BIHAR	755776	207774	9.6
MADHYA. P.	691455	182925	9.9
WEST BENGAL	682630	215531	8.6
RAJASTHAN	609415	156371	10.2
PUNJAB	598691	145945	10.6
KARNATAKA	574511	140856	10.6
GUJRAT	545429	153581	9.5
HARYANA	404985	103273	10.2
ORISSA	386152	95746	10.5
TAMIL NADU	361332	130488	7.5
KERALA	300114	95619	8.5
ASSAM	270462	75910	9.5
J & K	82817	23182	9.5
HIMACHAL. P.	57634	17902	8.7
TRIPURA	27580	11046	6.7
MANIPUR	23527	5261	11.3
NAGALAND	6292	2362	7.2
C.V.	.767	.735	

Source : C.S.O. ESTIMATES OF N.S.D.P.

Table 4.6 : PER CAPITA INCOME OF AGRICULTURAL WORKERS (Rs/Worker) . (AT CURRENT PRICES)

STATE	P.C.Y. 1989-90	P.C.Y. 1981-82	R.O.G. OF P.C.Y.
PUNJAB	18142	5507	8.9
HARYANA	15282	5164	8.1
KERALA	9681	3297	8.0
GUJRAT	7038	2538	7.6
WEST BENGAL	6499	2782	6.2
J & K	6125	2318	7.2
RAJASTHAN	6109	2351	7.1
ASSAM	5694	2410	6.3
TRIPURA	5516	2584	5.6
KARNATAKA	5426	1783	8.3
UTTAR. P.	5424	1755	8.4
ORISSA	5218	1609	8.8
HIMACHAL. P.	4803	1790	7.3
MANIPUR	4705	1754	7.3
MAHARASHTRA	4091	1714	6.4
ANDHRA. P.	4043	1334	8.2
MADHYA. P.	3799	1325	7.8
BIHAR	3788	1340	7.7
TAMIL NADU	2737	1255	5.7
NAGALAND	1573	1181	2.1
C.V.	.615	.507	

Source : Calculated from C.S.O. estimates of N.S.D.P. & 1971, 1981 & 1991 Census figures for . Agricultural workers.

Table 4.7 : **PER CAPITA INCOME OF AGRICULTURAL WORKERS AT 1980-81 PRICES. (Rs. / h.a.)**

STATE	P.C.Y. 1981-82	P.C.Y. 1989-90	R.O.G. OF P.C.Y. AT CONSTANT PRICES	R.O.G. OF P.C.Y. AT CURRENT PRICES
PUNJAB	10903	8319	3.4	10.7
HARYANA	8638	6986	2.7	9.9
KERALA	5313	4349	2.3	11.0
WEST BENGAL	3806	2621	4.7	10.2
ASSAM	3568	3233	1.2	9.6
RAJASTHAN	3413	3104	1.2	6.2
J & K	3393	3740	-1.2	5.5
GUJRAT	3388	4347	-3.0	11.8
HIMACHAL. P.	3261	2629	2.7	8.4
TRIPURA	3221	3204	0.1	9.1
KARNATAKA	3056	2952	0.4	7.7
UTTAR. P.	3049	2895	0.6	8.9
ORISSA	2869	2519	1.6	8.3
MAHARASHTRA	2806	2583	1.0	9.1
ANDHRA. P.	2215	2405	-1.0	8.6
MANIPUR	1878	2334	-2.7	6.7
BIHAR	1511	1689	-1.4	8.9
TAMIL NADU	1501	1911	-3.0	4.3
NAGALAND	963	1075	-1.4	3.5
MADHYA. P.	808	820	-0.2	8.3
C.V.	**.670**	**.546**		

Source : **Calculated from C.S.O. estimates of N.S.D.P. & 1971 , 1981 , 1991 Census for figures of agricultural workers.**

Table 4.8 : PERCENTAGE SHARE OF REGIONS IN COUNTRY'S NET DOMESTIC PRODUCT.

