FACTORS AFFECTING THE HIGH YIELDING VARIETIES PROGRAMME FOR PADDY IN INDIA

by

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D E C L A R A T I O N

Except where otherwise indicated, this sub-thesis is my own work.

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Material in this thesis is not to be referred to or quoted without the direct permission of Dr R.T. Shand, No. 4 Australian Compound, 1/50 Shanti Path, Chanakyapuri - 21, New Delhi, India, in whose care the data on which this thesis is based were originally entrusted.

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CHAPTER I

INTRODUCTION

The High Yielding Varieties Programme (HYVP) is the latest of a series of attempts made by the Indian Government to meet the current and growing problem of food shortage and poverty in rural India. The programme was first introduced on a national scale in the kharif season of 1966-67. Whereas the objective of its predecessors, the programmes of Community Development, Co-operative Movement etc., were to ensure the fullest development of the material and human resources over a period of years, to develop responsible and responsive village leadership and self-governing institutions and thereby raise the level of living of the village community, the HYVP attempts to raise farm productivity and rural earnings through a short cut (technological change), and depends to a great extent on better coordination of scarce resources through the help of the above institutions.

Ever since partition India has been faced with a problem of food shortage. The food problem has been identified with a shortage of food grains because cereals and pulses constitute the staple diet of the people. The shortage takes two forms. There is a chronic situation of undersupply under normal climatic conditions. This becomes a critical shortage when monsoons are unfavourable. The latter situation prevailed in 1965-66 and 1966-67, and in fact precipitated the HYVP.

An examination of consumption trends in India reveals that increases in farm population and per capita income during the period of the Five Year Plans combined to raise food consumption of the farming community at a rate faster than that of food output. There has been

therefore a negative relationship between total food production and the marketed food surplus. In 1967, 326 out of 466 millions (70 per cent of the total population) were reported to be suffering from malnutrition. As the Indian Institute of Public Opinion observed, "even in 1970-71, the position would be no better by that time, the increase in intake being marginal, malnutrition leading to ill health and disease, 3 per cent of total working time is lost to the nation'.[1] Lack of money and inadequate food lead to ill health and sickness and they in their turn lead to workless days and further loss of income - a vicious circle. Other consequences of low domestic surplus have been high domestic prices beyond the control of the government, and costly imports of cereals. This has been a continuing situation despite twenty years of independence, three Five Year Plans and a burdensome accumulation of PL 480 liabilities to the U.S.A. However, within this overall picture it should be noted that in some areas farming has been becoming progressively more efficient and commercialised, especially where there are assured water supplies for irrigation.

The current objectives of policy are to achieve self-sufficiency in food grain production, to reduce imports so as to improve the balance of payments, and to raise living standards of the population. It was estimated that if imports were to be replaced and if internal market demands were to be met in full, the marketed surplus of food grains would have to have risen to 53 million metric tons by 1970-71, or 68 per cent more than the 1960-61 level.

One factor that has made the achievement of this target more difficult has been the fact that the area of land under cultivation has

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[1] Kumar, Premanand, Dr (Mrs) (April 1969). 'Findings of the Indian Institute of Public Opinion', Rural India, (XXXII), (4) ..... whole no. 290.

been approaching the limits of arable land. The result was that an increasing policy emphasis has had to be laid on measures to intensify cultivation. The High Yielding Varieties Programme (HYVP) is just such a programme.

Following the famous 1959 report of the Ford Foundation, 'India's Food Crisis and Steps to Meet it', the 'Intensive Agricultural District Programme' (IADP) was sponsored by the Government of India in 1961-62. The programme aimed to exploit fully the production potentialities of some favoured areas with maximum irrigation facilities and minimum natural hazards. The main objective was to increase food production by demonstrating the use of improved practices and by supplying the farmers with inputs of credit, seeds, fertilizers, pesticides, implements etc. The achievements of the programmes of development, e.g. I.A.D.P., were slow or meagre and were generally considered to be disappointing. The Package Programme[1] in the selected districts did not reach its stated target of increasing food production by 50 per cent during the Third Plan period. It was recognised that traditional levels of inputs applied to traditional varieties would not achieve the objective of self-sufficiency in food. But it was also realised that even with an improvement in the quality and quantity of inputs, especially fertilizers, the traditional varieties were not sufficiently responsive to justify capital intensive operations.

Around the time the I.A.D.P. was being implemented, the Rockefeller Foundation was actively engaged in India, Philippines, Mexico etc., breeding fertilizer responsive food grain varieties for semi-tropical, tropical and monsoon climates. Rockefeller Foundation and plant

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[1] Intensive Agricultural District Programme (IADP) is also known as the Package Programme.

breeders in India concentrated on developing fertilizer responsive high yielding crop varieties for Indian conditions. The outcome was the release of the first hybrid maize variety in 1961. Similar work was carried out on sorghum and pearl millet and new hybrid varieties of these crops were released respectively in 1964 and 1965.

In 1963 trials on Mexican wheat and Taiwanese rice varieties were conducted, and by 1965 varieties were available which had been tested and in some cases accepted by Indian scientists. During the same period the International Rice Research Institute at Los Banos, Philippines, established in 1962, was attempting to develop dwarf indica varieties suitable for monsoon climates throughout Asia.

Monsoon failures in many parts of North India in 1965-66 and 1966-67 led to a severe food shortage and large imports of food grains were necessitated. This situation and the scientific events described in the foregoing paragraphs suggested that drastic changes in agricultural thechnology were both necessary and feasible. This was recognised at a time when the Fourth Five Year Plan was in preparation. As a result, a 'New Strategy' of agricultural development was announced in August 1965, that led to the introduction of the High Yielding Varieties Programme from the kharif season of 1966-67.

The Draft Outline of the Fourth Five Year Plan describes the new strategy for agricultural production as follows:

> If our dependence on imported food grains has to cease, it is necessary to make for greater use of modern methods of production and to bridge the gap between demand and the production by the application of the latest advances in the science of agriculture. A new strategy or approach is needed if we are to achieve results over a short span of time. During the last four years as a result of trials conducted in several research centres in India on exotic and hybrid varieties of seeds, a breakthrough has become

possible. The varieties are highly responsive to a heavy dosage of chemical fertilizers.[1]

Outline of the Programme

The main contents of the programme as envisaged by the Ministry of Food, Agriculture, Community Development & Co-operation Government of India were the following:

1. Selection of suitable areas within the district and its phasing over the five year period.

2. Completion of preparatory arrangements for administrative organisation such as ensuring a full complement of trained staff.

3. Production of certified seeds through National Seeds Corporation, State seed farms and the network of registered growers.

4. Providing facilities for the supply of treated seeds to cultivators or ensuring such treatment before they are sown.

5. Organisation of timely supplies of seeds to cultivators willing to take up this programme either through existing supply points or by way of opening new depots etc.

6. Ensuring the application of the recommended quantity of fertilizers in order to achieve the main objective of increasing per acre crop yields.

7. Making adequate arrangements for the timely supply of plant protection equipment and pesticides.

8. Making suitable arrangement for supplying credit for seeds, fertilizers etc.

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[1] Government of India (1969). Fourth Five Year Plan - 'A Draft Outline', Planning Commission, New Delhi, Para 7, Chapter XI.

9. Ensuring systematic follow up of the programme at the levels of cultivators and the village so as to facilitate assessment of performance and extension of the areas under these varieties.

10. Provision of adequate marketing facilities.

At the level of State government the issues relevant for the evaluation of High Yielding Varieties Programme were those relating to (a) formulation of policy on the programme; (b) creation of suitable machinery to co-ordinate, review and handle all the issues arising from the planning, allocation of resources, etc. for the programme; (c) working out detailed guidelines and directions for the lower levels of implementation; (d) maintaining a close watch on the progress of the programme so that suitable and timely action could be taken to deal with the problems and difficulties reported from the field.

The cultivation of HYVs which now constitutes the most important part of the 'new strategy for agricultural development' has so far included five crops, viz. wheat, paddy, bajra, maize and jowar, in the programme. It is appropriate to review summarily the programme's objectives and achievements in terms of coverage of area under different HYV crops and production. The discussion is largely based upon the first report of a cooperative research project between Programme Evaluation Organisation (PEO), Planning Commission, Government of India and Australian National University as prepared by Lockwood, Mukherjee and Shand in 1971.[1]

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[1] Lockwood, Mukherjee and Shand (1971). The High Yielding Varieties Programme in India, Part I, PEO and ANU, Department of Economics, the Australian National University, Canberra.

WHEAT:

Official data on the HYVs of wheat showed a rapid increase in area from a little over one million acres in 1966-67 to nearly 12 million in 1969-70. For 1970-71, it was estimated that a further increase had brought HYV plantings to 14.6 million acres representing 35 per cent of the total wheat area and 70 per cent of the irrigated wheat area. Lockwood, Mukherjee and Shand used an index of participation as an estimate of the proportion of irrigated crops in the villages surveyed by the PEO that was sown to HYVs. This showed a figure of 54 per cent. The substantial increase in yields (32 per cent) during these three years over the 1964-65 base period was observed to be a strong indication of the significance of the HYVP in the growth of output. However, the report further observed that it had been by no means the only contributing factor.

PADDY:

Lockwood, Mukherjee and Shand in their study reported that measures of HYVP participation for this crop showed that adopters of HYV paddy in kharif sowed a decreasing fraction of their total paddy area to the HYVs over the three years surveyed, with a proportion of only 16 per cent in 1969-70. By contrast, adopters of HYVs in rabi season sowed an increasing proportion of their total paddy area, rising to 55 per cent in 1969-70.[1] Overall only a very small proportion of paddy farmers in the survey were found to adopt HYVs and this proportion had shown a very slow growth over the three years. The

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[1] It is worth noting that HYV paddy was introduced as a kharif crop.

levels of HYVs area coverage, estimated by the index of participation reached only 8 per cent in 1969-70. Official data indicated that a little over 10 million acres were sown to HYVs in 1969-70, which in relation to total paddy acreage showed HYV area coverage was 14 per cent. In any event, both estimates clearly pointed out that the spread of the paddy programme by 1969-70 had been very limited. Official data on average paddy yields indicated no upward trend whatsoever during the HYVP years when compared with the base year (1964-65).

BAJRA (Millet)

The official estimate showed almost 10 per cent of total bajra area was under HYVs in 1969-70, whereas Lockwood, Mukherjee and Shand's study showed a lower 6 per cent. Total output of the crop in 1969-70 was 15 per cent higher than the base year (1964-65). However, the study revealed that the performance of the HYVP for this crop did not suggest that it had any significant influence on yield, and thus on total output, by 1970.

MAIZE

The official statistics showed the general level of participation as 8 per cent (of total area) for this crop in 1969-70 whereas the PEO/ ANU report suggested the figure to be only 1 per cent. Total maize output in 1969-70 was found to be well above the base year level. Average yields were, however, lower and it was only the substantial increase in area sown which had lifted the level of output.

JOWAR (Sorghum)

The general level of participation shown by official figures was 3 per cent, while the first PEO/ANU report suggests the figure was 2 per cent. Like maize the average yield was found to be lower and the area sown to be greater but not great enough to raise total output significantly above that of the base year.

The PEO/ANU report points out that the total output of the five crops included in the HYVP increased by some 11 million tons (16 per cent), from 1964-65 to 1969-70. The expansion in wheat production of roughly 8.8 million tons (80 per cent of the total increase) over the three year period from 1967-68 had been observed to be the crucial contributing factor. No linkage between the HYVP and the remaining 20 per cent output increase from the other four food grains could be established. The overall conclusions were that progress in the HYVP has been substantial for only one crop and had been evident within a limited geographical area of the country. Most significantly results had been negligible for rice, and for hybrids up to the time of the preparation of the report.

The difference between official estimates and those of Lockwood, Mukherjee and Shand could be explained in terms of sample size and/or difficulties in achieving precision in official estimates.

This review of the crops included in the HYVP indicates the nature and extent of past progress and pitfalls, and suggests the importance of the task of identifying the factors affecting the adoption of the HYVP. This becomes all the more urgent in view of the substantially greater expectations held for the HYVP in the Fourth Five Year Plan period.

The two outstanding features of agricultural production in India are the wide variety of crops and the preponderance of food over non-food crops. Paddy is a principal staple crop for nearly three-fourths of the population and occupies the largest acreage. In 1968-69 the area under rice was 37.0 million hectares which represents about 25 per cent of the total cultivated area and about 31 per cent of the total area under food grains. The total output of cleaned rice in that year was 40.0 million tonnes. There are two well defined crop seasons, namely kharif and rabi, in most areas and there is a great diversity in climate, sources and methods of irrigation and also in methods of production of the crop. Because the paddy is so important and because the spread of the paddy programme by 1969-70 had been so limited, it was decided in this study to concentrate upon this crop only.

With the aid of further PEO data, it is proposed to take the study of the spread of new agricultural technology one step further. Field data hitherto unanalysed provide details of local participation and of factors which have influenced this. Accordingly our objectives here are to:

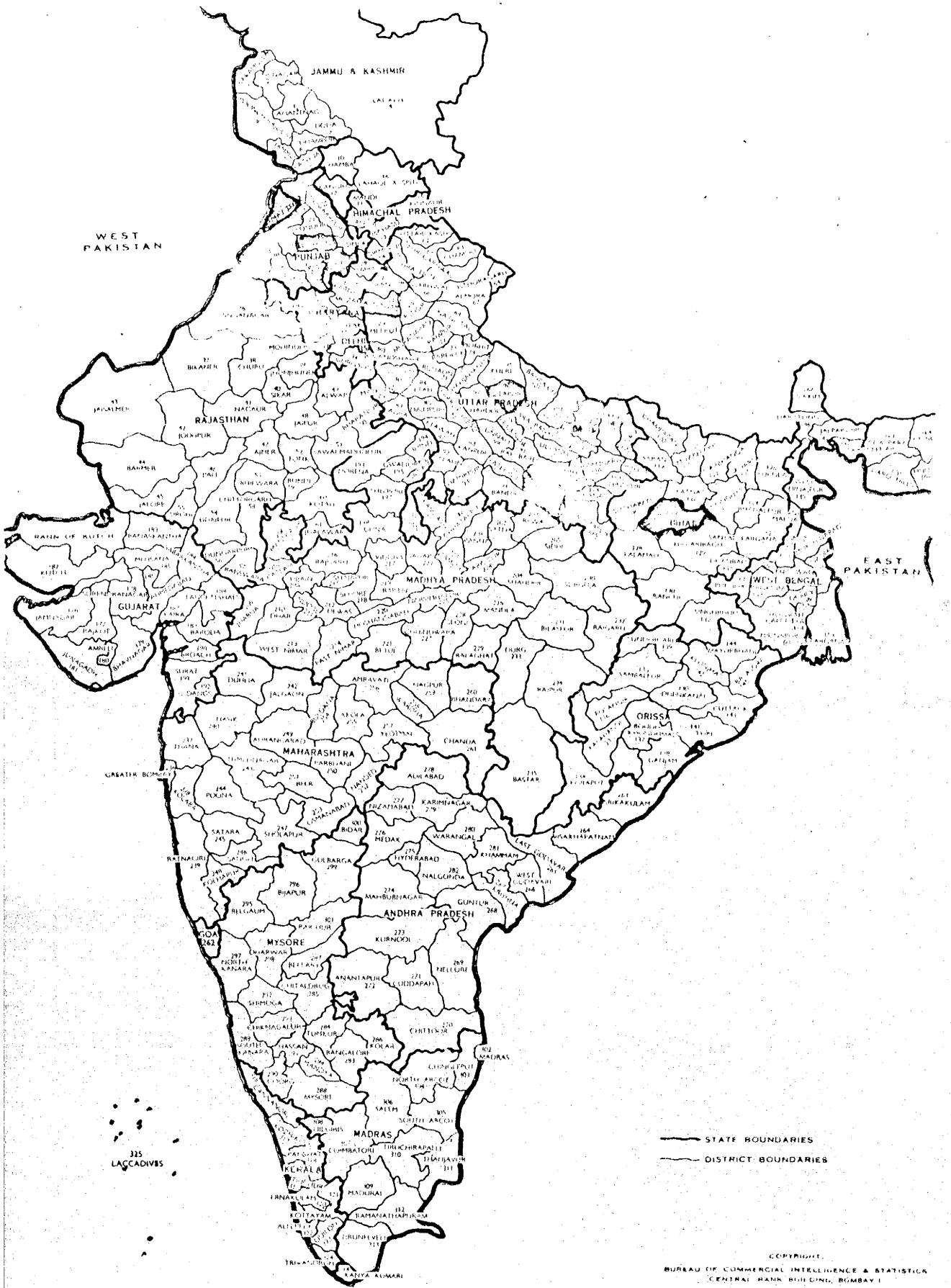
(i) assess the spread of HYV paddy in the selected States and districts; and

(ii) examine the factors accelerating or retarding the success of the HYVP (paddy).

The study is divided into five parts. The first, as given above, introduces the various aspects of the HYVP in India such as its antecedents, the origin and an outline of the programme. It also reviews summarily the programme's objectives and achievements in terms of coverage of area under different HYV crops and production. It defines the problem and presents a justification for this enquiry and states the objectives. Chapter II provides a methodological background

with a discussion of the PEO surveys and the analytical approach adopted in this study.

The third and fourth chapters are respectively devoted to the above two objectives of the study. It should be recognised that the HYVP as a major field programme of the 'New Strategy' is basically a package programme of inputs and practices applied to farms in favourable areas. It however comprises several component development programmes which were reoriented or launched afresh to obtain an effective response to the new dynamism in technology and with a view to bringing science and technology closer to the farmer. Chapter III considers physical and administrative factors affecting the programme. Chapter IV considers the package components of the programme, viz.: (i) production and supply of HYV seeds, (ii) availability of inputs and credit, (iii) water, and (iv) marketing of the produce. These components and their organisational structure are interdependent giving rise to a complexity and multiplicity of factors involved in the adoption and performance of HYV paddy programme. However, to facilitate analysis and presentation, we probe into each of these factors separately (Chapter IV). In the fifth chapter, an attempt has been made to draw inferences and discuss wider implications of the findings reported in the preceding two chapters.



CHAPTER II

METHODOLOGY

This chapter is divided into two parts. In the first, the survey design of the three HYVP Evaluation studies of the PEO[1] are described. The second involves a discussion of how the data have been used in this study and the problems encountered in presenting them. The contents of the chapter offer an introductory background to the nature, extent and scope of the enquiry in order to set the findings in perspective.

I

The HYVP Evaluation Surveys of the PEO

The HYVP was not a single programme at the field level but rather five separate programmes, each devoted to a single crop.[2] The PEO Survey design accordingly encompassed five crop studies. Each was concentrated in appropriate regions and states and during the appropriate season.

The HYVP originated in the Department of Agriculture of the Central Government and was implemented by the state Departments of Agriculture and other agencies. The distribution of resources between implementing authorities was based on the allocation of targets for coverage under

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[1] The Programme Evaluation Organisation of the Planning Commission, Government of India, carried out three extensive rural surveys in 1967-8, 1968-9 and 1969-70 to evaluate the effectiveness of the HYVP, an action programme incorporated in the Fourth Five Year Plan and implemented in 1966-7 in selected districts of most states.

[2] Paddy, wheat, maize, sorghum and millet.

HYVs by the end of the Fourth Five Year Plan. The first stage was to fix targets for the programme as a whole, that is, for all India. From these and a set of input requirements per acre, total input needs (and output potential) were calculated. The all-India area targets were then allotted to the States after much bargaining between central and State officials. The areas in each State with assured water and other relevant resources formed the basis for this division, and upon it target arrangements were made for input supplies. Each State then divided its target between districts on the basis of assured water and other resources, issued appropriate instructions to the officials of the chosen districts for the implementation of the programme, and arranged input supplies to meet the needs of the targets. In turn the district officials divided their targets amongst appropriate blocks, and the block officials attempted to plan the attainment of their targets by drawing up lists of farmers who declared themselves willing to participate in the HYVP and to purchase the component inputs such as seed, fertilizer etc. from the block office or cooperative organisation.

It is against this background that the PEO designed its first survey. States, districts and blocks were selected on the basis of the official targets, while villages and farmers were chosen on the basis of the official lists of participants.

In 1968-69 when the PEO survey was repeated (with certain changes in evaluation objectives), the State and district breakdown of the previous year was kept intact. But in choosing the blocks, villages and farmers, official targets were supplemented by information on the previous year's experience with the programme.

In 1969-70 the sample included the combined State, district, block, village and farmer samples of the first two surveys without

change, except that the number of farmers was increased in some villages where fewer than ten participants had been chosen in each of the earlier two years.

1. Selection of States

States were selected for the evaluation study in which selected crop (viz. wheat, paddy, etc.) was grown extensively.

2. Selection of Districts

In each eligible State a number of districts was selected; approximately one for every 50,000 acres targetted for the State. Having determined the number of districts to be studied in a State, the selection of districts was based on a method of systematic sampling with probability of selection being proportional to the size of the HYVP target for the crop to be studied. This is described below.

The number of districts selected in 1967-68 is shown in Appendix Table A1. The same districts were used again in 1968-69 and 1969-70, so that for the whole three year study the States and districts were selected on the basis of the targets set in 1966-67 for the whole Fourth Five Year Plan period.

Method of Systematic Sampling with probability proportional to size

(i) the districts participating in the HYVP for the particular crop and season were ranked in descending order of target area;

(ii) cumulative totals of targeted area (A_1) were then worked out. The total targeted area (A_n) was divided by the number of districts to be selected (n), thus giving a sample interval (s);

(iii) a random start (R_1) was made by selecting a district between 1 and s (in practice this was taken as s/2 or its integral part);

(iv) the other districts (if any) were selected from the sequence as follows: R_1; R_2 (= R_1 + s); R_3 (= R_1 + 2s); ... R_n (= R_1 + n+1); and

(v) districts were located corresponding to each number in the R_1 to R_n sequence, depending on where the number fell in terms of A (cumulative target acreage).

3. Selection of one block in each district and three villages in each block

One block was selected in each district in 1967-68 and another in 1968-69. Both were used in the 1969-70 survey. Three villages were selected in each block (in 1967-68 and 1968-69) and all six were used again in the 1969-70 survey. The method of village identification, after discussion with block officials was to select those villages in which there were farmers who had agreed to participate in the HYVP. In general the most promising villages were chosen.

4. Selection of samples of HYVP participant and non-participant farmers in each village

The survey design called for samples of ten participating farmers for each village to be selected from a list of all farmers subdivided between participants and non-participants and ranked in descending order by size of operational holding. The method of selection was that of systematic sampling with equal probability of selection from the ranked list; the following four steps resulted in the sample:

(i) the sampling interval(s) was (were) obtained by dividing the total number of participants (non-participants) by ten (five);

(ii) a random start (R_1) was made at the top of the ranked list between 1 and s (s/2).

(iii) a sequence of selected numbers was built up as follows - R_1; R_2 (= R_1 + s); R_3 (= R_1 + 2s) - until the population was exhausted; and

(iv) this sequence indicated the farm households to be included in the two samples.

Both samples were representative of their respective populations in terms of the distribution of operational holdings in the year and season of selection. It is from these samples, particularly the sample of participating farmers, that the bulk of PEO survey data was collected.

5. Collection of data

The district and block are the effective levels of implementation of the development programme. There is a certain amount of planning also done at these levels within the framework of policies laid down and the resources etc. indicated from higher levels. Mobilisation of local resources is an important part of the planning work at these levels. Thus the most important aspects to be looked into at the district/block levels relate to:

(a) methods of organising a programme;

(b) working out details in terms of men and material resources required for implementing the programme;

(c) imparting the technical and organisational skills to the lower level staff in charge of the programme;

(d) exercising periodical supervision and guidance in all the phases of a programme; and

(e) taking timely steps for the removal of bottlenecks reported from the lower levels.

The PEO had issued guide points for District Level Notes to be taken concerning the Evaluation Study of the HYVP under the following headings:-

1. Agency in charge of the programme
2. Method of selection of areas
3. Organisational aspects
   (a) improved seeds
   (b) fertilizers, pesticides and plant protection equipment
   (c) credit supply
   (d) supervision and guidance
   (e) marketing
   (f) summary

Thus the two main levels for the collection of the data were (i) in the village from village officials and farmers, and (ii) from block, district and state officials and institutions.

The village work was carried out by junior PEO officers who lived in villages during the season. Information from participating farmers was recorded during three visits to each village, the first at sowing time, the second mid-way through the season, and the last after the harvest.

Enumerators (junior PEO officers) were supervised by senior PEO officers in each region who also completed the work at district and State levels. Questionnaires were checked at regional offices and forwarded to the head office in Delhi for coding, punching, tabulation and analysis.

II

USING THE PEO DATA FOR THE PRESENT STUDY

The main objective of this study as already discussed is to assess the factors accelerating or retarding the high yielding programme for paddy. Our other objective, i.e. to assess the spread of HYVP (paddy) in the selected States and districts, has been covered extensively and intensively in the first PEO/ANU report prepared by Lockwood, Mukherjee and Shand (1971). The objective has been included in this study because further data are available which could assist in elaborating on the findings of the first report in terms of fulfilment of official targets set for the coverage of area under the crop. This will enable participation data for HYV paddy and the spread of new agricultural technology to be analysed in the right context and in better perspective.

1. Participation data for HYV paddy

Ten States: Tamil Nadu, Mysore, Orissa, West Bengal, Kerala, Andhra Pradesh, Uttar Pradesh, Punjab, Bihar and Maharashtra were chosen for the purpose. The paddy survey took place in two seasons (kharif and rabi) of each year in all but the last four of the above listed States where paddy is predominantly a kharif crop. We have considered each season separately; for the participation in the HYVP paddy was found to vary markedly between kharif and rabi. The survey covered 176 villages and over 25,000 farmers. Table 2.1 shows the details of the blocks included in paddy surveys of 1967-68 and 1968-69.

The main source of data for this study is the District Level Notes submitted to PEO by its different regional or district units. The data

Table 2.1: Blocks included in kharif and rabi season Paddy Surveys, 1967-68 and 1968-69[a]

State	District	Number of blocks surveyed[b] 1967-68 Kharif	1967-68 Rabi	1968-69 Kharif	1968-69 Rabi
TAMIL NADU	Thanjavur	1		1[c]	1[c]
	North Arcot	1	1	1	1
	Coimbatore	1		1	1
		3	1	3	3
MYSORE	Shimoga	1	1	1	1
ORISSA	Sambalpur	1	1	1	1
	Cuttack	1		1	1
		2	1	2	2
WEST BENGAL	Midnapur		1	1[d]	1
	Hoogly	1	1	1	1
	Burdwan	1	1	1	1
		2	3	3	3
KERALA	Trichur	1	1	1	1
	Palghat	1	1	1	1
		2	2	2	2
ANDHRA PRADESH	West Godavari	1	1	1[e]	1
	Krishna	1	1	1	1
	Nellore	1	1	1	
	Nizamabad	1		1	
		4	3	4	2
UTTAR PRADESH	Basti	1		1	
	Varanasi	1		1	
		2		2	
PUNJAB	Amritsar	1		1	
BIHAR	Shahbad	1		1	
	Gaya	1		1	
		2		2	
MAHARASHTRA	Thana	1		1	
	Bhandra	1		1	
		2		2	
ALL STATES		21	11	22	13

Notes:

a. In 1969-70 all blocks were resurveyed.

b. With three exceptions (indicated as c).

c. Only two villages surveyed.

d. This block (salboni) has been excluded from this study owing to incomplete data.

e. Blocks surveyed in both seasons of the same year, although in most cases different villages were selected.

contained therein are oriented in an official way which is different from the approach of a researcher.

The two main objectives of the PEO Surveys in the two year period were (i) to assess the various measures instituted to administer the HYVP and provide farmers with adequate and timely supplies of inputs and credit facilities and (ii) to take a broad view of the performance of the HYVP in selected districts. In keeping with these objectives the District Level Notes offer a broad view of the programme as a whole[1] and are not necessarily restricted as to comment on the constraints on the development of the HYV paddy programme. The data provided in these notes are extensive, at times incomplete, vague and inconsistent. Various examples of these limitations will be cited in the text of this dissertation. The nature of the data prevented the use of any sophisticated analytical techniques. It also presented many problems in analysis. Within these limitations, the analysis mainly involves time series elements and attempts to observe the process of adoption of HYV paddy and the associated package of inputs over time. The surveys also permit an examination of a geographical cross-section of the country with respect to the adoption and performance pattern in each of the two seasons of the years involved.

The PEO Surveys covered three years and six seasons for paddy, but the District Level Notes were available only for 1967-68 and 1968-69.[2] Since the HYVP is of recent origin (begun at field level only during kharif season 1966-67), these notes, particularly those made for the

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[1] I.e. over the five crops involved: wheat, paddy, maize, sorghum and millet.

[2] District Level Notes for 1969-70 were made by PEO but were not available for this study.

kharif 1967-68, also provide in retrospect substantial information for the year 1966-67. We have therefore taken 1966-67 as the base year for purposes of comparison.

CHAPTER III

AN APPRAISAL OF THE HYVP (PADDY)

(Physical and Administrative Aspects)

In this chapter we examine the response to the programme in physical terms and also the repercussions of administrative arrangements for implementing the scheme. The wider implications of our findings will be discussed in Chapter V.

1. Targets and Achievements

In terms of fulfilment of official targets Table 3.1 indicates that the programme showed progress from 1966-67 to 1968-69 but that the rate of adoption of HYVs has been slow, and that in the majority of cases targets remained unfulfilled. There were variations between seasons and districts and the following discussion examines these in some detail for the three years (1966-69).

In kharif, Nellore and Nizamabad in Andhra Pradesh, Shimoga (Mysore),[1] Cuttack (Orissa), Midnapur (West Bengal), Thanjavur and North Arcot in Tamil Nadu[2] have shown relatively a better response to the HYVs of kharif paddy than other districts.

In general the best overall response to HYV rabi paddy has been in Cuttack and Sambalpur in Orissa, Midnapur in West Bengal (especially in

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[1] It is also significant that in the summer season (i.e. the third cropping coming between kharif and rabi) a higher proportion of paddy land is sown to HYV rice than in the kharif season, although the total area may be more or less the same in both seasons.

[2] Tamil Nadu is a special case. ADT-27, officially classified as an HYV, was introduced in 1964, three years prior to the HYVP.

Table 3.1: Targets and Achievements Under HYVP (Paddy) Area in Acres

State	District	Kharif 1966-67		Rabi 1966-67		Kharif 1967-68		Rabi 1967-68		Kharif 1968-69		Rabi 1968-69	
		Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
ANDHRA PRADESH	Krishna	10,000	2,360 (23.6)	39,000	10,456 (26.8)	76,000	5,000 (6.57)	56,000	15,000 (26.78)	30,000	28,280 (94.26)	498,000	70,318 (14.12)
	Nizamabad	4,170	4,050 (97.12)	19,000	5,222 (27.48)	66,000	29,427 (44.58)	30,000	285 (0.95)	3,831			
	West Godavari	40,000	8,666 (21.66)	65,000	13,231 (20.35)	45,000	6,421 (14.26)	98,000	36,390 (37.13)	25,000	18,052 (72.20)	100,000	76,111 (76.11)
	Nellore	146	245 (Above 100)	11,000	1,387 (12.6)	21,000		55,000		8,859	7,300 (82.4)		
MYSORE	Shimoga	5,000	5,056 (Above 100)	4,000	3,530 (88.25)	10,000	8,000 (80.0)			25,000	-	15,000	17,727 (Above 100)
BIHAR	Shahbad	17,435	8,973 (51.46)	52,971	17,192 (32.45)	206,050	137,696 (66.82)	76,000		175,000	130,790 (74.73)	61,928	61,465 (99.25)
	Gaya	4,000	3,451 (86.27)			60,000		25,000		75,000	70,000 (93.33)		
UTTAR PRADESH	Basti	10,000	8,200 (82.0)			33,000	33,000 (100)			70,000	71,000 (Above 100)		
	Varanasi	6,400	2,474 (82.0)			20,000	17,193 (85.96)			45,000	39,000 (86.66)		
PUNJAB	Amritsar	5,000	3,000 (60.0)			15,400	7,500 (48.70)			17,000	10,387 (61.10)		
ORISSA	Cuttack	8,000	5,259 (65.73)	29,931	26,639 (89.0)	25,000	20,867 (83.46)	52,666	43,549 (82.69)	35,332	20,593 (58.28)	97,585	
	Sambalpur			29,000		12,000	7,886 (65.71)	23,925	17,965 (75.08)	30,000	5,652 (18.84)	45,000	39,252 (87.22)
WEST BENGAL	Burdwan	1,000		200		80,000	78,400 (98.0)	7,000	5,000 (71.42)	250,000		10,000	
	Hoogly	400				50,000		13,000		90,000		30,000	
	Midnapur		566		1,011	23,000	20,000 (86.95)		4,176	90,000	63,000 (70.0)	5,000	18,000 (More than 3 times)
TAMIL NADU	North Arcot					20,000	21,900 (Above 100)	27,800	27,293 (98.17)	73,000	55,000 (75.34)	74,000	26,804 (36.0)
	Coimbatore			34,300	30,527 (89.0)	22,000						81,000	29,370 (36.26)
	Thanjavur	200,000	200,000 (100)			900,000	500,000 (56.6)			900,000	448,000 (49.77)	175,000	175,000 (100)
KERALA	Palghat		32,671		30,292	100,000	2,758 (2.75)	80,000	847 (1.05)	100,000	17,441 (17.44)	130,000	28,977 (22.3)
	Trichur	25,670	15,050 (60.4)			50,000		80,000	1,000 (1.25)	50,000	6,000 (12.0)	110,000	23,000 (20.9)
MAHARASHTRA	Bhandra	22,000	6,353 (28.87)			40,000	4,755 (11.88)	6,000	6,000 (100)	102,000	39,406 (38.63)	109,000	90,000 (82.56)
	Thana	25,000	16,015 (64.06)			40,000	31,468 (78.67)			109,000	90,440 (82.97)		

NOTE: [Figures in parentheses are percentages to the total.]

1968-69), Thanjavur, North Arcot and Coimbatore in Tamil Nadu and in Particular Orissa and Tamil Nadu.[1] Reception of the programme in the rabi has also been very encouraging in Sambalpur. There was no significant progress in the district of Palghat in either of the seasons. Trichur is a district where the achievement percentage has declined over time.

From the overall rabi figures of 1968-69 it is clear that the achievements are higher than in previous years while no such inference can be drawn for the kharif.

In almost all the districts in States where paddy is predominantly a kharif crop, namely, Uttar Pradesh, Punjab, Maharashtra and Bihar, the response in 1968-69 and success in fulfilling targets is greater than in the States where paddy is grown in both seasons. The most responsive districts in order have been Basti, Gaya, Varanasi, Thana, Shahbad, Amritsar and Bhandra.

In Bhandra and Shahbad, where paddy has been grown in rabi as well, it would appear that with the passage of time adoption has increased and during 1967-69 these districts have approached the targets more closely. One of the most significant features of the HYV paddy was the emergence of a third crop season, i.e. summer cultivation of HYV in assured water supply areas of Shahbad district of Bihar.

Out of twenty-two districts in the sample only two (9 per cent) reported that the targets were realistic,[2] two districts made no comments about the targets fixed by the authorities, 32 per cent said that the targets were high but not unrealistic and 50 per cent of the districts categorically stated that the targets were unrealistic. They

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[1] Idem.

[2] These districts belonged to the paddy tract.

also complained that targets had been set by higher authorities at all stages and had been relayed to them by many different authorities.

In many districts targets fixed for villages bore no relationship to total area under the crop. Also a number of cultivators shown to be participants on the block lists neither belonged to nor had any land in those villages. It was not uncommonly reported that the area shown as being under HYV paddy in VLWs' reports, on actual verification, proved far smaller and thus reflected upon the reliability of the data.

The evidence clearly shows that the targets were fixed by the government and little effort was made to derive realistic figures from below. With few exceptions no compromise in terms of feasibility was made. This means that discussion of achievement in relation to HYV paddy targets is largely futile both for this reason and because of the suspect nature of the statistics of achievement. The District Level Notes provide convincing implicit evidence that the entire HYVP was conceived at the State level, and that the district and block authorities were reduced to the status of executive and implementing agencies. They had no involvement in the planning aspects of the programme, i.e. in the organisation of human and material resources in the key question of target setting.

2. Selection of Areas and Participants

General instructions[1] regarding selection of areas and cultivators were issued in 1966-67, 1967-68 and 1968-69 by the States which were made more specific by Agriculture Departments. Detailed assessment of the process during the three years is as follows.

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[1] Appendix A2.

(i) Initial Year (1966-67). Availability of irrigation potential was found to be the principal basis of selection of areas for the programme. In most of the districts the programme was introduced in I.A.D.P. or I.A.A.P. areas, although selection of areas for the programme had no link with the trials and experiments conducted on suitability of various HYVs in these areas. As regards the selection of the participants, in general only the relatively well off progressive farmers who were ready to adopt the 'package of practices' or were in a position to meet the high cost of cultivation of the HYVs and had enthusiasm and interest were to be selected as participating cultivators. These criteria of selection, viz. progressive outlook, sound economic position, enthusiasm and interest etc., sound appropriate but their application relied upon the subjective judgement of the VLWs. The fact remains that no proper assessment of the potentiality of villages and farmers was actually made either by VLWs or by their superiors. The task was undertaken without a clear idea of where to concentrate the programme.

(ii) 1967-68 (kharif Season). There were four main criteria to be used officially for selection of areas for HYVP (paddy), viz. assured irrigation, well drained areas, suitability of soil and compact areas. The analysis reveals that assured irrigation was the main criterion for selection in 77 per cent of the districts in the sample; in 50 per cent of the districts drainage was also considered and in 59 per cent suitability of soil. Compactness of the farmed area was taken into account in only 9 per cent of the districts in the sample.

Gaya and Midnapur were the only two districts in which programme officials took into account all four criteria. Thana, Coimbatore, Thanjavur, Krishna, West Godavari, Nellore, Burdwan and Hoogly took into

account the first three and ignored the fourth. Shahbad, North Arcot and Nizamabad were the three districts which considered only irrigation and suitability of land. Sambalpur took into account irrigation and drainage only. Amritsar, Shimoga and Cuttack took into consideration only irrigation as basis of selection.

Three districts, viz. Bhandra, Nizamabad and West Godavari, did not receive any specific instructions with regard to selection of areas and participants from higher authorities. Many districts complained that circulars and instructions were not received in time. Basti and Trichur were the two districts where none of the instructions in this regard were followed. In general, most instructions regarding the selection of compact and well drained areas were ignored.

The major change in the selection of farmers was that the criterion of selecting only well-to-do cultivators was dropped. Anybody who had assured irrigation and suitable land was accepted as a participant. However, no extensive contacts were made by VLWs with farmers while preparing the lists. In many cases the enlisted rayots changed their minds and withdrew. Indeed block officials became acquainted with the participants only when they came to the block depot for seed or for loans or permits for various inputs. In practice, the participating cultivators could be identified only at the nursery stage. In certain districts, District Agricultural Officers and Deputy Registrars of cooperatives conducted meetings with their staff and decided that the selection of rayots for participation in the HYVP could be dispensed with as a wider area was programmed for coverage. No departmental follow-up or verification of the block list was found to be possible since the area of jurisdiction of the VLWs and ADOs was so large. To the question of whether the list was prepared carefully, only two districts (9 per cent of the sample) were found to have

reported in positive terms with the qualifying clause 'as far as possible'. It was also found that 90 per cent of the participating farmers had no detailed knowledge of the package of recommended practice even after three years of HYVP's existence.

(iii) 1968-69 (kharif Season). In almost all the districts the method of selection of areas remained unchanged. In the case of participants, however, the VLWs in places took their past performance into account.