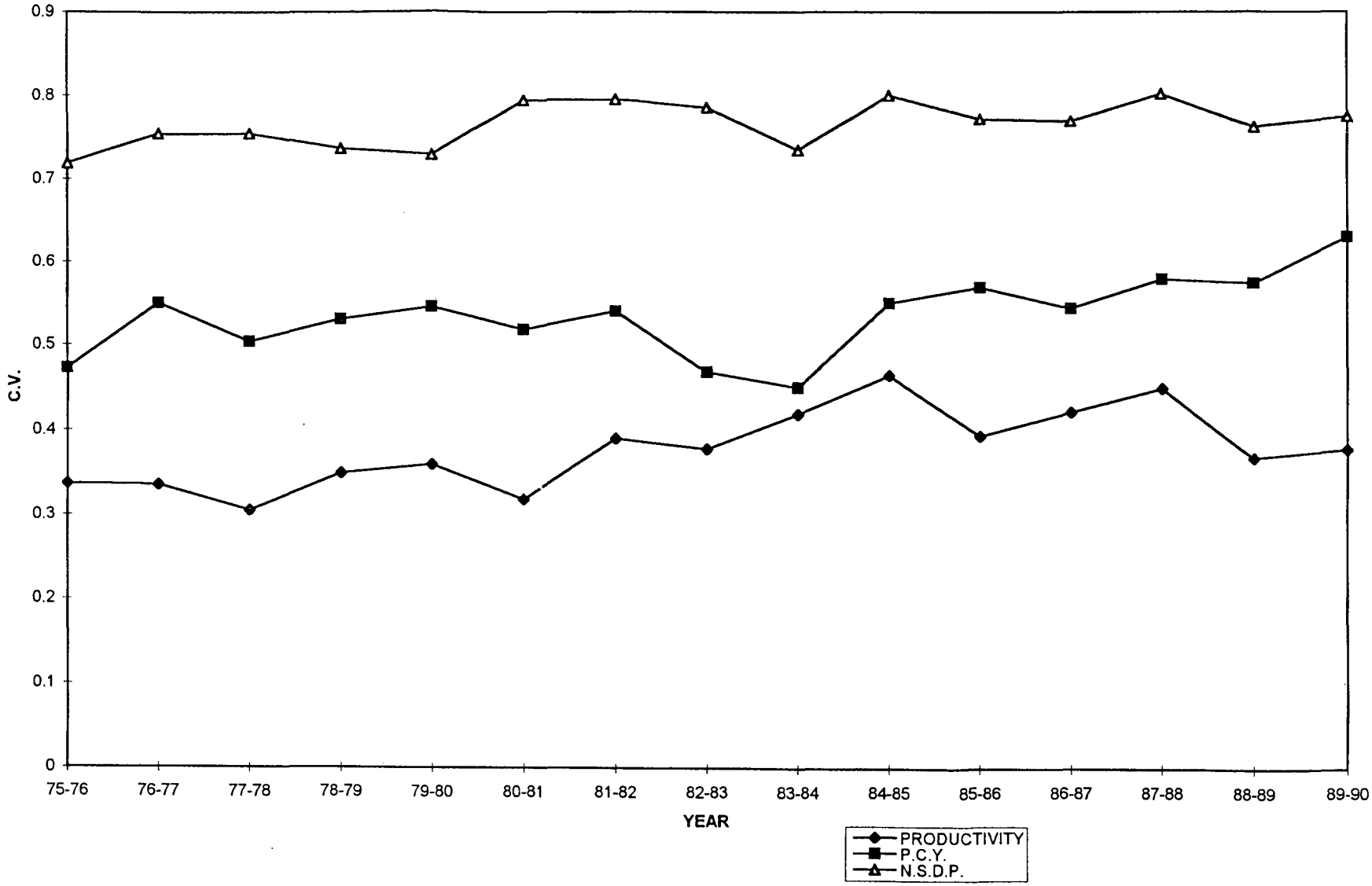
REGION	PERCENTAGE SHARE IN 1989-90	PERCENTAGE SHARE IN 1981-82
NORTH	31.1	19.9
SOUTH	22.1	24.7
EAST	19.0	19.9
CENTRAL & WEST	23.7	25.1
OTHERS	1.0	1.3
ALL INDIA	**100**	**100**

Source :Calculated from table 4.7

Note : All India figure has been taken as the summation of N.S.D.P. arising out of agriculture for all states