General conclusions are that the procedure adopted for selection of blocks, villages and cultivators was not based on the instructions issued and received from year to year. The question of changing the procedure for selection of blocks, villages and cultivators in the light of past experience had never arisen at the State level nor at the district level. The following is a quote from the district report of Nizamabad:

> The selective introduction of the programme cannot be envisaged under the circumstances where the object of the programme is achievement of higher targets. Selective implementation comes up when a programme is under trial. HYVP has been taken up as a decisive programme for high yields. The question of adhering to principles in picking and selecting villages or blocks or participants cannot be taken up as it is more or less a mass programme of covering more than one-third area with it.

There could be some exaggeration in this statement but it does possess much truth and more or less describes the situation of the programme in this regard.

3. Trials, Experiments and Demonstrations

No trials and experiments were conducted either on departmental or cultivators' farms before the HYVP for paddy was introduced. Not

only farmers, but even the district planning and agricultural departments, were quite unfamiliar with the programme. Two exceptions were found, North Arcot of Tamil Nadu[1] and West Godavari of Andhra Pradesh (the States where paddy is grown in both seasons) where a few trials with regard to ADT-27 were conducted and some demonstrations made. But these were not extensive. The other was Shahbad of Bihar (a State where paddy is predominantly a kharif crop) where a trial in 1965-66 was conducted on the district farm on about one acre. The crop was in fact extensively infested by blight and the results in terms of yield were not encouraging. Details as to trials, experiments and demonstrations are shown below (Table 3.2).

In Uttar Pradesh farmers were generally convinced of the superiority of HYV seeds over desi (local) varieties and it was observed that a stage had been reached where progressive cultivators now looked for new varieties and that the average cultivators were following their lead provided they had the benefit of irrigation water. In Amritsar it was observed that most of the farmers were Punjabis who by nature and temperament had a greater capacity to bear risk and as such they had been actively seeking new varieties and schemes. In Basti, Varanasi and Trichur districts, district and extension authorities argued that the stage of conducting trials, experiments and demonstrations had already passed. This is true only in respect of certain varieties in some particular areas. Even in these areas trials, experiments and demonstrations remain important. Elsewhere they are essential to the success of such new programme as the HYVP. These activities were conspicuously missing from the HYV paddy programme. It is therefore not

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[1] Tamil Nadu is a special case. ADT-27 (officially classified as HYV paddy was introduced in 1964, some three years prior to the HYVP.

Table 3.2: Trials, Experiments and Demonstrations in Paddy Districts

District	Year	Trials	Expt.	Demons.	Remarks
Basti	1968-69	-	-	a few	Composite demonstrations
Varanasi	1966-69	-	-	-	None during the three years.
Gaya	1966-69	-	-	-	Results of trials conducted on private as well as State farms were reportedly available from Shahbad and on that basis areas were selected.
Shahbad	1965-66	one	-	-	1 acre plot results discouraging. On other research stations results were satisfactory.
	1967-68	-	-	yes	Demonstration programme was launched on a big scale.
Amritsar	1965-66	-	-	-	TN-1 on private farms was found to be unsatisfactory.
	1966-69	-	-	-	
Nizamabad	1966-69	-	-	-	Not even the results from adjoining districts were taken into account while framing the programme. On the farmer's holding TN-1 showed no significant response.
West Godavari	1964-65	yes	-	-	Results of TN-1 were encouraging.
	1965-66	yes	-	yes	
Nellore	1965-66	-	-	-	No trials, experiments or demonstrations were carried out, even in adjacent districts. Rushing many varieties all at one time and frequent changes of varieties from time to time was observed.
	1966-67	-	-	a few	But package of practices in these demonstrations was not followed nor were the yield results maintained.

Table 3.2 (Cont'd.)

District	Year	Trials	Expt.	Demons.	Remarks
Shimoga	1967-68	-	-	yes	
Burdwan)					
)	1966-69	-	-	-	No comments were made,
Hoogly)					however, in Midnapur.
Midnapur)		-	-	-	A few demonstrations were carried out.
Cuttack	1966-69	-	-	yes	In 1967-68 a few demonstrations were carried out. At times such demonstrations were unsystematic and were a disincentive to farmers because of overall poor results and particularly yields which were far from satisfactory.
Sambalpur	1966-69	-	-	a few	
Bhandra	1966-69	-	-	yes	Ordinary and composite demonstrations were made.
Thana	1967-68	-	yes	yes	IR-8 was found to be suitable.
	1968-69	-	-	384	
North Arcot	1965-66	yes	yes	yes	But none of the three activities after 1966.
Coimbatore	1966-67	yes	yes	yes	But not many.
Thanjavur	1967-68	yes	-	yes	
Palghat	1967-68	-	-	a few	Demonstrations were unsystematic.
Trichur	1966-69	-	-	-	

surprising to find that in as many as fourteen sample districts farmers were not convinced of the superiority of the HYVs over the local varieties as long as two years after their introduction. Even in those districts where it was observed that many farmers were convinced of the superiority of the HYVs, about 50 per cent, especially small and medium cultivators, were not and wanted to wait and observe the results on others' farms.

4. Training, Extension and Supervisory Work

Training programmes at different levels were organised in the States of Uttar Pradesh and Bihar, and in the districts of West Godavari, Shimoga, Burdwan, Thana, North Arcot and Thanjavur. In North Arcot, besides training of the officers and VLWs, short courses (for 10 days) for progressive farmers were conducted on the nearest State seed farms in July 1968, which imparted theoretical and practical knowledge to the farmers. In Thanjavur also, over 45,700 farmers were reported to have been trained and the programme in this district had continued year after year. It was felt that the training had helped officials and non-officials alike, although it could have been made more effective and useful with audiovisual aids, regular seminars, provision of journals, magazines, by purchasing books and by inclusion of technical aspects in general meetings. It was only in the district of Krishna that a Package Press was attached to IADP whereby publications were brought out and distributed to the extension workers and cultivators covering all important aspects of development and new techniques of agriculture. Elsewhere, even publicity material was unavailable. Training programmes for officials and non-officials were not intensive and training and orientation of farmers in HYVP did not help much in solving field

problem arising in the cultivation of HYVs. Training has been a continuing feature only in Shimoga district where camps were organised at the beginning of every season.

The complement of staff was reported to be inadequate in Uttar Pradesh, Bihar, West Bengal and Tamil Nadu. In IADP districts a reasonable number of officials at the district level and extension officers and agricultural officers at block level had responsibility of supervising the programme. In other districts and also in quite a few of the IADP districts the general feeling was that, except for distribution of seeds, the HYVP had not been extended any special treatment. Specific problems of transport were mentioned by the officials of North Arcot district. No specific and precise responsibilities had been fixed for officers at various levels in respect of the HYVP.

In 90 per cent of the sample districts, extension agencies were found to be ill equipped with technical knowledge of varieties, suitability of land and recommended practices to be followed by cultivators. Technical officers themselves did not know much in 1966-67 about the varieties and could add little to their knowledge in the following years. Plant protection work in general was found to be poor. Technical guidance was badly needed by the farmers. With two exceptions of North Arcot and Coimbatore, findings of the evaluation studies were not made available to the districts. Coimbatore and North Arcot officials attempted to take corrective measures in the light of evaluation studies. Thus follow-up programmes could not be implemented at all.

Nowhere other than in North Arcot, Coimbatore, Thanjavur and Burdwan were records kept at agricultural, divisional and block offices nor were periodical returns filled with the expected regularity and

desired accuracy. In the above three districts of Tamil Nadu, systematic records formed part of the package programme and no records were maintained for the HYVP separately. At district level, records were found to be unsystematic and incomplete even in these districts. In other districts not only were records unsystematically and incompletely maintained by the VLW/Agricultural Sub-inspectors or Assistant Extension Officers at the village and block levels, but they were not maintained with enough care and efficiency to be useful to anybody as necessary information for facilitating periodical reviews or stock taking of various aspects of development in fields of agriculture or cooperation with reference to the HYVP. At district levels unchecked and unscrutinised data at all levels had been used and it would seem potentially misleading to use any figures provided even by responsible officials.

In Uttar Pradesh and Bihar the regional officers conducted inspections strictly in accordance with check points[1] but the district level officers, though they inspected the blocks, did not make use of check points. In certain cases the district agricultural officers were not even aware that certain blocks were entrusted to them for supervision. In West Bengal as a whole, supervision work was affected by a levy, the dehoarding drive and procurement work and at times it was almost stopped in both rabi and kharif seasons. In Midnapur district of West Bengal, owing to deficiencies in supervision, adulteration of fertilizers and

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[1] Check points for the guidance of officers in connection with inspection of HYVP for blocks and districts were issued by Agricultural Production Commissioner's circulars from time to time. District targets were to be split up by blocks and by VLWs on the basis of irrigation potential and were to be communicated to all concerned. These check points related to selection of farmers, requirements of inputs and training, and distribution points and storage arrangements.

pesticides was found and in certain cases prices charged were very high. Administrative interferences due to the abnormal political as well as economic situation in the districts of West Bengal obstructed operation of the programme. In many other districts it had not been possible to effect as much supervision and follow-up as was desirable at the field level. Agricultural functionaries at the district level confidentially reported (North Arcot and Trichur districts) that owing to diarchy in practice today (i.e. Extension Officers were under the administrative control of Block Development Officers and technical control of District Agricultural Officers), it had not been found possible for District Agricultural Officers to have effective control and supervision over the Extension Officers. This was also the case in many other districts, though was not reported in so many words. Relatively better coordination between block agency and agricultural department was only found in Shimoga district. At an operational level there was no coordination between District Agricultural Officer and Assistant Plant Protection Officer (Amritsar).

In general, the number of visits by officers were very few. In Thana district extensive tours by district officers had reportedly given greater confidence to both the junior staff and the farmers. Overall satisfactory supervisory service was only recorded in Coimbatore and North Arcot districts of Tamil Nadu.

CHAPTER IV

FACTORS AFFECTING THE HYV PADDY PROGRAMME

(A) SEEDS

1. States with kharif paddy only

In the States of Uttar Pradesh, Bihar, Punjab and Haharashtra, where paddy is a kharif crop, the situation with regard to supply of HYV seed was quite satisfactory in both the years (1967-68 and 1968-69). In the year 1967-68, Amritsar, Bhandra and Thana districts were self-sufficient: the entire demand was met within the district partly by district authorities and partly by progressive farmers. The district of Basti was able to raise its own supply, and natural spread in this district amounted to 33 per cent of the total acreage. In Varanasi 75 per cent of the seed requirement was met internally, while in Gaya 50 per cent of seed arrived from outside and the rest was met by registered growers. Shahbad, however, because of drought and the fact that HYVs were of recent origin, could not rely upon local procurement and the district was largely dependent upon the outside supply of seeds. Everywhere the supply was reported to be adequate and timely.

In 1968-69, there was no dearth of seed of the varieties introduced earlier in these districts, mainly TN-1. However, in all the districts IR-8 was preferred to TN-1, which was found most unsuitable for cultivation in the kharif especially in canal fed areas without drainage facilities. The reactions of farmers, consumers as well as traders were not favourable to TN-1. IR-8 was found to be less susceptible to pests and diseases than TN-1 and hence was more suitable for kharif. Basti district had achieved self-sufficiency in seeds of both HYVs, viz.,

IR-8 and TN-1, Gaya depended on an outside supply to the extent of only 10 per cent and in Varanasi, IR-8 was procured to the extent of 72 per cent of the total requirements. The supply in these districts was timely and adequate. In Amritsar, IR-8 was obtained from outside in limited quantity and so was that for Shahbad where late arrival was also reported.

The National Seed Corporation had not set up any sales depots in the districts of Basti, Varanasi, Gaya, Shahbad (mainly because of non-availability of storage facilities), Bhandra and Thana, and no seed processing centres were working in the districts of Gaya, Shahbad, Bhandra and Thana. However, in Bhandra and Thana districts samples of paddy received from cultivators and considered suitable for seed were sent to chemical laboratories in Nagpur, and those recommended for seed were procured in the block areas by payment of 6 per cent premium price by purchasing cultivators. The system of registered growers was not introduced in the two districts of Maharashtra, while in Amritsar the institution of registered growers was abolished.

In Uttar Pradesh, under the policy of the State government, the same price for a particular variety was charged by agriculture and cooperative departments irrespective of whether the seed had been procured from outside the district or within the district. In Bihar, the principle underlying the fixation of price was 'No Profit No Loss'; an average price was charged for the seeds pooled from different sources. In Thana district of Maharashtra prices of HYV seed varied in different blocks in both the years and this was reported to be due to the variation in the expenditure incurred on transport and other incidental charges. This, however, does not seem to have adversely affected the programme.

2. States with both kharif and rabi paddy

(i) kharif 1967-68. In all districts the variety in greatest demand was IR-8, except in Shimoga District where TN-1 was found to be more suitable than Taichung-65. Districts self-sufficient in seeds were Coimbatore, North Arcot, Sambalpur, Cuttack and Shimoga. In the remaining districts, demand was generally met either out of departmental supplies from outside the district or by the supply from cultivators' farms within the district. The supply was reported to be inadequate and late in the districts of Burdwan, Midnapur, Trichur and Palghat. In the districts of Krishna and West Godavari the supply was timely but inadequate.

(ii) rabi 1967-68. In general IR-8 was chosen except in Sambalpur where TN-1 was preferred to IR-8 because, according to cultivators, the former required a lower fertilizer dosage. There was apparently no problem of seed supply; almost all districts were either self-sufficient or could procure the seeds in time and in adequate quantity. Supplies were reportedly inadequate, however, in the district of Palghat. In Burdwan district seed became a limiting factor as a lack of storage facilities in favourable pest free conditions made it difficult for the rabi crop.

(iii) kharif 1968-69. The variety in demand in 1968-69 was IR-8 and the seed supply situation was quite satisfactory. The districts were generally self-sufficient and the supply was adequate and timely with the only exceptions of Burdwan and Krishna districts where supplies were inadequate. The reason for short supply in Burdwan was lack of storage facilities while in Krishna it was reported that inadequate funds were made available for procurement. No complaints of poor

germination were reported in Nizamabad in this season. In Trichur the seed was not treated before distribution. Shimoga district, though self-sufficient, was not supplied with foundation seed. Coimbatore also reported inferior quality of seeds because they were not replaced after third generation. Data for Midnapur and Palghat districts for this season were not available.

(iv) rabi 1968-69. The varieties in demand varied from region to region and district to district. Other than IR-8 which was in general demand, the popular varieties were TN-1 in Krishna, IR-68 besides IR-8 in West Godavari, Midnapur and Coimbatore. In Sambalpur CR 28-25 was preferred for it reportedly required shorter time, yielded more straw and was more resistant to pests and diseases in the rabi.

In this season also districts were mostly self-sufficient for seed. Those which were not in respect of certain varieties could procure the seed without difficulty and distribute them to the cultivators in time and adequate quantity. Quantities supplied in the districts of Krishna and Burdwan were in this season also limited. Krishna district was entirely dependent on an external supply and the cultivators were left to make their own arrangements for seed. Field enquiries in this district revealed that there was need for better organisation of the seed supply for there was no coordination between the agriculture department and the N.S.C. In Coimbatore seed was procured from outside the district. The cost of production of IR-8 on the seed farms of this district worked out to be 90 Paisa a kilogram while outside it could be obtained at 60 Paisa/kilogram so that self-sufficiency was not attempted. In Burdwan seed procurement as well as

distribution was short for lack of storage facilities. Data for the districts of Shimoga, Nizamabad, Cuttack, North Arcot, Thanjavur and Palghat for this season were not available.

Observations common to both seasons of both years

Other than in the districts of Krishna, West Godavari and Thanjavur, there was no seed processing centre working either in the district or in adjoining districts. In many districts adequate germination tests could not be conducted for want of time and absence of facilities for seed processing. Complaints of low germination of IJ-52 in Nizamabad and Tainan and IR-8 in Burdwan (because of prolonged unscientific storage) were loud in kharif 1967-68. Although N.S.C. seed processing centres are located at Vijaywada and Gannavaran in the Krishna district, it was reported that the N.S.C. was biased against processing the seed of private farmers who were kept waiting for certification of their seeds for a number of days. It was also alleged that the seed produced under the supervision of departmental personnel and sent for processing was not up to standard. There did not appear to be proper liaison between the department and the regional offices at Vijaywada.

The system of registered growers was not working in the districts of Shimoga, Burdwan, Hoogly, Sambalpur, Cuttack, Coimbatore and Trichur and as a result sponsored programmes of multiplication of seeds were lacking. In this connection it was observed for Coimbatore that the system of registered growers had the disadvantage that the department of agriculture had been bound to purchase a specified quantity of seed even if the seed was not of the required standard and this led to the distribution of inferior quality seed. On the other hand the procurement

system,[1] while fairly satisfactory to the cultivator as he got a 25 per cent premium, also enabled the department to be selective in accepting the seed.

No seed depots were working in Shimoga, Burdwan and Midnapur. In many districts seed was not treated by the department before distribution or before sowing by the cultivators. Purity of seed was not maintained and there was evidence in several districts that the seeds were so mixed up with other varieties that even farmers could detect the inferior quality of seeds. Lack of sufficiently dry and pest/disease free facilities for seed storage in Midnapur, Burdwan and Coimbatore were reported (the expert explanation of the phenomenon of decreasing virility was that certain varieties, e.g. ADT-27, do not have a period of dormancy and that when there is moisture in the atmosphere with the approaching rains, these varieties start germinating. The extent of loss corresponds to the period of delay in sowing. Hence storage facilities - modern and adequate - were a necessity.)

In the districts reported to be self-sufficient, progressive farmers supplied seeds of HYVs and there was apparently no problem so far as availability in adequate quantity and timeliness. In most of the districts, however, nucleus seed, without which foundation seed cannot be raised, was not supplied or seeds were not replaced after the third generation. The last mentioned was true in such districts also where seed was procured or raised on seed farms. In some districts farmers did not distinguish between seed bought from the block and by exchange between themselves. Obviously, there was a lack of awareness

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[1] This system was introduced in early 1967. Apart from the seed farms, seeds were procured by the Agricultural Departments at 25 per cent premium over the procurement price. Such cultivators were exempted from the civil supplies levy to the extent to which they supplied seed.

regarding purity and quality of seeds or a lack of confidence in the superiority of the seeds supplied by the department.

In general, prices for the same varieties in a particular area were uniform but were found to vary between areas because of different marketing conditions. The prices also differed between locally produced and procured seed of IR-8, perhaps because of special attention paid to proper cultivation of pure seed on seed farms or a difference in procurement charges of various agencies. Complaints concerning high prices of IR-8 were also received from Burdwan district. This variation did not affect the programme as a whole for only the newly introduced varieties of seed not available for free sale were costing more and not the seed locally procured. In Burdwan district, however, higher prices did put a constraint on the adoption of HYV paddy. In Trichur district, where prices were uniform throughout the district and block, the cultivators complained that the prices charged for IR-8 and culture-28 varieties (Rs. 1.50/kg) were higher than those which they received from the government for civil supplies levy paddy (Rs. 0.65 per kg). There was a similar complaint in Sambalpur where there was a difference between procurement and sale price (the government purchased seeds from the cultivators when required at a price varying from Rs. 53/- to Rs. 54/- per quintal but sold to the cultivators who required it at Rs. 66/- per quintal).

From our analysis it would appear that the serious problem was not so much the availability of seeds but rather the supply of quality seeds. In most of the districts the system of multiplication of seed through registered growers had either been dropped or was not getting encouragement, since the authorities considered that the natural spread of HYVs of paddy had gained enough momentum. The purity and germination tests had been conducted in only a few districts, and the

seed was not treated even though the block staff were instructed to do so. In order to maintain the progressive character of HYVP there should be a regular flow of proven and tested quality seeds into the field. In general, the price charged for HYV paddy seed has been lower than the open market price. In fact it is essential to maintain this somewhat lower price, in order that farmers do not turn to privately produced seed of lesser quality. The ordinary farmer is still not aware of the fact that purity and quality of seeds can be maintained only by the adoption of certified, tested and treated seed. With the expansion of HYV paddy the quality of seed is bound to deteriorate after a couple of years. Change of foundation seed after the third generation is a necessity. Therefore it is also essential that quality incentives to farmers are not offset by delays and difficulties in procurement. The evidence suggests that variation in prices would not adversely affect the programme; however, discrimination in procurement and sale price by the government would act as a disincentive and create a lack of confidence amongst users of the quality seed.

(B) WATER

The high yielding varieties released under the HYVP have specific water requirements with regard to timing and quantity. Therefore water in required quantity and at distinct times is an indispensable condition for their cultivation. Deep water, floods, drought, etc. impose severe restriction upon the full expression of yield and sometimes even on the survival of the crop. Because water is so critical an input for the HYVs (paddy), one of the most important recommended and reportedly, by and large, adhered to criterion in selection of areas and participating cultivators was the availability of assured irrigation facilities to the

cultivators. Climatic conditions and/or availability of irrigation determine the cropping patterns in different areas. For example, it is mainly because of availability of water only in the kharif season that certain States grow paddy solely in that season. In the following analysis we examine the availability of water in selected dis-ricts and the question of whether water was a limiting factor in the adoption and performance of the HYVs (paddy).

1. States with kharif paddy only

In both survey districts of Uttar Pradesh, irrigated area as a percentage of total cultivated area was found to be 48 per cent and more than half of all irrigation was provided by State works, yet the irrigation water actually available was less assured and less intensive than the figure might suggest. Assured irrigation[1] as a percentage of total irrigated area was only 16 per cent in Basti, while the respective figure for Varanasi was 29. This was mainly because of the fact that the entire length of State canals was dependent on rainfall (in 1966-67 the rains had failed, the canals had remained dry and the entire kharif crop was damaged). In the rabi season these canals had dried up or provided only one irrigation to a very small area served by them. Thus the State canals could not be relied upon insofar as the cultivation of HYVs was concerned. Other sources like reservoirs, small tanks, kachha wells and shallow masonry wells were even less dependable.

In the district of Gaya it was reported that in kharif, availability of irrigation from canal or tube well was more or less assured; however, irregular working of State tube wells had caused inadequacy and

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[1] The PEO officials consider that this area alone is suitable and is therefore the maximum area which can be placed under HYVs of differen- crops.

untimeliness in the supply of water. The major problem in the district was one of drainage in canal areas. Waterlogging in the fields, it was asserted, had been responsible for the high incidence of pests and bacterial attack on crops. In Shahbad district the main water sources were the Sone Canal and Durgavati Canal. The former is perennial, the latter is rainfed and seasonal. Again in both the districts in certain areas served by the canal there was always uncertainty regarding the supply of water. In Shahbad's selected block, a substantial number of cultivators were found to have planted Taichung paddy where there were no irrigation facilities. They had found it extremely difficult to make the deposit of Rs. 1,200/- required for the introduced scheme of energisation of wells.

The entire district of Bhandra was mainly dependent on rainfall. In Thana district the soil selected for raising TN-1 paddy was one capable of retaining required moisture, and initially it was felt that water would not be a limiting factor in raising HYVs of paddy. However, later it was found that since the area was entirely dependent on rains cultivators were not enthusiastic to apply recommended doses of fertilizers.

In Amritsar the two principal sources of water were canals and privately owned tube wells with primary emphasis on the latter. The tube wells enabled the cultivators to use the canal source without being dependent on it for timing or quantity. Reportedly, private investment in small tube wells has been considerable in Amritsar. In the districts of Shahbad and Varanasi after the drought a large number of pump sets and diesel sets were installed.

2. States with both kharif and rabi paddy

In the States where paddy is grown in both seasons, water is provided from a variety of sources, and there is a wide diversity in annual rainfall, climatic conditions and soils even within the States. It is appropriate therefore to offer some introductory background in respect of the systems of irrigation in different districts of these States.

ANDHRA PRADESH

West Godavari. The average annual rainfall in the district is 45 inches. The rains generally begin in May. The south-west monsoon usually sets in by the second week of June and the rainfall during the month is fair. July to October is the heaviest monsoon period when all the major wet and dry crops are raised. Timely rains in this period are conducive to the success of the paddy crop.

The Godavari canal system through its seven main canals and numerous distributory channels irrigates major taluks of the district.[1] The Elura Canal which starts from the Anicut[2] over the Krishna River at Vijaywada irrigates a portion of Elura Taluk. Besides these two big rivers there are a few hill streams which drain the upland taluks and are also used for irrigation. In the upland taluks irrigation is provided by tanks, tube wells and bore wells. In all 75 per cent of the total cropped area is irrigated and the irrigation system is dependable.

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[1] The district has delta taluks, upland taluks and mixed upland and delta taluks.

[2] Noun. (Anglo-Indian word) refers to river dam in South India built for irrigation purposes.

Nizamabad. There are several large and small irrigation projects in the district. The Nizamsagar Project and Poocharam in the district have a large ayacut[1] under them. Ramadugu is a small project benefiting an area of about 5,000 acres in Nizamabad block. Reportedly, irrigation is assured and soils are fertile. However, an inadequate supply of water in Nizamsagar and Poocharam Canals is one of the important factors limiting the area under paddy (all varieties) during rabi season. Drainage in waterlogged areas is also a serious problem and is beyond the management of cultivators. About 80 per cent of the total rainfall in a year (average is 41 inches) is received during south-west monsoon period corresponding to kharif season. In all, 49 per cent of the normal cultivated area is irrigated.

Krishna. The district is a major beneficiary of the Krishna Canal irrigation system, yet over 33 per cent of the area consisting of four taluks known as upland taluks do not benefit from irrigation facilities. The total net irrigated area in the district under various sources such as government canals,[2] tanks, wells, etc. is 71 per cent. Irrigation wherever available is assured. Apart from irrigation facilities, the district normally received 36 inches of rainfall per year.

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1 The Ayacut Development Programme (ADP) aims at bringing about an integrated development of large tracts of areas likely to receive new irrigation from major and medium projects, involving large scale land levelling and shaping, construction of field channels and field drains, etc.

The general ADP is being executed in the State sector mainly in Andhra Pradesh under the Nagarjunsagar Project ayacut, in Mysore under Tungbhadra Project ayacut, in Maharashtra under a number of medium irrigation projects, in Tamil Nadu under Parambikulam Aliyar Project ayacut and in Rajasthan under the Rajasthan Canal Project ayacut.

2 This is the principal source of irrigation accounting for 70 per cent of net irrigated area.

Nellore. The average annual rainfall in the district is 38 inches. The district has one of the biggest reservoirs in South India, viz., Kanigiri.[1] In addition it has some medium irrigation projects such as Rallapadu Project, Nakkalagandi Project, Pandagavandi Project, Upputenu Lower Anicut - besides a few other minor irrigation schemes - all providing more or less assured irrigation to an area of over 20,000 acres in *kharif*. Apart from these, the district is served by a network of tanks providing irrigation to an area of 4.5 lakh acres, including Kanigiri reservoir. The other tanks of considerable importance are Nellore Tank (serves 25,000 acres) and Sarvepalli (serves 10,000 acres).[2] In all, 32.6 per cent of the total cropped area in the district is under irrigation.

KERALA

Palghat. The average rainfall in a year comes to 120 inches. In the district one major irrigation project exists, viz. Malampuzha, which benefits about 50,000 acres. Other minor projects together benefit another 40,000 acres. These include Walayar Project, Mangalam, Meenkara, Pothundi, etc. Water still remains a scarce factor in this hottest district of the State despite commissioning of five major irrigation schemes. Irrigation facilities are utilized only during *rabi* as there usually is heavy rainfall in *kharif*.

Trichur. Three major rivers with their tributaries pass through the district. All these have been exploited for irrigation. The

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[1] The reservoir irrigates over 120,000 acres in *kharif* and another 20,000 to 25,000 acres in *rabi*.

[2] The net sown area of the district according to 1964-65 Agricultural Statistics is 1,644,330 acres.

percentage of total irrigated area to the total cropped area comes to 25 (the State average is 20). Though 60 per cent of the total paddy area was irrigated from various sources, the selected block did not benefit from irrigation schemes till 1968-69. A further scheme was under construction for this area during the Fourth Five Year Plan (current plan period).[1]

MYSORE

Shimoga. Reportedly, the district enjoys assured channel irrigation, but the large scale cultivation of HYVs of paddy during summer[2] has resulted in shortage of water. The irrigation authorities had prescribed a cropping pattern for the summer season limiting the cultivation of paddy but the farmers have not followed the suggested pattern and have continuously grown paddy extensively in preference to dry crops like ragi. This has resulted in a scarcity of water even in channel areas. The situation was further aggravated by the irrigation authorities who restricted the supply of water.

TAMIL NADU

North Arcot. Irrigation in this district is based on water supplies from a myriad of tanks, river channels, spring channels, kasan channels and wells. The normal rainfall in the district is between 30 and 35 inches in a year. It depends both on the south-west monsoon (June to September). The rainfall is quite inadequate even for the cultivation

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[1] By the end of March, 1970, India had completed three Five Year Plans and three Annual Plans.

[2] The HYVs of paddy have given much better response in summer in this district than in kharif.

of traditional varieties of paddy as both monsoons are weak by the time they reach the district. Many tanks depend on rains for supply of water. Hill streams also feed numerous tanks. These sources are supplemented by a number of wells. Palar, Cheyyar and Poney are the major rivers contributing largely to irrigation.

Coimbatore. Rainfall in this region (24.5 inches annually) is not only much less than the adjoining areas but is also undependable. Cultivation depends on irrigation from assured sources like perennial rivers. The important rivers, all flowing east through the district, are Cauvery and its three tributaries of Bhavani, Noyyil and Amravathi. In the southern part of the district, the two important river systems are west flowing, the Aliyar and Penyar. However, irrigation water is a limited resource in the district. In view of the diversion of water for irrigation purposes for thw lower Bhavani project, the water system in the old ayacut area as well as in the new adjacent area is different from season to season (kharif to rabi). In kharif, water is given to the new ayacut area which is larger. In the western part of the district, water is drawn from the Mettur canal of the Cauvery river. Because of the limited supply of water for three months in kharif short term HYV paddy crops like ADT-27 were being raised. During rabi both ADT-27 and CO-25 were being taken up as short duration HYV paddy varieties in new areas. Under Mettur Canal where supplies were available for five months in a season, long term HYV paddy varieties like CO-19 were being raised.

Thanjavur. The district is dependent upon CMP water supply for irrigation. The uncertainty of irrigation water has dissuaded the rayots from planting CO-25 in the rabi season. The volume of pipe-carried water in certain villages was small and inadequate water was

discharged to fields. Further the lands in those villages were generally situated on a higher plane and since the level of water of G.A. Canal was low it could not irrigate all fields. In other villages irrigation water and drainage posed serious restrictions on planting of ADT-27. Scarcity of water was also felt in tail end areas of Pattukottai. For this area, it was anticipated that G.A. Canal was capable of supplying water in full, but it could not supply adequate and timely water owing to lack of sufficient and timely rains.

ORISSA

Sambalpur. The HYVP was adopted in this district because a part of the district was under a major irrigation project, viz. Hirakud Project, but out of 29 blocks, only six were in the irrigated zone of the district. The remaining 23 blocks were mainly unirrigated. Whatever small irrigation facilities they had were provided by tank irrigation based mostly on the individual cultivator.

Cuttack. The canal is the main source of irrigation in this district. The release of canal water was reported to have been untimely. It was not uncommon to see the irrigation department changing frequently the area to be irrigated in the block in a particular season.

WEST BENGAL

Burdwan. No data are available other than the report that irrigation water is a limited resource in the district and also that the supply was untimely.

Hoogly. No detailed information is available. During rabi 1968-69 as many as 717 shallow tube wells, 117 deep tube wells and 75

river pumps were running and 16 river pumps were in the process of energisation. In the same season the Damodar Valley Corporation also gave water in time but the command area was too small.

Midnapur. The average rainfall is 60 inches in a year. The monsoon starts in the month of June and continues to early October. Almost every year one river has caused devastating floods and destroyed standing crops. A number of embankments has been erected at various places on either side of the river but flood damage has continued to be major obstacles, and protection and drainage major requirements in the development of agriculture.

Until very recently the main source of irrigation was the Midnapur High Level Canal. The gradual extension of the kansabati project has meant the development of another major source of irrigation.[1] Besides private canals, tanks, wells and natural springs contribute a substantial share to the irrigated area of the district. Of the 44 deep tube wells in the district, 18 were to be energised. There were 17 river lift pump units. Taking all these sources into account, about 25 per cent of the cultivated area of Midnapur (west) had irrigation facilities.

The above data provide the background in the following analysis by seasons of the specific problems faced in different areas in respect of irrigation water.

(i) kharif 1967-68. Unfavourable weather conditions prevailed in the districts of Nellore, Shimoga, Cuttack and Sambalpur. The weather conditions varied in this respect and consequently problems and losses also varied in corresponding fashion.

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[1] About 18 per cent of cultivated area has been irrigated by kansabati canal since kharif 1967-68.

In Nellore, the rainfall in 1967-68 was only 30 inches compared with the average of 38 inches. The persistent and long spell of drought conditions[1] existed till the end of September, the network of tanks and reservoir failed and water became a limiting factor for all varieties of paddy as well as other crops. In Shimoga district unfavourable weather conditions led to late transplantation of HYVs of paddy which resulted in severe pest attack and failure of the varieties. Similarly in Sambalpur, monsoons came late, irrigation water was uncertain,[2] and consequently both HYV coverage and yields were low. Moreover, harvesting was delayed and the fields were not completely dried out for the next kharif operation which contributed to pest attack in that season. In Cuttack the crop almost failed due to scarcity of water.

In the district of Thanjavur, late release of CMP water, followed by stoppage of irrigation on account of breaches and then the introduction of the turn-system affected the calendar of agricultural operations. An area of 2.5 lakh acres in the new delta area was the worst affected. A further setback was the effects of the north-east monsoon during the third and last week of October 1967 (when harvests were in full swing). This caused delays in harvesting in some cases with all its attendant problems, for example labour shortage.

There was a general complaint of malpractices among subordinate engineering staff in Coimbatore district. These malpractices were often found to be detrimental to the standing crops.

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[1] This situation was termed as unprecedented in the agricultural history of the district in this century.

[2] Owing to uncertain weather and irrigation both officials and farmers were slack towards the preparation of a plan for HYV paddy and towards its execution.

Water management was a problem in Sambalpur. From the transplanting to the dough stage of the plants about two to three inches water had to be maintained in the plot. Excess water had to be drained out a few times. A low level of water invited weeds and for this there had to be a weeding every week - leading to increased cost. Moreover, field channels in the canal irrigated zone were constructed by the government only up to the first 50 acre block from the water head. The plots lying beyond this block got water through overflooding of other plots. If those latter plots were under HYV paddy, it was difficult to manage water in them. People in this area were found to be reticent about digging further water channels and careless about the closing of the water channels after the plots were irrigated.

(ii) rabi 1967-68. While in North Arcot the rabi season was less suited to successful cultivation of certain short duration varieties like ADT-27 paddy, the season was found to be more suitable for cultivation of HYV paddy in Krishna district. By contrast favourable factors such as monsoon, availability of irrigation water at the flowering stage of crop etc. conferred an advantage on North Arcot district during kharif.

With the failure of the north-east monsoon the dams in Palghat district faced a critical water shortage in rabi 1967-68. It was to some degree a drought condition which resulted in a 25 to 50 per cent decline in total yield of paddy. Similarly, a major portion of Nellore district suffered famine conditions, rivers did not feed tanks and the Kanigiri reservoir in this part of the year. In addition to shortage of water there were complaints about the distribution of the available irrigation water in Palghat district.

In the district of Thanjavur water shortage at the earhead stage of the crop resulted in drying of crops in most of the cases. The main problem was release of CMP water in adequate quantity and time till February.

In Hoogly and Burdwan districts the HYV paddy suffered owing to an inadequate supply of irrigation water.

(iii) kharif 1968-69. In this season also weather conditions were very unfavourable. In some districts failure of monsoons wrought havoc, in others flood affected the crops, or rains and cyclone damaged the crop.

Except for a few days in a later part of the season, the district of North Arcot experienced drought conditions following monsoon failures. Amidst the general economic gloom, the HYV paddy too received a severe setback.

In Nellore this year the recorded rainfall was less than 28 inches against the normal of 30 inches in a year. The rainfall was not only scanty but also very much delayed and unevenly distributed. The virtual failure of the south-west monsoon rains had brought drought conditions.[1] Although a little relief was brought by river Pennar's flood in October, this river is not perennial, and serious difficulties were encountered owing to inadequate water supply at crucial stages of the cropping period. As a result an area of nearly 150,000 acres, usually brought under paddy in the tank fed area in the district, remained fallow in the main kharif season. Apart from this, rayots in the perennial zone, for want of adequate water in the first instance (July-August), had to feed their nurseries to cattle.

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[1] The situation prevailing since 1967-68 was unknown to the present generation in Nellore district.

North-east monsoons failed in Trichur district and since the district had been already suffering from lack of irrigation in general and minor irrigation in particular, it was in a precarious condition. Farmers who in the hope of rains had put IR-8 in lands where water supply was not assured were very much disappointed.

Drought conditions also severely affected certain parts of Nizamabad district especially in non-command areas.

In Hoogly flood affected more than 50 per cent of villages in the block and the entire district of Midnapur was severely affected by flood in early August 1968.

In Krishna district rains and cyclone brought damage to about 50 per cent of the total paddy crop (only 25 per cent of the area was harvested before the rains damaged the crop. Fifty per cent of the total area under the crop was harvested but not heaped or threshed at the time of cyclone. About 25 per cent of the crop was to be harvested and the damage in this case also was expected to be considerable).

In Cuttack canal water was not supplied in time. The Irrigation Department had continued the practice of frequently changing the area to be irrigated in blocks in the season. Cultivators began to discontinue their participation in HYVP paddy. Similarly in Shimoga the irrigation authorities restricted the supply of water for the cultivation of paddy crop, for the cultivators in their enthusiasm to grow HYV paddy did not adhere to the cropping pattern laid down by the irrigation department. This affected the HYVP paddy in both these districts. In Sambalpur, the cultivators were first unwilling to pay the rate fixed by the government for the supply of irrigation water from the Hirakud dam. They did not apply for water nor applied after persuasion with the result that the sowing was late and the yield was low.

(iv) rabi 1968-69. In this season, failure of monsoon and resultant drought conditions badly affected HYVP paddy in Coimbatore district. The cyclone damaged the standing crops as well as harvested crops left in the field in sheaves in Krishna district to the extent of 75 per cent.

The conditions in respect of the supply of irrigation water were no better than previous seasons in Burdwan and Midnapur[1] districts. In Hoogly the Damodar Valley Corporation had supplied water in time but the command area was too small so HYVP paddy suffered a water shortage in the whole of West Bengal. Similarly, in Thanjavur district of Tamil Nadu, lack of timely and adequate irrigation affected the HYV paddy.

In both districts of Orissa, water became a limiting factor. In Cuttack before the beginning of the season there was an announcement by I and P department regarding closure of canals because of water shortage and repairs to canals. As this would not have allowed cultivators to grow HYVs of paddy, they consumed the stock of seed.[2] Subsequently when it was known that water would be released in canals, there was an acute shortage of seed. The department of agriculture could not meet the demand and prices of seeds rose three to four times the normal level. In Sambalpur, there was a dispute between cultivators and the government and the latter would not release water from the Hirakud dam until the farmers had paid their arrears of water rates.

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[1] There has been a growing demand for agricultural machinery, especially diesel pumps, shallow tube wells. Cultivators had been showing interest in increasing irrigation potentialities of their holdings. The government is encouraging this by allowing farmers to pay in parts.

[2] This is a rice eating area. There was already an acute shortage of rice in many parts because of failure of crops in the last two seasons and farmers had been consuming only wheat (both meals of the day).

This caused delays in sowing and transplanting. Thus, in both these districts, coverage of HYV paddy was badly affected, sowings were late and yields were greatly reduced.