The Northern region includes Haryana , H . P. , J & K , Punjab & U. P.
The Eastern region includes Assam , Bihar , Manipur , Nagaland , Tripura , Orissa & W.B.
The Southern region includes A. P. , Karnataka , Kerala & T. N .
The Central-Western Region includes Gujrat , M. P. , Maharashtra & Rajasthan .
Others are states not included in this study

Chart 4.1 INEQUALITIES IN THE AGRICULTURAL SECTOR



CHAPTER 5

SUMMARY & CONCLUSIONS

The study has closely examined the inequalities in the Agricultural Sector. We have shown that the H.Y.V.P., over time has spread to the different regions of the country, thereby reducing the inter-state inequalities in the coverage of the H.Y.V.P. This is especially true in the case of rice, maize and bajra. In the case of Jowar, though the inequalities have declined, it still continues to be high. This is mainly because the Jowar growing regions of Northern India are not covered by the H.Y.V.P. at all. In the case of wheat, it has been seen that the advanced States such as Uttar Pradesh, Haryana and Punjab have been able to extend the H.Y.V.P. at a slightly faster rate than the backward States.

With regard to the other 'critical' inputs we see that inequalities in fertilizer consumption has declined though this decline has started taking place only since 1983-84 onwards. This is probably due to the special projects set up the government with the aim of increasing fertilizer consumption in rainfed

and other low consumption areas. With regards to inequalities in the provision of irrigation facilities one finds that while there is only a marginal decline in inequalities in total area irrigated, in the case of the H.Y.V.P. crops specifically, there has been a sharp decline in the inequalities. There is of course urgent need to increase irrigation coverage of the 3 coarse cereals, especially in the case of Jowar & Bajra which have only 5 to 6% of their G.C.A. irrigated.

However, despite the decline in inter-state inequalities in the use of the 'New technology' we have shown that inequalities in productivity and total output for the H.Y.V.P. crops has increased (Maize is the only exception as there was a reduction in the inequalities in productivity for this crop). This increasing inequality has come about mainly because there has been a growing tendency towards regionalisation of the H.Y.V.P. crops. That is, most of the productivity and total output increases in these crops have been achieved in areas which were traditionally well endowed for growing these crops. For example, while the wheat crop is getting concentrated in Northern India, Rice is getting regionalised in Eastern and Southern India. In the

case of coarse cereals too, these crops are getting concentrated in the 4 states of Rajasthan, Maharashtra, Madhya Pradesh and Karnataka which also happen to be the 4 main 'coarse cereal' growing States.

This points to the fact that the H.Y.V.P. has been most effective in the areas which are traditionally suited for growing the concerned crops, with it being less effective in the other regions. This has resulted in the increasing inequalities.

We have also found that variations in rainfall have a profound effect on the trend in inequalities, with inequalities tending to rise sharply in years of poor rainfall. This happens because the advanced agricultural states such as Punjab, Harayana and Uttar Pradesh do not get as adversely affected in years of poor rainfall as do states such as Madhya Pradesh & Gujarat, as the former states have a much more extensive irrigation system than the latter. Variations in rainfall have the maximum effect on inequalities in coarse cereals because these crops hardly have any irrigation cover. While in the case of rice too, rainfall does have a substantial effect on inequalities, in the case of wheat the

fluctuations in inequalities caused by variations in rainfall is the least because almost 80% of the wheat crop is irrigated.

We have also found that the rising inequalities among the H.Y.V.P. crops have not only resulted in increasing inequalities in the foodgrain sector but also in the 'Agricultural Sector' as a whole. The per capita income inequalities have demonstrated a tendency to rise fairly sharply and this has been because of the rapidly growing agricultural workforce in many of the low income states such as Bihar, Madhya Pradesh, Andhra Pradesh & Tamil Nadu.

This study has also found that regionwise, though the North-Western Sector still remains the most important, the Eastern Sector, specially West Bengal has performed well. The Southern Region however has been very disappointing.

Keeping all the findings of this study in mind, we can conclude by saying that while Prof. Hanumantha was correct in saying that the H.Y.V.P. has over time spread to the different regions of the country, Prof. Das & Prof. Barua have correctly asserted that inequalities have continued to increase.

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