The foregoing analysis reveals that water was a critically limiting resource during the two years surveyed (1967-68 and 1968-69). Following the failure of monsoons, drought and near famine conditions prevailed in some parts of the country. In other parts natural hazards such as heavy rains and cyclones or floods caused devastation. In some of these areas certain parts had more or less assured rainfall and irrigation and natural hazards were unknown. The conditions during these two years were unusual and imposed severe restriction upon the full attainment of HYV yield potential. In many cases the crop barely survived.

(C) FERTILIZERS

Trials and experiments on the HYVs have established that they are responsive to a heavy dosage of chemical fertilizers and their latent potentialities can only be exploited by application of sufficient quantities of various types of fertilizers. The nature and extent of fertilizer requirements vary with soil conditions.

1. States with kharif paddy only

The main agencies concerned with the distribution of fertilizers were the departments of agriculture and cooperative societies. In some districts, however, private agencies or cane societies also catered for the needs of the cultivators.

In general, the assessment of seasonal fertilizer requirements of a district which covered the high yielding and other varieties of paddy

and other crops was made on the basis of a targeted area multiplied by a recommended dose. For the HYVs on the same basis targets of fertilizer consumption were fixed at State level and were split up blockwise by the District Agricultural Officers. The estimates of fertilizer requirements of the HYVs were made taking into consideration a full coverage of the targeted area. These estimates later proved to be high partly because they bore no relation to actual distribution and/or consumption and partly because the actual coverage was much lower than the targeted area. Only in Shahbad district was consideration given to expected demand in a particular year. In Gaya district no changes were made in the assessment of fertilizer requirements in view of the liberalised supply with a free sale basis up to 50 per cent (1968-69). It was reported that private agencies had till then not entered the market for fertilizers. In Bhandra and Amritsar districts (1968-69) no specific targets were fixed for fertilizer consumption separately for the HYVs.

It was difficult, from the field reports, to determine the situation as to adequacy and timeliness of supply of fertilizers. Generally, supplies of fertilizers were received throughout the year and were stored in godowns. In the absence of adequate care on the part of agricultural authorities and the lack of proper records, it had become difficult to maintain the balance of N, P, K[1] at different stores. In one lot only one type of fertilizer was received. Thus, while fertilizer of a particular type was available in adequate quantity it was difficult to distribute it for want of the requisite combination with other fertilizers. A detailed analysis by years is as follows:

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[1] Nitrogen, Phosphorus and Potash.

(i) kharif 1967-68. Quantities obtained and supplied to farmers were adequate and timely in both districts of Maharashtra. Overall there was no shortage of fertilizers in either district of Bihar though there was a general shortage of N fertilizers for top dressing the crop. In the district of Varanasi excess stocks were available but the distribution of P fertilizer was only 28 per cent of the requirement, and the respective figure for K fertilizer was 13 per cent. In Basti district while the supply of N fertilizer was much greater than requirements at the time of basal dressing, P and K fertilizers were not available to perform the operation in the right manner. In Amritsar district though an adequate quantity of fertilizers was available in time, the supply of C A N[1] was very limited.

(ii) kharif 1968-69. Generally speaking, the supply position was better than in the previous year: in both districts of Uttar Pradesh and Bihar the available stocks were far greater than requirements. In Thana the supply was adequate and timely while in Bhandra the supply was adequate though it was not in time. In Amritsar the quantities of fertilizers received were much less than the requirements (50 per cent of requirements of N fertilizers) and the distribution was even less than the receipt.

In both years, district agricultural authorities considered the number of sales depots available in both dist ricts of Uttar Pradesh was quite sufficient, but they were not satisfied with the actual storage capacity available (hired private buildings) at these sales depots. Very serious problems of storage both on account of available storage capacity and transport facilities were experienced by these

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[1] Trade name of a nitrogenous fertilizer.

districts. In Shahbad district of Bihar it was proposed to increase the number of sales points in rabi 1967-68. The inadequate storage facilities, machinery to handle the distribution and difficulties in transporting the fertilizers to some interior places had impeded the increase in the number of supply points. In 1968-69, the transport bottleneck was removed but it was reported by the Deputy Director (Agriculture) that there had been no pressure to open new sale points. Lack of proper storage facilities still continued, and this was partly the reason that sale points could not be increased.

In Bhandra district of Maharashtra, the quantity obtained by the marketing society was timely and adequate for the district as a whole. However, shortages of stocks in certain block depots were reported. The cultivators obtained fertilizers according to the outlook for the monsoons, and shortages resulted in many places because of sudden rushes for fertilizer purchase. It was not possible for the society to keep the entire stock required at each centre in advance because of storage losses, uncertainty of fertilizer consumption, lack of godown facilities and high godown charges. The marketing society, however, was responsible for moving the required fertilizer from one distribution point to another point immediately on intimation. But delays in communication and lack of transportation facilities obstructed quicker movement of fertlizers to the place of use. In 1968-69, 50 small sale points in the district were closed because they were found to be uneconomical. Discussion between the PEO officials and/or district/block officials revealed that the HYVP paddy in these districts suffered for want of proper and timely distribution of fertilizers though the extent cannot be specified.

Consumption of Fertilizers. State Departments of Agriculture issued N, P and K dosage recommenddations for HYV (paddy). The recommended dose for all different HYVs per acre were as shown in Table 4.1.

Table 4.1: Fertilizer Recommendations - kharif paddy States only (kg/acre)

State	District	N[a]	P[b]	K[c]
UTTAR PRADESH	Basti	180	112	30
	Varanasi	180	112	30
BIHAR	Gaya	180	140	30
	Shahbad	180	135	36
PUNJAB	Amritsar	160	125	30
MAHARASHTRA	Bhandra	200	150	0
	Thana	200	150	35

Notes:

a. In terms of ammonium sulphate.

b. In terms of superphosphate.

c. In terms of muriate of potash.

Table 4.1 shows that there were no variations in recommendations either at State level or between districts within the States of Uttar Pradesh and Bihar. The table also suggests that overall there were variations in recommendations between the States but little between districts within States.

These recommendations were made on a State-wide basis. They were worked out on experiment stations and were expected to yield better results under irrigated conditions. Broadly speaking, in most of the cases the recommended dose was realistic and found to be technically correct unless other production conditions were not totally unfavourable. However, there was no evidence in either district of Uttar Pradesh that the recommendations were supported by soil tests on the farms of

cultivators. In Basti (1967-68), the cultivators who had applied higher doses claimed that they had led to the attack of bacterial blight while those who had applied a lower dose claimed that a slightly higher dose would have given better results. In the district of Gaya the recommended dose was found to be unrealistic in view of the results of the soil analysis carried out in the district.

In all survey districts fertilizer application to HYVs was far below the level recommended. Generally speaking, cultivators were traditionally used to applying not more than 30 to 60 kilograms of chemical fertilizers (wheat and paddy varieties taken together) per acre, irrespective of the crop or varieties. Data on actual applications of N, P and K fertilizers were not available to enable a precise assessment of the extent to which the recommendations were actually followed. However, the following analysis gives an insight into the conditions as they existed during 1967-69 with regard to consumption and distribution of the fertilizers in these districts.

In the district of Gaya (1967-68) not a single participant in the district block was found to have applied fertilizer as recommended. In the same year, in Varanasi, 75 per cent of farmers applied fertilizers only at the time of top dressing. In Shahbad, about 50 per cent of the HYV paddy growers had been applying only 50 per cent of the recommended dose while the remaining half used less than 50 per cent of the prescribed dose. In the districts of Basti, Varanasi and Gaya it was reported that the farmers did not possess knowledge of the recommended dose and the crop stages at which they needed to be applied. Evidence of the lack of such knowledge in other districts was commonly found. In Amritsar district many farmers did not know that a special loan had been sanctioned under the programme through cooperatives and accordingly they purchased fertilizers on cash or with their normal credit limits

fixed by cooperatives. In some cases the farmers had the capacity to invest in this input, but they decided upon a lesser dose of fertilizers in view of their soil type and the dose they themselves felt would be sufficient to get optimum yield. They had not got their soil tested. Other farmers were either unable to invest in the recommended dose of the input or could not get the requisite finance to have appropriate quantities in time.

Hardly any favourable change in the use of fertilizers was observed in 1968-69 in any district except that in Amritsar where the consumption increased above that of the previous year. In the district of Gaya shortages in distribution this year were attributed to the dry spell prevailing in the district from August to the first week of September 1968. This evidence suggests that, over time, though there was an improvement in fertilizer supply position there was no improvement with regard to actual distribution and/or consumption of fertilizers.

2. States with both kharif and rabi paddy

The District Co-operative Marketing Society was the principal agency for the distribution of fertilizers through their primaries. Unlike the States with kharif paddy only, in almost all the districts private dealers also existed. Liberalised supply of fertilizers allowed in 1968-69 on a free sale basis of up to 50 per cent of the total anticipated demand (on the basis of the estimates of fertilizer requirements in a certain district), had greatly improved the efficiency of the supply system. There was no fixed rule regarding the percentage of the total requirement to be supplied by cooperatives, Food Corporation of India (FCI) and/or private agencies and it varied from district to district. In some districts, especially in 1968-69, the private market

was found to be dominating.[1] In the district of Palghat no competition between different selling agencies was observed because FACT, the main producer and supplier had fixed the prices of all its products. In most cases the district collector had the authority to allocate quantities of chemical fertilizers to different distributing points of the cooperatives.

In 1967-68, the assessment of the requirements of chemical fertilizers was based on the targeted area and recommendations of State Departments of Agriculture. Table 4.2 shows the recommended dose for different HYVs per acre.

The table shows considerable variations in recommendations between States but little between districts within States.

As in the States with kharif paddy only, the recommended doses in different areas were of a general nature and no trials to obtain the correct schedule of fertilizer doses for particular areas were conducted. In some districts variations in recommended doses had to be made usually on the strength of past experience and rarely on the basis of soil tests. Such cases brought variations in recommended doses from district to district and sometimes within the district, depending upon the area and variety.[2] In other districts the recommendations as handed down from

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[1] Even though the general policy is to encourage Co-operative Movement in the field of distribution of agricultural inputs, in the present set up a reduction in the number of private depots will adversely affect the efficiency of the supply system.

[2] For example:

In Nizamabad the recommended dose (in absolute terms) was 35 kg of N, 22 kg of P and 18 kg of K for TN-1; in some cases N ranged between 35 and 53 kg; for varieties other than TN-1 the recommended ratio of N, P and K (in absolute terms) was 27:27:14.

In North Arcot the recommended doses for ADT-27 (in absolute terms) were 12 kg of N, 9 kg of P and 6 kg of K for delta areas of Thanjavur district as against a ratio of 12:6:3 for old delta area.

(Cont'd. on p.67)

Table 4.2: Fertilizer Recommendations - States with both kharif and rabi paddy
(kg/acre)

State	District	TN-1/IR-8 etc.			ADT-27/CO-29 etc.		
		N[a]	P[b]	K[c]	N[a]	P	K[c]
ANDHRA PRADESH	Krishna	185	150	25			
	Nellore	287	145	50			
	Nizamabad	235	150	35	190	150	35
	W. Godavari	400	300	85			
KERALA	Palghat	400	300	85			
	Trichur	450	300	85			
MYSORE	Shimoga	250	250	70			
ORISSA	Sambalpur	200	200	50			
	Cuttack	200	200	50			
TAMIL NADU	Coimbatore	375	220	50	140	130	25
	N. Arcot	375	220	50	140	130	25
	Thanjavur	400	312	67	140	130	25
WEST BENGAL	Burdwan	165	120	52			
	Hoogly	180	150	39			
	Midnapur	180	125	40			

Notes:

a. In terms of ammonium sulphate.

b. In terms of superphosphate.

c. In terms of muriate of potash.

State level were not altered. In Coimbatore for example, it was a well known fact that the recommended dose for nitrogenous fertilizers was high for alluvial soils of the old deltaic areas on the Aliyar and Amravathy rivers and that the thrice cropped paddy lands of the district were, in general, poorer and required higher N, P and K, but no recognition of

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2 (Cont'd. from p.66)

In Palghat the recommended ratio of N, P and K (in absolute terms) was 53:35:35 whereas in Trichur it was 44:22:22 for poorer soils and 35:22:22 for fertile soils.

In Sambalpur the recommendations were for 100 kg of CAN or ammonium sulphate, 200 kg of superphosphate and 50 kg of potash.

these facts was taken either by block staff or the staff of District Agricultural Officer.

In general, no systematic procedure was followed in the assessment of fertilizer requirements and channelling of supplies for the HYVP as a whole and the paddy programme was no exception to this. Firstly, local adjustments rendered it rather difficult to know the procedure adopted in assessing fertilizer requirements and secondly, records for the HYVP by crops were not available; where available they were mixed up with varieties like TKM-6, Culture-6522 etc. Coimbatore and Thanjavur districts, however, were two exceptions. In these districts the VLW prepared the farm plans, fixed the quantity of fertilizer requirement according to the nature of the crop which was then checked by the junior extension officer. The requirements of fertilizers were estimated by Agricultural Extension personnel and scrutinised by the Block Development Officer. These were finally checked and approved by the District Agricultural Officer on the basis of dosages recommended by the departmental crop specialist. The soil testing laboratory in these districts had also adopted this schedule and generally had recommended to the cultivators and extension agencies almost the same ratios as recommended by the crop specialist. However, in a few individual cases it had suggested some deviations on merit which were found beneficial.

The major and remarkable change in 1968-69 was that, owing to a liberal supply of fertilizers in the States, no cropwise allocations as between HYV and non-HYV crops were made. The Government of India had stopped the practice of making special allotment of nitrogenous fertilizers for HYV and non-HYV crops after the liberalisation of fertilizer sales; however, at district level the requirements were estimated as in the previous year. Following liberalisation of supply

on a free sale basis of up to 50 per cent, the supply position in general improved very much. One example where the effect was particularly apparent was in Burdwan district of West Bengal. There, farmers began getting the fertilizers from Sindri Fertilizer Factory directly, which overcame the difficult situation with regard to supply experienced in the previous year.

(i) kharif 1967-68. Broadly speaking, the 1967-68 fertilizer supply position was sounder and much more adequate in all districts compared with 1966-67. In a majority of districts no shortage of any kind of fertilizer was reported and in a few, the supply was reported plentiful and generally speaking, timely. However, a few districts had had some problems as described hereunder:

In West Godavari district the field enquiries revealed that Diammophos[1] allotted for HYVs had not been collected by most of the distributing agencies (cooperative societies) in time to supply cultivators for basal application.[2] In Nellore district there was no evidence that official attempts were made to assess the requirements of P and K fertilizers for they were reportedly obtainable from private stores.[3] In the district of Coimbatore there was a general scarcity although the situation was much better than in the previous year. The supply was reported to be untimely mainly because of a delay in transport, the lack of credit for non-members and defaulters of cooperative societies and inadequacy of straight fertilizers which were in greater

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[1] Name of a particular brand of fertilizer.

[2] Most of the cultivators, however, could manage with existing stock or by purchasing it in open market.

[3] Shortage of P and K fertilizers was more a problem for small cultivators in the district.

demand than the grades. The total quantity of N fertilizers received in Burdwan district was adequate for HYVs but inadequate for superphosphate and muriate of potash. However, a large portion of N fertilizers were diverted to the cultivation of local varieties of paddy and hence inadequacy was also felt in respect of N fertilizers for the HYV paddy. Fertilizers received in some interior areas were untimely. The district of Sambalpur was seldom supplied with fertilizers according to indents; superphosphate was in chronic shortagw; price variations were frequent and sometimes supply of fertilizers to distribution points was delayed.

Supply points were sufficient in number everywhere except in Shimoga district where cooperative societies were defaulters and had shown their incapacity to deal with the input; however, private parties were allowed to set up selling points in places where cooperatives were inactive. In Nellore the problem was not one of adequacy of supply points but one of availability of adequate stocks in time. In Coimbatore though the number of sales points was reported to be adequate, yet authorities felt a few more would have been useful. In Sambalpur the number was adequate but some centres had to be closed owing to questionable practices and their ineffectiveness. Data in regard to supply points were not available for the three districts of West Bengal.

(ii) rabi 1967-68. Following the revision of policy in the latter half of 1967 for the supply of fertilizers through private trade channels an overall improvement in the supply position of almost all kinds of fertilizers was observed in the season. The supply to the cultivators was timely and they obtained their full requirement except in Burdwan where it was both inadequate and untimely. In Hoogly the supply was adequate and no comments about timeliness of

supply were made. In the district of Sambalpur though the overall supply of fertilizers was satisfactory there were occasional bottlenecks during the season, e.g., P fertilizer was short and the supply was not quick. Again at the time of second top dressing, ammonium sulphate was short, cultivators were urged to use urea instead but they did not. Data in respect of Nizamabad, Coimbatore and Thanjavur were not available for the season.

Supply points in the districts of Burdwan and Midnapur were insufficient to cater for need. In Sambalpur district a need for more supply points was felt owing to the closure of a few in the last season.

(iii) kharif 1968-69. In this season the programme broadly did not suffer from any maladjustment or delay in the fertilizer supply system. There were no complaints about inadequacy and untimeliness of supply. Adequate and timely action was taken to move the fertilizer wherever supplies were found depleted. Transport arrnagements to life fertilizers did not form bottlenecks in this season. In places fertilizers were overstocked which led to the problem of deterioration and storage. For this reason in North Arcot district marketing societies and block functionaries had facilitated the supply of fertilizers right to the door steps of rayots. In Shimoga district, however, though there was no scarcity of fertilizers at the district and block levels, the distribution at village level was unsatisfactory owing to the failure of the primary cooperative society. The situation in West Bengal was satisfactory and much better than in previous years. There were no problems in Midnapur where the supply was adequate and timely. In Hoogly the supply was adequate and fertilizers were more freely available in the market but in Burdwan, whereas N fertilizers were by and large available, P and K fertilizers were in very short supply. In

Sambalpur district the supply of ammonium phosphate was negligible and that of urea was inadequate. Use of di-ammonium phosphate was largely encouraged and the supply of this substitute was adequate and timely.

Supply points in Sambalpur and Midnapur remained inadequate.

(iv) rabi 1968-69. Broadly speaking, in this season also no problems were experienced by rayots in the supply of fertilizers either in respect of timeliness or adequacy. However, in Cuttack non-availability and scarcity of fertilizers were reported. In case of Hoogly and Burdwan districts the situation had not improved after the last season and in Midnapur, shortage of P fertilizers was reported in places. The only universal complaint from the district of Thanjavur was that the prices of superphosphate and ammonium sulphate had increased by nearly 25 to 30 per cent over a period of four to five years. This increase in the price had contributed to increasing overall cost of cultivation of paddy as well as other crops. Data in respect of Nizamabad, Nellore, North Arcot and Palghat districts were not available.

The number of supply points again remained inadequate in Midnapur and Sambalpur districts. It was reported that owing to a low margin of profit and high transport cost private dealers were reluctant to open new depots in interior areas. In Trichur a need for corrective measures to improve the efficiency of existing supply points was felt.

Particular Problems of Implementation

In Coimbatore (kharif 1967-68), the joint circular issued by the Director of Agriculture and the Registrar of Co-operatives stressed that no discrimination should be made between members of cooperatives and non-members in the matter of distribution or sale of fertilizers

by the distributing agencies. But the cooperatives proceeded on their usual basis of the farm plans of their members giving priority to them. Rich rayots who were not members of the cooperatives because they considered it as a sort of social stigma to borrow could not get their needed supply from the cooperatives and private agencies, which had a limited quota, could not cater for their needs.

In Nellore (1968-69), while the supply position was more or less adequate, the quality of fertilizers was questioned by farmers though denied by officials. Fertilizer bags supplied through cooperatives and by private traders were underweight. A few cases of adulteration were booked by the District Agricultural Officer and subsequently handed over to the vigilance department.

In North Arcot (1968-69), many malpractices were noticed in the distribution of fertilizers by cooperatives, e.g., discrimination in favour or against a few, over-billing (billing for higher amounts by manipulating the duplicate copy and pocketing the margin).

In both seasons in Midnapur (1968-69) adulteration in fertilizers was reported. The cooperatives were most unsatisfactory in Cuttack. The result was that, although at district level arrangements were made to meet the requirements for the HYVP, at the village level, many a link in the chain was found to be either broken or very ineffective and weak. Malpractices were also evident in adjoining districts.

Broadly speaking, overall demand for chemical fertilizers and their consumption sharply increased during 1967-68 over 1966-67 partly because of the higher acreage put under HYV paddy and partly because of growing awareness of the effectiveness and utility of chemical fertilizers amongst the rayots. While the farmers in most of the districts were largely following the recommended dose of N fertilizers with slight variations based on individual experience they were still not usually

prone to use P and K fertilizers as recommended because their impact on crops was not as obvious as for N fertilizers and hence they were either slow or reluctant to follow the recommendations. Lack of data, however, prevents comment on the extent of inadequacy of the use of P and K fertilizers.

In Shimoga district few of the cultivators adhered to the recommendations either due to fear that a high dose of fertilizers would spoil the natural fertility of the soil or to their inability to buy the required quantities of fertilizers. Similarly, the recommended doses for HYV paddy were considered by the rayots of North Arcot district to be slightly high. The general feeling amongst them was that the dosages as recommended could be sustained only if they were accompanied by application of traditional farmyard manure compost and/or green manuring. The same sort of apprehensions were encountered amongst the rayots of Trichur district where only 50 per cent of the recommended doses were applied. The farmers claimed that the application of higher doses would lead to various diseases and severe pest attack. In some cases their financial situation also prevented them from following the official recommendations.

The other main factors responsible for limited consumption of fertilizers were (i) lack of water (West Godavari, Shimoga, North Arcot, Thanjavur), (ii) soil testing arrangements in general were not adequate and (iii) the farmers preferred to maintain their traditional doses with slight modifications, particularly in the districts of Midnapur, Coimbatore, Cuttack and Sambalpur.

In 1968-69, though demand and consumption had risen further, water, lack of adequate facilities, apprehensions of farmers, and small cultivators' inability to buy required quantities of fertilizers were the factors which stood in the way of use of recommended dosages of

fertilizers. The disproportionately low application of P and K types as against N also continued.

One common feature of both the paddy growing areas, i.e., States with kharif paddy only and the States with both kharif and rabi paddy, was that farmers have had their own preferences for type of fertilizers[1] and they were hesitant to use other types as substitutes. Often these substitutes tended to remain unused even if they were taken by the farmers on the insistence of the distributing agency(ies). Frequent changes in variety(ies) of fertilizers recommended posed a serious problem. Once accustomed to a particular type it was found to be difficult to change the cultivators' belief and introduce a new variety in place of the old one. It was difficult to convince them by demonstration in a short period about the efficacy of the new type, even a good or better substitute was not accepted. Hence the short supply of a particular variety of fertilizer caused some dislocations as the alternative variety was not acceptable. Secondly, cultivators judged the price ordinarily from the point of view of volume and not the content.[2] Hence psychological disincentives had worked in the process.[3]

Another important feature was that soil testing, which plays a very important role in indicating the response of a particular type of land to various kinds and levels of fertilizers, was nowhere carried out in a systematic way. Soil samples taken from cultivators in Coimbatore,

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[1] For example: in Shahbad they preferred urea, in Amritsar they preferred CAN, in Thana the preference was for ammonium sulphate. In Coimbatore the preference was for complex fertilizers N P K. In 14:14:14 Sambalpur they preferred ammonium phosphate.

[2] The same volume of di-ammonium phosphate costs three times more than CAN.

[3] This was more serious in States where paddy cultivation is restricted to the kharif (1967-68).

Cuttack, Shahbad and Varanasi districts were few and far between, results were never communicated to the cultivators in time and no follow-up occurred. Moreover, in the last two districts the results communicated were found to be uniform in all cases and the cultivators observed that the results were unreal and raised the issue at farmers' fair. These are just a few illustrations from the places where soil testing laboratories were working. In most of the districts either no facilities were available or they were not adequate and satisfactory.

The distribution of P and K type fertilizers have not yet found favour with the vast majority of cultivators and N fertilizers continue to dominate. In the case of HYVs of paddy what is important is not the total supply of particular fertilizers as dictated by targets but rather the availability of all the three types of fertilizers at a particular time. With few exceptions shortfall in the use of fertilizers was not as much due to scarcity or non-availability of fertilizers as it was to poor comprehension of the technical content of the programme; failure of the extension agency to attach adequate importance to different sub-programmes (e.g., soil analysis, application of balanced dosages), lack of demonstrations on cultivators' farms and lack of farmers' confidence owing to malpractices, discrimination, etc.

The foregoing analysis confirms a part of the results of our observations reported in Chapter III and explains in turn the reasons why the yield levels of many cultivators, particularly the small and medium cultivators, were far below expectations.

(D) PESTICIDES AND PLANT PROTECTION EQUIPMENT

1. States with kharif paddy only

Agencies that supplied fertilizers, mainly the Department of Agriculture and cooperatives, were also responsible for the supply of pesticides and plant protection equipment and for taking such measures as might be necessary in a particular area.

(i) kharif 1967-68. Field observations showed that cultivators in general were not conscious of the need for plant protection and the use of chemicals for preventive as well as curative purposes was restricted to a few big and enlightened cultivators. They were also ignorant of the exact quantity and type of pesticides which should be applied and the stage at which it should be applied.

The State of Maharashtra proved a positive exception in all respects. Adequate quantities of pesticides and equipment were already available in Bhandra under a Package Programme and in the case of Thana they were made available through the agency of Panchayat Samiti. In the former case the department had arranged to organise three sprayings on Taichung Native paddy as well as on other varieties of paddy initially at government cost by employing labour. The block staff was to operate this spraying and subsequently to recover the costs from the cultivators. In the latter case the Parishad had undertaken aerial spraying of paddy fields but no additional steps were taken or arrangements made by way of strengthening the programme as well as the staff.

In the district of Amritsar (Punjab) only, recommendations had been made for spraying the nursery and the crop with streptocyclin and copper fungicide etc., as preventive measures against the attack of

blight and brown spot diseases. The extension efforts in this regard were very poor and at the operational level there was no coordination between the district Agricultural Staff and the staff of Assistant Plant Protection Officer (both belonged to the same department). The result was that the crop was damaged. Only a few big cultivators took curative measures.

In the two districts of Uttar Pradesh there was a serious problem of storage. Pesticides supplied were not effective in controlling outbreaks, plant protection equipment was not readily available, and although the staff was adequate government owned equipment was not.

In both the districts of Bihar the supply of pesticides was adequate but the demand was much less. In Gaya the staff was inadequate. In both the districts plant protection equipment was sold to the cultivators at 50 per cent subsidy; however, the supply position was unsatisfactory. In Shahbad chemicals were sold with a subsidy ranging between 25 to 50 per cent and the sale of pesticides was made compulsory, yet the cultivators did not collect the pesticides on permits issued by the PEO unit.

(ii) kharif 1968-69. Generally the situation had not improved much in 1968-69. Though the use of pesticides in Uttar Pradesh was becoming popular and the supply of chemicals and equipment had improved, the situation was far from satisfactory. There was a serious storage problem, pesticides supplied were not effective in cont rolling pests and the equipment was not readily available. The government-owned equipment was inadequate. In Varanasi not even a single cultivator or institution in the selected villages owned any type of plant protection equipment. Subsidies were available in both the districts of Bihar as in the previous year but there was a shortage of pesticides

and equipment in the beginning of the year. In spite of fairly widespread incidence of diseases, curative measures were taken only by a few prosperous and progressive farmers and sales of pesticides and chemicals in the season had declined. While there was some demand for cheap chemicals like BHC, costly chemicals like streptocyclin and Eldrin were very much less in demand. The position in regard to equipment was also disappointing. Unlike other states, community ownership of equipment was not in evidence nor had the cooperatives and Panchayats kept the equipment in Bihar. Power equipment was not in evidence; only a few cultivators owned hand sprayers and dusters (Shahbad). Conditions in this regard were better in Maharashtra, yet were far from satisfactory even there. There were no agencies to sell the plant protection equipment, doses applied were much lower than recommended and small cultivators were more or less ignored. There was no change in Amritsar district.

Thus the position regarding plant protection on both counts of availability of pesticides and equipment and carrying out the necessary operations was most disappointing. In spite of limitations much could have been done had the cultivators been aware of the technical content of the programme and had extension agencies taken up the work properly. The HYVP programme in general and paddy programme in particular in these States did clearly suffer on this account.

2. States with both kharif and rabi paddy

Supply of plant protection material and equipment was in fact combined with the supply of chemical fertilizers so the distribution agency was generally the same; however, this section of the programme of HYVs has received much less att ention at both levels, namely (i)

distribution and (ii) field level. In fact, plant protection is one of the main problems that has emerged after the introduction of the HYVP. Diseases and attacks of pests and insects on plants have increased considerably. It was already known that the HYVs were more susceptible to pests and diseases and this was the reason that the HYVP was intimately bound up with the plant protection aspect. Broadly speaking, PEO data in this respect are very poor both in quantity and quality. However, such analysis as was possible is presented below.

(i) kharif 1967-68. The supply position with regard to chemicals and pesticides was satisfactory and there were no difficulties worth noting. The deficit districts were Burdwan and Midnapur in West Bengal.[1] In Sambalpur district the supply was sufficient but fell short owing to unusual conditions.[2] In some districts the sale was at subsidised rates.[3]

Excepting the districts of Tamil Nadu and two districts of Andhra Pradesh (Nizamabad and West Godavari), plant protection equipment

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[1] In West Bengal, plant protection policy of the department was under review by the government and hence adequate funds were not made available for pesticides and fungicides. The number of supply points in Burdwan district had decreased considerably as the system of supplying through VLWs had been withdrawn by government and alternative sales points could not be established for all districts..., by the rabi season the supply points were further reduced to two to three, even to one, in blocks in place of 15 or 20 in earlier years with the result the supply of pesticides were inadequate for corresponding demand.

Cultivators were expected to get supplies from block headquarters (Hoogly). The HYV paddy programme was very much affected.

[2] Severe setback due to pest attack (this also gave prejudices to cultivators for the HYVs). The authorities ascribed the cause of such extensive pest attack to weather conditions, late sowing and retention of moisture in the soil. HYV paddy in North Arcot district also suffered from stem borer and diseases.

[3] Subsidies on equipment and pesticides were given to all the cultivators; there was no special treatment to HYVP cultivators.

was in short supply in relation to demand. In most of the districts the sale of equipment was subsidised to the extent of 50 per cent.[1] There was a general shortage of personnel in Andhra Pradesh and the districts faced serious problems of servicing and repair facilities which were insufficient. This was also a serious problem in Sambalpur (Orissa). Plant protection work in general was strengthened only in Coimbatore (by an intensive training programme not only for proper use of equipment but also for proper and timely application of chemicals), in Thanjavur (by creating additional facilities in diverse directions as part of the Package Programme), and in Krishna district (by arranging mobile squads consisting of 10 specially trained field men and maistries for undertaking a campaign with the aid of a mobile van).

(ii) rabi 1967-68. Data in respect of Midnapur, Cuttack, Coimbatore, Thanjavur, Nizamabad and Shimoga districts for this season were not available. The position in the districts of West Bengal remained unchanged.

The supply position of pesticides and chemicals was satisfactory. But there was no improvement in the supply of equipment. In North Arcot district both chemicals and equipment were in short supply which was untimely too. In Krishna and Nellore districts, though the supply position of both chemicals and equipment was unsatisfactory, the plant protection section of the agriculture department, together with a special squad of staff, seemed to be effective and satisfactory. In Sambalpur the incidence of pest attack in this season was negligible

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[1] Equipment is very expensive and small and medium farmers cannot afford to buy their own unless these are subsidised.

and so was it in West Godavari. However, in the former, the subsidy for plant protection material and equipment was withdrawn.[1]

(iii) kharif 1968-69. Supply position in West Bengal had improved. However, according to reports received from Midnapur, subsidies on pesticides and equipment were withdrawn and distribution of pesticides to cultivators in the State as a whole was left to the private agencies[2] which could not establish elaborate selling points, so the supply position with regard to chemicals and pesticides remained inadequate. Reportedly, an emergency stock was maintained in the district. Equipment was supplied from the block for use free of cost but the number was inadequate. In all the districts of West Bengal HYV paddy suffered to a very great extent on account of poor plant protection work. In all other districts, while the supply with regard to chemicals and pesticides was satisfactory (except Trichur), the equipment was in short supply. The districts of Tamil Nadu were exceptions to this.[3] In Nizamabad arrangements were made to train staff for repairs of the equipment.

Efforts to strengthen the plant protection aspect were made in Coimbatore and Thanjavur districts. In the former case the subsidy

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[1] The measure adopted by the State government was partly meant to check unfair practices adopted by different agencies. But its main repercussion fell on cultivators and proved to be a disincentive in the adoption of plant protection measures.

[2] Pesticides were sold at a very high price by private traders. The government had no control over prices. This was true in other districts too. Because of price differences farmers wanted to buy from the government agency even though all items were available in open market.

[3] In Krishna district, though the crop was damaged by pests and diseases in both the kharifs (1967-68 and 1968-69), the major loss was due to heavy rains. In rabi cyclones had caused heavy damage to the crop.

was continued (35 per cent of the cost of pesticides was borne by the State government), and besides, the farmers also enjoyed a 50 per cent subsidy from the central government. This left to the cultivator a rate of about Rs. 10.0/acre for aerial spraying. In this season of 1967-68 aerial spraying was also tried in Thanjavur district. To make farmers conscious of the need for plant protection a demonstration of plant protection measures was proposed to be conducted over a compact area of 100 acres.

(iv) rabi 1968-69. There was hardly any noticeable change in regard to supply of chemicals, pesticides and equipment. The situation remained as it was in kharif season of 1968-69.

Consumption of Plant Protection Material

Cultivators were less conscious of the need for use of chemicals and pesticides. Preventive measures had very rarely been used. Curative measures which often did not give satisfactory results for various reasons were undertaken in some places but nowhere as recommended. Wherever the plant protection measures were taken, they were untimely, partly because of ignorance and partly because of inadequate equipment. In some districts/blocks cultivators believed that the use of poisonous material would affect their domestic animals.

Weak links in the operation of the plant protection programme were a lack of servicing and repair facilities for equipment, lack of allocation of specific responsibility at the block level to look after equipment and its right disposal. Also some of the insecticides were ineffective owing to adulteration and/or immunisation of pests. Non-seasonal, irregular and/or continuous cultivation of fields with varieties of varying duration also accounted for intensive attacks of

pests and diseases. It was observed at several places that as one paddy field ripened the adjoining field reached flowering stage, and pests and insects of the former field passed on to the latter. This process assisted their survival almost throughout the year. These were instances, again indicative of poor technical comprehension of the programme, of a lack of extension effort and follow-up activities.

Unlike fertilizers, no general comments can be made regarding the preferences of farmers for different varieties of pesticides and chemicals. Farmers, for example, were reluctant to adopt substitutues in Sambalpur district, while in Trichur, preferences for chemicals varied from season to season.

The increased cost of plant protection material and withdrawal of subsidy weighed heavily with the participant cultivators against adoption of the measures. However, there were districts, for example, Nizamabad and Cuttack, where even without subsidy cultivators were becoming conscious of the need for application of chemicals and demand for them had been increasing.

Broadly speaking, there were indications of a slowly growing consciousness among the farmers about the need of chemicals. Though the total supplies of pesticides and chemicals had risen over time, the facilities to use them were not adequate. Equipment ramained a constraint. The very future of the HYVP would be at stake unless the plant protection measures as recommended are adopted effectively.

(E) CREDIT

It was anticipated that the HYV technology would require fairly heavy expenditure on inputs by adopting farmers. To ensure that participation in the programme would not be affected by non-availability

of credit support due to inadequate farm cash balances, an effective credit system was a necessity. Initially the credit programme was channelled through the existing cooperative system with additional supplies being made available from government sources. Many measures were taken to liberalise the system by modifying the rules and reducing the restrictions to enc ourage the HYVP. Data from the district level, however, sho no uniformity in the credit system, even within the same State. Also a wide range of particular problems were encountered relating to implementation from district to district. Therefore, in what follows we attempt to examine the credit situation as it existed during 1967-69 in different States/districts.

The institutional arrangements made through cooperatives and governmental agencies for financing credit needs of the farmers participating in the HYVP during the initial year 1966-67 were continued during the following two years under examination.

The essential ingredients of the cooperative loans system were related to the production needs and the repayment capacity of the borrowers based on the value of their total produce. The short term production requirements of a cultivator were classified under the following broad categories:

(i) a basic requirement of cash to meet labour and other similar charges or to meet the consumption requirements of a small cultivator working on his own field;

(ii) inputs in the shape of seeds, fertilizers, pesticides etc.; and

(iii) additional cash requirement to meet the cost that may be incurred in putting these inputs into use.

The short term production loan to an individual member cultivator was split into four components as given below:

(i) a cash component in the shape of basic finance;

(ii) a kind component - inputs like chemical fertilizers, pesticides, etc.;

(iii) an additional cash requirement to service the kind inputs;

(iv) incentive loans to such member cultivators who repay their loan from the sale of their surplus produce through the cooperative marketing societies or in the shape of seed to cooperative stores.

1. Scale of Finance

The scale of finance for HYVs (paddy) based on the four component formula for the selected States/districts is given in Tables 4.3 and 4.4. The basis for fixation of the rate of loan per acre for the various crops was the cost of cultivation of an average farmer rather than of the progressive farmer. In broad terms, the credit requirement of a district, wherever assessed, was on the basis of scale of finance required per acre for the three main inputs, viz. seeds, fertilizers and pesticides. The total credit requirement of the districts was thus worked out on the basis of targets fixed for different HYV crops and their average cost of cultivation per acre.

2. Role of Reserve Bank of India

In 1966-67 the Reserve Bank of India (RBI) introduced the scheme of sanctioning special credit limits to every Central Cooperative Bank for meeting the short term credit requirements of participants in the HYVP. This scheme was withdrawn in kharif 1967 and instead the bank increased the limit within which the institutions could operate and

Table 4.3: Availability of Finance per Acre for Paddy in States with kharif Paddy Only

State	District	Year	Variety of Paddy	Rate of Credit per acre (Rs.)	Remarks
UTTAR PRADESH	Basti	1967-68	TN-1	187.31	The credit requirement was assessed on the basis of scale of finance required/acre for three main inputs (seed, fertilizer and plant protection material).
		1968-69	N.A.	N.A.	The credit requirement was assessed on the basis of cost of total quantity of seed and fertilizers only.
	Varanasi	1967-68	TN-1	187.00)	As for Basti 1967-68.
			Local	134.00)	
		1968-69	TN-1	184.00	" " " " "
			IR-8	187.00	Of the total per acre cost fertilizers accounted for Rs. 143, pesticide for Rs.31/- and seed for remaining Rs.13/-.
BIHAR	Gaya	1966-67	HYVs	250.00	The cash component was assessed at Rs.100/- and fertilizer was assessed at Rs.150/-.
		1967-69	HYVs	-	The scale of finance was fixed but the report does not give the actual scale.
	Shahbad	1967-69	HYVs	-	" " " " " " " " " " "
PUNJAB	Amritsar	1967-69	HYVs	306.00	Of the total of Rs.306/-, Rs.80/- accounted for cash, Rs. 10/- for seed, Rs.191/- for fertilizer and Rs.25/- for pesticide. In cash, an amount of Rs.80/- which included additional cash component of Rs.40/-.
			Local	190.00	
MAHARASHTRA	Bhandra	1967-69	HYVs	300.00	This included Rs.200/- in kind.
			Other varieties	190.00	
	Thana	1967-69	TN-1	300.00	This included Rs.200/- in kind.
			Other improved varieties	190.00	This included Rs.60/- in kind.
			Local	160.00	This included Rs.20/- in kind.

Notes: The portion to be distributed in kind was as prescribed and it was stressed that it should be given only in the form of inputs. The additional component (cash) was to be allowed only when the portion in kind was fully taken up by the cultivator.

N.A. refers to not available.

Table 4.4: Input Ratio for Crop Loans (Scale of Finance) for Paddy in States with the kharif and rabi Paddy

State / District	Year	Variety of Paddy	Rate of Credit per Acre (Rs.)	Break-up (Rs.)							Remarks
				Seed	Ferti-lizers	Pesti-cides	In Kind Portion	Cash Loan	Total	Any Extra	
TAMIL NADU											
North Arcot	1967-69	HYVs	300	N.A.	N.A.	N.A.	150	150	300		
Coimbatore	1967-69	ADT-27	300 + 60*	12	143	20	175	125	300	60*	*This was an extra amount that was allowed for life irrigation
		TN-1	330 + 60*	10	155	50	215	115	330	60*	
		Tainan-3	300 + 60*	10	155	20	185	115	300	60*	
		IR-8	350 + 60*	15	170	50	235	115	350	60*	
Thanjavur	1967-69	HYVs	250	18	120	22	160	90	250		
	1969-70	ADT-27)* CO25 & CO29)	300	15	140	20	175	125	300		Proposed rate for 1970-71.
		IR-5 & IR-8	380	15	220	20	255	125	380		
KERALA											
Palghat	1967-69	HYVs	400	N.A.	N.A.	N.A.	200	200	400		
		Local in some blocks	225	"	"	"	100	125	225		
		Local in some other blocks	250	"	"	"	100	150	250		
Trichur	1967-68	HYVs	400	"	"	"	225	150* & 100			*Rs.150/- as Component 'A', another Rs.100/- as Component C which was allowed only when Component B (portion in kind) was accepted in full.
	1968-69	HYVs	450	"	"	"	200	150 & 180*			*Again provision was there - provided kind portion has been accepted by the farmer in full.
ANDHRA PRADESH											
Nizamabad	1967-69)*	N.A.	N.A.)								*The scale was fixed but figures and details were not available.
Krishna	)	N.A.	N.A.)								
West Godavari	1967-69)	HYVs	325	"	"	"	75	200 + 50**			**Additional Cash Component.
Nellore		N.A.	N.A.	"	"	"	N.A.	N.A.			
MYSORE											
Shimoga	1967-69	HYVs	260	"	"	"	170	60 + 30**	260		**Additional Cash Component.
		Local	250	"	"	"	100	125 + 25	250		
WEST BENGAL											
Burdwan)* Hoogly)											*No details available regarding cash and kind proportion.
Midnapur	1967-69	HYVs	290								
ORISSA											
Cuttack	1966-67) -69	HYVs	330								Details about cash and kind proportions not available.
Sambalpur	1967-69	HYVs	360								

withdrew the distinction between the HYVP and normal agriculture.[1] The RBI also agreed to provide additional assistance to areas where the programme promised good prospects if the central financing agencies approached the Reserve Bank for the purpose. The Reserve Bank was also agreeable to stretch the multiple adopted in fixing the credit limits of the Central Bank so that a reasonably adequate support could be extended by it to the HYVP.

The Reserve Bank sanctioned credit limits to State Cooperative Banks for the purpose of financing the purchase and distribution of inputs, taking into account the total quantum of different inputs likely to be entrusted to the cooperatives.

3. The Credit Channel

The Central Cooperative Banks at State level obtained the sanction from the RBI and then sanctioned the amount after fixing maximum credit limits[2] for the district Cooperative banks who in their turn issued loans to the cultivators through Cooperative Societies.

4. Expansion and Liberalisation

Under normal conditions, loans were not to be issued to defaulting societies or to societies which were overdue, but for the HYVP this condition was relaxed. In broad terms, credit could flow in cases

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[1] The system was named as Crop Loan Credit.

[2] Maximum Credit Limit (MCL) of Central Banks in the districts, Cooperative Societies and individual cultivators varied from place to place. We discuss it in relation to particular places.

where the default did not exceed 50 per cent[1] of the total money that was borrowed. In the case of viable societies coming under the re-organisation of the credit programme, even this limit was not insisted upon. Exceptions to the 50 per cent overdue cover rule were made in cases of non-defaulting HYVs participants as individuals irrespective of overdues of societies to district Central Cooperative banks (DCCB) to ensure a better flow of credit for the programme. In some cases the restriction in regard to issue of loans to participating individual cultivators overdue was also reduced to a considerable extent. Besides these relaxations, other diminutions in credit rules were effected in some instances, for example, (i) restrictions regarding share qualifications of surety were removed or reduced; (ii) members were encouraged to lift the portion of loans to be taken in kind, but the strict rules were often relaxed and they were not denied cash loans. But these relaxations were not uniform and varied from place to place and time to time depending upon the problem of implementation in particular areas. Similarly, the maximum credit limit (MCL) of DCCB, Cooperative Societies and individual member cultivators were also raised from time to time. These were not uniform in States with both kharif and rabi paddy and attention is drawn to that fact in the following detailed analysis of the credit situation in different States. Table 4.5 gives the details of relaxations and expansion of credit rules in the States in the kharif paddy only.

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[1] There was a slight variation in the extent of the percentage of outstanding loan(s) that was allowed to make the societies eligible for loans which ranged between 25 and 50 per cent in different districts.

Table 4.5: Liberalisation and Expansion of Cooperative Credit in States with kharif Paddy Only

State / District	Year	Steps taken by Reserve Bank of India	Steps taken by District Central Cooperative Bank (DCCB)	General
BIHAR				
Gaya	1966-67			The limit of mortgage free short term and medium term agriculture loans was raised from Rs.750/- to Rs.1,250 for each crop season (not to exceed Rs.2,500/-) for HYV growers.
Shahbad	1967-68	A special credit limit for the district was sanctioned for financing HYVP to the extent of Rs.21 lakhs.		
	1968-69	In the kharif season of the year the special limit and sanctional amount was withdrawn by RBI because cooperative sector could not absorb it in kharif 1967-68. The loans made from this fund amounted to Rs.5 lakhs only.		
PUNJAB				
Amritsar	1967-68	The RBI had raised the credit limit of two central cooperative banks in the district. 50 lakhs for kharif (in the previous kharif it was Rs.34.4 lakhs and in rabi Rs.62.9 lakhs).		The maximum credit limit (MCL) of an individual member cultivator was Rs.2,500/-. This MCL was raised to Rs.4,000/- but in cases where on the basis of scale of finance (Table 4.3) the MCL fixed by the Registrar of Cooperative Societies the credit requirements worked out lower than the MCL, only the lower amount was made available to the cultivator concerned. Out of the MCL of Rs.4,000/-, Rs.500/- represented 'A' component. In May 1969, the Registrar of Cooperative Societies raised the amount under component A to Rs.750/- in deserving cases.
	1968-69	This year the RBI sanctioned a credit limit of Rs.165 lakhs.		
MAHARASHTRA				
Bhandra	1967-68	RBI had sanctioned special finance to DCCB for grant of credit facilities to HYVP cultivators.	The DCCB had sanctioned a special MCL for HYVP at 54.17 lakhs.	
	1968-69		On account of HYVP the DCCB had extended its credit limit to about Rs.2 crore as compared to 56 lakhs in 1967-68. Out of Rs.2 crore the bank sanctioned Rs.88 lakhs under HYVP.	

Departmental Credit

The agriculture and/or revenue department issued taccavi loans mainly in the shape of seeds, fertilizers and pesticides to those cultivators who were not members of cooperative societies. These loans were called by different names such as Intensive Manuring Scheme (IMS), Departmental Loan, Fertilizer Loan, Integrated Short Term Loan, etc. It may be mentioned that taccavi loans were sanctioned for general cultivation of crops. In view of the increased demand of the HYVP the distribution of such taccavi loans was intensified in 1966-67. In some districts HYVs enjoyed special treatment.

In a few districts supplementary credit was also available to meet the credit needs of non-members of cooperatives and in general this was reserved for the HYVP. The funds were provided by agriculture and revenue departments. An amount of Rs. 1,000/- could be borrowed by any HYV grower for each crop season.

Provision was also made for medium and long term credit for capital investment in land improvement and irrigation and purchase of assets. In some districts these loans were also issued from cooperative credit societies, in other districts only by the agriculture department through blocks.

The foregoing sketches the organisation and system of credit and the arrangements made to meet the credit demand for the HYVP. With this background, in the following analysis we attempt to examine the credit support as it was extended to HYV growers during the two seasons of 1967-68 and 1968-69 and the response of the growers to it.

1. States with kharif paddy only

On pages 93- , details of the supply of credit by district are given. These show that, by and large, lending institutions were not able to disburse a large proportion of funds made available to them. The reasons for this failure are discovered on pages

UTTAR PRADESH

(i) kharif 1967-68. In both districts, of the total credit requirements of HYVs, assessed on the basis of scale of finance required per acre for three main inputs, viz. seeds, fertilizers and plant protection material, 20 per cent had to be contributed by cultivators from out of their own resources, of the remaining 80 per cent, half was to be arranged by the cooperatives by way of short term crop loans and the remaining half by the agriculture department by way of taccavi loans.

(ii) kharif 1968-69. In the district of Basti, funds allotted by the two institutions amounted to only 70 per cent of needs, because they had taken into account only the need for financing purchase of seed and fertilizers and had ignored the requirements for plant protection material.

In Varanasi district, the credit requirement was assessed as in the previous kharif but of the total financial requirement of the district 44 per cent was to be met by the agriculture department by way of taccavi loans, 13 per cent by the cooperatives by way of short term loans in kind and the remaining 43 per cent was to be met by the cultivators from their own resources. The cultivators' share was increased from 20 per cent during the previous kharif to 43 per

cent in this season. Reportedly, this step was taken to tap the resources of the cultivators which, in view of good harvest in 1967-68, had improved their capacity. Thus only 57 per cent of the total financial requirement of the district was planned to be met by the two agencies.

Table 4.6 shows the assessed credit requirement and the extent to which it was met by different agencies in the two districts of Uttar Pradesh during the two years under study.

Though it was not intended that the financial requirements of the cultivators should be met in full by the two agencies and cultivators had to meet a part of it from out of their own resources, Table 4.6 shows clearly that in both districts in both years the agencies singularly and in combination actually supplied only a limited proportion of the assessed requirement.

In the district of Basti, in 1967-68 kharif, though the demand for funds by cooperative societies was met in full, the cooperative agency could disburse only about 35 per cent of the sum it was required to disburse in kind and cash loans. The distribution of taccavi loans as is apparent from the table were sharply expanded. However, instances were reported where cultivators were forced to take the taccavi loans even when they had desired to buy the various inputs on cash payment. This was done mainly with a view to achieving the target of 40 per cent fixed for the agriculture department.

In 1968-69, the agencies together supplied 69 per cent of the targeted credit in Basti. Working out the supplies as a proportion of the total financial requirement the agencies combined supplied only 48 per cent of the total. It may be noted that there was no dearth of finance at the disposal of the agriculture department, which was given

Table 4.6: Credit Requirement and Supply Position 1967-69 in Uttar Pradesh
[in Rupees]

District	Year	Assessed requirement	Amt. Rqud. to be distributed by cooperatives	Amt. actually distributed by cooperatives		Total	Amt. rqud. to be distributed by Agri. Dept.	Amt. actually distributed by Agri. Dept.	Total amt. to be distributed by both agencies	Total amt. actually distributed by both agencies	Per cent of total assessed requirement met by		
				Cash	Kind						Coops.	Ag.Dept.	Both together
Basti	1967-68	11500000	4600000[a]	900000	700000	1600000 (34.78)	4600000	2211159[b] (48.06)	9200000	3811159 (41.42)	13.91	19.22	33.13
	1968-69	16114025	4837365	-	-	3422220 (70.74)	6449820	4336395 (67.23)	11287185	7758615 (68.73)	21.30	26.91	48.14
Varanasi	1967-68	7406000[c]	2962400	-	-	279053 (9.41)	2962400	2045681 (69.06)	5924800	2324734 (39.23)	3.76	27.62	31.38
	1968-69	14687892[d]	1909425	-	-	441077 (23.10)	6462672	3394395 (52.52)	8372097	3835472 (45.81)	3.00	23.10	26.10

Source: Compiled and computed from different district reports.

[Figures in parentheses are the percentages of the total.]

Notes:

a. The cooperatives demanded a sum of Rs.20 lakhs and the same was sanctioned in their favour.

b. This amount was a little less than double the amount distributed during the corresponding season of the last year.

c. Of this total amount, HYV paddy in the district (TN-1) accounted for Rs.3740000.

d. Of this total amount, HYV paddy accounted for Rs.8330800.

a blanket sanction to proceed with the distribution within the overall limit of 40 per cent of the total credit requirement of the district. Yet, the table suggests that the distribution of credit was far below the amount targeted for distribution by this agency. This was also the case with cooperatives.

The two agencies were required to advance loans to the extent of Rs. 2,962,400/- each in Varanasi district in 1967-68. In actual terms the agriculture department distributed a sum of Rs. 2,045,681/- as taccavi loans and the cooperatives only advanced credit of Rs. 279,053/- for the purchase of seed and fertilizer. Thus the total credit distributed by both agencies was Rs. 2,324,734/- or only 39 per cent of the total credit targeted for distribution through these agencies. This was a poor result and especially on the part of the cooperative department. It supplied as little as 10 per cent of the total credit targeted for distribution. From the figures of input in kind granted on credit, actually distributed by the cooperative department, the results were much more disappointing. This is evident from the following details:

(a) Against total required supply of Rs. 556,800/- for plant protection, the cooperatives distributed a sum of only Rs. 53/-.

(b) The total distribution for purchase of seed was only Rs. 31,000/- as against the requirements of Rs. 220,760/-.

(c) For fertilizer the distribution was only Rs. 248,000/- as against the requirement of Rs. 2,184,840/-.

The table shows that in 1968-69 for Varanasi, credit supplied by the agriculture department was only 23 per cent of the total assessed requirement. This indicates that whereas the total credit supply had been pushed ahead as compared to the previous year, the actual

achievements of this year were poor as compared to the quantum of credit to be handled during the two seasons and that in this regard the position of the agriculture department had deteriorated considerably. In 1968-69, it met about 52.5 per cent of the total targeted credit as compared to 70 per cent the previous year. The cooperatives, although they still lagged far behind the target, had improved their performance from less than 10 per cent during 1967-68 to 23 per cent during 1968-69. In terms of the percentage of the total assessed financial requirement of the cultivators in the district, the achievement of both the agencies was only 26 per cent.

BIHAR

Gaya. In 1967-68, the short term credit need of participating cultivators was not assessed. Hence no credit could be advanced by the Central Co-operative Bank under the HYVP, though special credit limits for the programme had been sanctioned by RBI.

Integrated short term loans from the agriculture department for seeds, fertilizers and pesticides were available only for the HYVP participants. There was provision to disburse the seed component in cash if it was required by the participating farmer. No specific data relating to targeted credit and disbursement were available; however, it was reported that there was no shortage of funds.

In 1968-69, no special cooperative credit was reported to have been disbursed for HYVs during kharif season.

The integrated short term loan of the agriculture department which was withdrawn by the government in the middle of rabi 1967-68 was

revived[1] at the beginning of kharif 1968-69 and under this a maximum of Rs. 600/- in kind could be given to individual cultivators.

Shahbad. In 1967-68 the cooperatives were virtually immobilised owing to non-realisation of dues for 1966-67 on account of serious drought. Cooperative loaning in this season was only Rs.8 lakhs which was much less than previous years. No precise data in regard to taccavi and supplementary credit were available. It was mentioned that the State government had allotted huge funds under these two schemes of credit and that cultivators had no problems in obtaining an adequate amount of loans.

In 1968-69 cooperative credit was almost the only source of credit available to the cultivators. Owing to a stringent financial position and instructions from State authorities, the supply of credit by the agriculture department was restricted and as such the total supply of credit in general and HYV paddy in particular was much less than the previous years. No cash loans were distributed. Although supplementary credit was open to the farmers, the authorities were hesitant in distributing it.

PUNJAB

Amritsar. During kharif 1967-68, no taccavi loans were made available, the State department of agriculture having reserved them for rabi. The only source of institutional credit available to cultivators was the cooperative agency.

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[1] This was withdrawn by the government right in the middle of rabi 1967-68. Under this loan scheme in 1968-69 loan was sanctioned for general cultivation of crops. Like 1967-68 no special treatment was given to the HYVP farmers.

A sum of Rs. 50 lakhs was sanctioned for the two central banks of the district and they were asked to advance from their own resources another 25 lakhs of rupees. The banks[1] could utilize a sum of Rs. 16.3 lakhs only for the HYVP. The crop loan system was introduced in the kharif season only. It was then too late to fix up the maximum credit limit of cooperative societies. The loans issued were delayed and cultivators could not get adequate credit.

Again in kharif 1968-69, the government did not provide any taccavi loans. The RBI had sanctioned a credit limit of Rs.165 lakhs to the two Central Co-operative Banks in the district. As against this, the banks advanced Rs. 116 lakhs under the Crop Loan System. According to bank records nearly Rs. 36 lakhs were advanced for HYV Crops.[2]

MAHARASHTRA

Bhandra. In 1967-68 the district Central Co-operative Bank had sanctioned a special maximum credit limit for the HYV of Rs. 54.17 lakhs, of which only Rs. 33,000/- were disbursed.

A special sanction by the Revenue Department was given for a grant of taccavi[3] for the HYVP. Statistics regarding the amount granted and disbursed were not available.

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1 The two banks have 1,505 agricultural credit and service societies as their members. Reportedly 50 per cent of these societies were in default in respect of payment.

2 Too much reliance cannot be put on this figure because the field staff did not always mention whether the specific loan was given for HYV crops or other kharif crops.

3 The rate of finance was the same as that fixed by cooperatives, viz. Rs. 300/- per acre of which Rs. 100/- were to be lent in cash and Rs. 200/- in kind.

Thana. The credit disbursed by the cooperative agency during 1967-68 kharif (up to 31.8.67) stood at Rs. 4.25 lakhs as against a sanctioned amount of Rs. 49.78 lakhs. Rupees 6 lakhs were earmarked for the district to be distributed as taccavi loans, which again could not be utilized by the non-members of cooperatives who were either defaulters on loans obtained earlier or had other financial encumbrances which had rendered them ineligible for the taccavi finance.

Data for 1968-69 were not available.

2. States with both kharif and rabi paddy

TAMIL NADU

In North Arcot (kharif 1967-68), special credit provision for the HYVP was made by the RBI but since the cooperative credit societies were heavily over due to the DCCB and the latter to the apex bank, the DCCB could not borrow the funds sanctioned by the apex bank.[1] In kharif 1968-69 restrictions regarding share qualifications of sureties were removed. The cash portion of the loan was sanctioned provided the participant farmers achieved 60 per cent (of the value of Rs. 90/- per acre) of the in kind component. In rabi 1968-69 (i) the cash portion of loan was allowed provided at least the in kind portion to the extent of Rs. 70/- per acre was taken up by the farmer, (ii) the period of issue of cooperative loans was extended up to March, and (iii) in drought declared areas, the short term loans were also converted into medium term loans.

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[1] The societies' over dues amounted to Rs. 232 lakhs and the over dues of the DCCB were Rs. 92 lakhs. However, these were reduced to Rs. 190 lakhs and Rs. 45 lakhs respectively by the end of the season.

In Thanjavur the cooperatives were mainly responsible for dispensing agricultural credit through the two Co-operative Banks in the district. In kharif 1967-68 the maximum credit limit of an individual member was raised to Rs. 10,000/-, while the limit which could be borrowed on personal surety was enhanced to Rs. 5,000/-. The cash portion of loan in 1968-69 was raised to Rs. 120/- from 90/-.

Table 4.7 shows the supply of credit in the three districts of Tamil Nadu State.

The table suggests that in North Arcot district IMS loans were more popular than cooperative loans. In kharif 1967-68 cooperative credit accounted for less than 19 per cent of the total credit provided under the HYVP and so was that in rabi of the same year. Again in kharif 1968-69 the IMS loans distributed under the HYVP in the district accounted for nearly 90 per cent of the total loans disbursed. In rabi, however, the position regarding distribution of cooperative credit had registered some improvement. The table also reveals that the cooperatives could not utilise the sanctioned amount. This means that the failure of DCCB to borrow from the apex bank did not affect the programme.

The data in respect of Coimbatore district were not available for the years under study. It was, however, reported that non-availability of credit, especially the cash component, was a major constraint in the implementation of the HYVP in both the seasons of both years.

In Thanjavur, Table 4.7 shows the amount available to both the agencies was quite adequate. However, disbursement was very low. In this district also the farmers preferred IMS loans. The cooperative in 1967-68 could distribute less than 50 per cent of the sanctioned amount. The respective figure for 1968-69 was 40 per cent.

Table 4.7: Loans Sanctioned and Disbursed in the Selected Districts of Tamil Nadu State (1967-69)
[In Rupees]

District	Year/Season	Allotment under IMS	Amount disbursed	Amt. sanctioned for co-ops.	Amt. disbursed	Total Credit provided	Percentage share of total credit provided by		Remarks
							Co-ops.	Dept.	
North Arcot	k 1967-68	2022890	2022890 (100.0)	594922	465264 (78.20)	2488154	18.70	81.30	
	r 1967-68	N.A.	3658290	N.A.	851259	4509549	18.88	81.12	
	k 1968-69	N.A.	885571	N.A.	101151	986722	10.25	89.75	
	r 1968-69	N.A.	1668130	1615675	650000 (40.23)	2318130	28.04	71.96	
Coimbatore	k 1967-68	N.A.	N.A.	1471000	721000 (49.01)	N.A.			Detailed data not available.
	r 1967-68	N.A.	N.A.	N.A.	N.A.	N.A.			The amount sanctioned and supplied was very inadequate.
	k 1968-69	N.A.	N.A.	N.A.	N.A.	N.A.			Credit was a major constraint on the HYVP.
	r 1968-69	N.A.	N.A.	N.A.	N.A.	N.A.			" " " " "
Thanjavur	k 1967-68	2000000*							*Against this total amount, farmers participating in the HYVP benefited to the extent of nearly Rs. 4.41 lakhs.
	k & r 1967-68			83800000	3780000 (48.87)				Amount available with the agencies was adequate; however, disbursement was very low.
	k & r			112400000	45100000 (40.12)				
	k 1968-69	2700000*	2400000 (88.8)						*Besides IMS, Rs. 16.3 lakhs were distributed against a target of Rs. 98.77 lakhs for sinking wells, purchase of pumpsets etc. by primary land mortgage banks. This was in effect to government order from April 1968 that taccavi loans be advanced only through Land Mortgage Banks (LMBs).

Source: Compiled and computed from District Level Notes.

Note: k and r refer to kharif and rabi season respectively.

By and large, the problem was that the farmers failed to take advantage of credit facilities available. They appeared apathetic to cooperative credit. The reasons will be discussed under a separate heading.

KERALA

The only source of credit in the State was DCCB. All agricultural credit including taccavi loans was channelled through cooperatives. Only in those areas where there was no network of cooperatives were taccavi loans directly advanced to the farmers by the department of agriculture.

In both districts of the State the revised MCL of an individual participant member in kharif 1967-68 was fixed by the cooperative department at Rs. 2,000/- on personal surety and Rs. 5,000/- on mortgage. But since the societies were given freedom to fix MCL consistent with their resources they generally kept the norm at Rs. 1,000/- on personal surety and did not make any provision for mortgage loans. In rabi of the same year the personal surety loan limits were reset at Rs. 3,000/- by the cooperative department.

In Trichur (1968-69), the cooperative department had permitted the credit societies to increase loan amount of shareholders from five to eight times the share capital.

Supply Position. In both districts in the sample, no problem was faced in obtaining finance for the HYVP from the financing institutions nor was there any paucity of funds for the participating member cultivators. Table 4.8 relates to amount disbursed in Palghat district for HYV cultivation.

Table 4.8: Disbursement of Credit in Palghat District

Year	Season		Total amount disbursed (Rs.)	Remarks
	kharif	rabi		
1967-68	16600	2600	19200	
1968-69	130000	87737*	217737	*Total cooperative credit given during rabi for all crops and agricultural purposes was Rs. 38.75 lakh.

The increase in the disbursement of loans could be attributed partly to liberalisation of credit rules and partly to the larger area under HYV cultivation during 1968-69.

In Trichur, the total amounts allotted and disbursed during 1967-68 were as under:

		Amount allotted (Rs.)	Amount disbursed (Rs.)
kharif	1967-68	300000	-
rabi	1967-68	2940301	1600983

Note: There were no applications for loan under the HYVP in kharif 1967-68.

The above figures suggest that there was absolutely no problem in regard to supply in the district of Trichur. The cooperatives were reported to be readily prepared to advance the required amount. Table 4.9 suggests that there had been a sharp increase in the use of credit during the last four years.

Table 4.9: Increase in Use of Credit Over Time in Trichur District

Year	Credit distributed (Rs.)
1964-65	44.5 lakhs
1965-66	66.8 "
1966-67	78.3 "
1967-68	138.0 "
1968-69	300.0 " (anticipated)

ANDHRA PRADESH

Following the liberalization of credit rules in 1966-67 the MCL of individual participating members was fixed at Rs. 4,000/- in the selected districts of the State. In view of the difficult financial position, the DCCB, Nizamabad distributed the loan only at Rs.3,000/- per member in 1967-68. In Krishna, in the same year, the participating members could borrow up to Rs. 10,000/- for HYV cultivation.[1] In the district of West Godavari in respect of the HYVP, the DCCB could draw whatever amount it required from the RBI through the State Co-operative Bank, and likewise in the case of MCL of individual participants. The members could borrow any amount according to acreage scale of finance fixed. In January 1968 the MCL of individual participating members was lifted to Rs. 10,000/- in case of delta areas, and to Rs. 6,000/- in upland areas (from Rs. 4,000/-). Similarly, the surety loan limit was also raised from Rs. 750/- to Rs. 1,500/- in both delta as well as upland blocks.

Supply Position. No special problem was faced by the institutions in obtaining credit in Nizamabad. In kharif 1967-68, the RBI had

[1] This further relaxation from Rs. 4,000/- in the MCL was not uniform for the members of all the societies in the district, it was selective.

sanctioned a sum of Rs. 1.7 crores of which only Rs. 561763 were distributed by the DCCB under the HYVP.[1] In rabi of the same year only two societies in the district, viz. Verni Society and Kondur Society, had borrowed and distributed amounts of Rs. 7,468/- and Rs. 17,276 respectively.

In kharif 1968-69, the total credit needs for short term agricultural operations for all crops in Nizamabad district were estimated at Rs. 3 crores, out of which Rs. 126 lakhs were required for the HYVP. Of this total amount required for the HYVP the cooperative sector was required to disburse Rs. 26 lakhs. An amount of Rs. 257,418 (9.90 per cent of the targeted amount to be disbursed) by co-operatives and Rs. 4 lakhs from the department of agriculture were disbursed as credit during the season. Reportedly there was speedy disposal of applications by the DCCB, but the cultivators did not come forward to avail themselves of the cooperative credit.

In the Masulipatnam area of Krishna district in 1967-68 kharif the DCCB sanctioned Rs. 161,017/- to 16 societies but by August 1967 only one society had taken advantage of this and had disbursed Rs. 2,900/- (1.80 per cent of the total amount sanctioned to 16 societies). The total amount disbursed in the district under the crop loan system for the HYVP was not available but reportedly the amount had formed no more than 2.2 per cent of that issued as short term loans (Rs. 13,473,070) in this area in 1966-67. Again, while the DCCB Vijaywada could not disburse any loans for the HYVP during the whole year, the DCCB Masulipatnam had issued a small amount of Rs. 249,443/- for the whole cooperative year 1967-68. This amount was insignificant compared to

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[1] The funds were available but there was not much demand for cooperative credit, hence the DCCB did not borrow up to its limit under the HYVP.

the total amount of Rs. 12,740,405/- disbursed against normal short term credit during the corresponding period in the previous year. Added to this the cultivators did not obtain any other loans such as IMS or taccavi owing to the paucity of funds of the State government. Thus while in Masulipatnam area it was a problem of taking up available credit by farmers,, in Vijaywada area the problem was an inadequate supply of credit.

Data in respect of supply of cooperative credit in Krishna district were not available for either kharif or rabi 1968-69. However, a sum of Rs. 6.75 lakhs was allotted to the district for disbursement under IMS.

It is of interest to note that despite the inadequacy of credit and several other shortcomings in implementation of the system, the considered opinion of responsible officials of the district was that the HYVP did not suffer or receive any setback in either years because of credit inadequacy.

In West Godavari district the larger part of short term lending for agricultural purposes was done through cooperative societies. Table 4.10 shows the credit disbursed during 1965-66, 1966-67, 1967-68 and 1968-69.

Table 4.10: Disbursement of Cooperative Credit in West Godavari District Rs. (Lakhs)

	1965 - 66		1966 - 67		1967 - 68		1968 - 69	
	k	r	k	r	k	r	k	r
Target	200	100	200	100	200	N.A.	N.A.	N.A.
Total disbursement	165	24.62	144	28.38	163	N.A.	205.43	49.8 (Estimated)
Disbursement for HYVP	Nil	Nil	0.28	9.35	0.40	N.A.	N.A.	N.A.

Notes: k and r refer to kharif and rabi respectively.
N.A. refers to Not Available.

In addition to cooperative credit just discussed, sums of Rs. 2 lakhs in 1967-68, Rs. 14,000/- in kharif 1968-69 and Rs. 1.7 lakhs in rabi 1968-69 were made available by the agriculture department for disbursement under IMS loans. The figures regarding disbursement were not available.

The 'C' class Co-operative Central Bank of Nellore had continued overdues from 1964 onwards and the balance of overdues on 30th June, 1967 was more than 58 lakhs. Hence, the bank was unable to draw more than Rs. 4.7 lakhs from the apex bank out of its credit limit. The DCCB continued its struggle throughout 1967-68 to clear its outstanding dues to the bank at State level and was successful by the end of 1968 agricultural year. Since it was under reconstruction, the RBI had not sanctioned any credit limit since 1965 and as such it had to suspend crop loans for the HYVP during 1967-68 also. The apex bank had fixed a ceiling of Rs.3,400,000 as a special credit for short term agricultural loans with strict conditions such as the drawing of a maximum amount of Rs. 20,000 at a time and that the restriction on the extent of remittances made by DCCB. During 1967-68 the DCCB could manage to disburse only Rs. 29.86 lakhs for various short term agricultural operations to certain societies which had partly earned eligibility to borrow.[1]

Added to the above situation, the district of Nellore had to go without any other loans such as IMS during the whole of 1967-68. However, only a small sum of Rs. 341,300 were disbursed as medium term loans for oil engines and pumpsets during 1967-68.

The provision of credit under the crop loan system was kept in abeyance and was probably considered by the RBI after December 1968.

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[1] In fact, the DCCB was till June 1968 required to recover Rs. 31.5 lakhs of overdues from about 900 of 1,037 societies.

Thus, no such loan could be provided during 1968-69 kharif either. The short term credit requirement in the district was estimated at Rs. 95.5 lakhs for the year (both seasons) but the apex bank had sanctioned only Rs. 45 lakhs as a credit limit to the DCCB for the year 1968-69 and that too at Rs. 5 lakhs at a time.

The agricultural programme did not enjoy the benefits of any other types of departmental loans during kharif 1968-69. However, some of the Panchayat samities[1] which had become eligible after clearing their previous dues, had received an amount of Rs. 75,000/- under IMS loans during the kharif. This amount was, however, not meant for the HYVP alone, but for all types of paddy and other crops.

MYSORE

The crop loan system in Shimoga district was introduced during 1967-68 and had been proving helpful to those farmers who qualified by raising rates per acre paid. But the position in both years was unsatisfactory. In the first place, no proper assessment of the credit requirement was made and secondly, a large number of societies were either defunct or defaulters.

Short term credit was not advanced by any other agency. Medium term taccavi and land improvement loans were advanced by the block.

WEST BENGAL

In Burdwan and Hoogly districts loans were advanced by DCCB(s) to members. Besides this, facilities also existed for the purchase of fertilizers on credit through different block headquarters.

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[1] There are several panchayat samities in a block/district, generally one in a village or one in two to three villages, depending upon the size of the village.

In Burdwan district there was no increase in funds during kharif 1967-68 because it was only in July 1967 that the DCCB had accepted the proposal of financing at a higher rate in terms of acreage rates fixed for HYVs. Therefore cooperative societies and their members[1] could not derive any benefit from the higher rate of finance during the kharif season. A sum of Rs. 12 lakhs was received for distribution as different kind of loans to the farmer. During rabi of the same year the DCCB had targeted to advance loans to the extent of Rs. 135,535 only. Data regarding disbursement was not available.

In kharif 1968-69 the DCCB had advanced loans to the extent of Rs. 60.72 lakhs to members besides a sum of Rs. 6.5 lakhs, advanced by blocks as fertilizer loan. No data for rabi were available.

In the district of Hoogly data were only available for kharif 1968-69. The agriculture group loan was allotted to the extent of Rs. 9 lakhs, of which Rs. 6.36 lakhs (70.66 per cent) were distributed by August 1968. Besides this, a loan arrangement for fertilizer by blocks was made and a sum of Rs. 15.36 lakhs was made available of which only Rs. 4.69 lakhs (30.53 per cent) were disbursed by August 1968.

In Midnapur the cooperative structure was very weak. The societies, because of outstanding dues did not get adequate funds from the DCCB and the latter from the provincial bank. Despite this situation, they were able to provide an adequate supply at enhanced rate of finance of Rs. 290/- per acre to the participants of the HYVP reportedly because the actual adoption was much lower than the targeted acreage and also because only 50 per cent of the participating farmers were members of the cooperative during 1967-68.

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[1] Only 33 per cent of the farmers in the district were members of cooperative societies.

The investment of cooperative finance as crop loan during 1968-69 was of the order of about 2 crores of Rs. but the amount could not be utilized to give the needed financial support to the HYVP participants because in the supply and distribution of cooperative loans there was practically no coordination between the concerned officers at the district and block level.

As cooperative loans were not available easily the State government substantially raised the allotment of fertilizer purchase loans for giving support to participating cultivators. This is shown in Table 4.11.

Table 4.11: Allotment of Fertilizer Purchase Loan in Midnapur district

Year	Allotment (in Rs.)	Remarks
1966-67	284,000	These loans were received and disbursed in time but the amount was inadequate in all the three years.
1967-68	440,000	
1968-69	1,149,000	

The MCL of the HYV participants was also raised from Rs. 500/- to Rs. 1,000/-.

As a flood of relief measure the allotment of agricultural loans such as group loans and cattle purchase loans, were also stepped up during 1968-69 (Table 4.12).

In kharif 1968-69 a minor sum of Rs. 33,770 was distributed as crop loans to the HYV cultivators. The sum distribution during rabi of the same year was also negligible, because during this period cooperatives were busy recovering the crop loan issued in kharif. It may be mentioned that the quantity of normal short term agricultural

Table 4.12: Allotment of Other Agricultural Loans

Year	Allotment (in Rs.)	Remarks
1966-67	1,685,000	Reportedly there was no delay in disbursement of these loans; however, the amount was inadequate in all the three years.
1967-68	2,499,000	
1968-69	2,910,000	This year, in addition to these loans a sum of Rs. 200,000 was distributed as seed loan.

loans in 1966-67 was a little over Rs. 1 crore, but in subsequent years with the introduction of the crop loan system there was a sharp decline in the amount disbursed, as is evident from the following statistics:

Year	Amount disbursed (Rs.)
1967-68	7,855,374
1968-69	3,307,138

ORISSA

Since 1966-67 the MCL of participating members in both sample districts was raised from Rs. 500/- to Rs. 2,000/- in service cooperatives and in special cases to Rs. 6,000/-. From rabi 1967-68 the cultivators were allowed the cash component of the sanctioned loan even if they did not avail themselves of the portion in kind.

Statistics for supply were not available in Cuttack for either year. The available information shows that the disbursement of loans to the HYVP cultivators was not satisfactory, for most of them were either defaulters or belonged to defaulting societies. Departmental credit, such as taccavi loans, was given to agriculturists for improvement

of land, purchase of inputs and bullocks etc. but this credit was for general cultivation and not specially for the HYVP. Also there was no coordination between departmental and cooperative credit with the result some cultivators enjoyed the benefit of both department and institutional credit, while others enjoyed none.

In Sambalpur there was no difficulty in getting credit in cash or kind from the primary cooperative societies. However, in both seasons of both years under study, the credit acutally drawn by the cultivators was small in comparison to the sanctioned and available amount (Table 4.13).

Table 4.13: Credit Made Available and Availed by Cultivators in Sambalpur district

Year/Season		Amount Sanctioned			Amount drawn by cultivators		
		Cash	Kind	Total	Cash	Kind	Total
r	1967-68	N.A.	N.A.	5,202,512	N.A.	N.A.	2,303,311 (44.27)
k	1968-69	N.A.	N.A.	12,426,828	N.A.	N.A.	2,335,984 (18.79)
r	1968-69	2,442,087	5,309,769	7,751,856	350,610 (14.35)	1,456,500	1,807,110 (23.31)

Notes: Figures in parentheses are percentages to the total.
k and r refer to kharif and rabi respectively.
N.A. refers to Not Available.

Table 4.13 shows that only 44 per cent of the total sanctioned amount was taken up by the cultivators in rabi 1967-68,[1] the respective figure for kharif 1968-69 was only 19 per cent. In rabi 1968-69 less than 25 per cent of the sanctioned credit was taken up by the cultivators. It also brings out that in that season slightly less than 15 per cent

[1] Out of total drawings the loans in kind were to the extent of about 80 per cent.

of total cash credit sanctioned was actually utilized by the cultivators whereas a slightly more than 25 per cent of the kind credit sanctioned was drawn by them. Though figures for kharif 1967-68 were not available, reportedly the same trend was noticed.

The reasons for this trend other than indifference of cultivators for cooperative credit (discussed at some length under a separate heading) were many and were different in different years/seasons. In rabi 1967-68 it was partly explained by the fact that a number of cultivators were expected to clear up their outstanding debts for the previous kharif but could not do so. In 1968-69, by contrast, in this district, the cash portion under the crop loan was not welcomed by the farmers and when the loans were sanctioned they did not avail themselves of it. The societies could not meet the full demand for fertilizers which was one of the most important components of the in kind loan.[1] In addition, broadly speaking, every year in each season the farmers deviated from their earlier plans and it was only the eligible small cultivator who availed himself of the full sanctioned credit.

Departmental credit such as taccavi, etc. was not current in this district.

The foregoing appraisal brings out the following points.

1. Out of 22 districts in the sample in 1967-68, credit was advanced by both agencies in 12 districts. Of these 12 districts, Basti, Varanasi, North Arcot and Midnapur were mainly supported by the agriculture department. The credit support was mainly extended by cooperatives in the districts of Bhandra, Thana, Thanjavur, West Godavari, Burdwan, Cuttack, Krishna and Coimbatore. The credit support

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[1] During field surveys of the PEO officers it was observed that the kind portion of credit sanctioned was diverted in many cases to local paddy or other crops instead of HYVs.

from the agriculture department was missing altogether in the districts of Amritsar, Palghat, Trichur, Nizamabad, Nellore, Shimoga and Sambalpur, while Gaya, Shahbad and Hoogly were the three districts where the department was the only source of credit.

In 1968-69 the only change was in the districts of Nizamabad and Shahbad. In the former credit was advanced by both agencies in 1968-69 and in case of the latter, cooperatives were the only source of credit.

2. In the districts[1] where the credit support was not adequately forthcoming from the cooperative sector a large number of societies were defaulters. The only exception was Gaya where no credit was advanced by the DCCB for the credit needs were not assessed. In Amritsar (1967-68 kharif) besides the default of the societies the reason was partly the late introduction of the crop loan system because of which the MCL of the societies could not be worked out. It was the same situation in Burdwan district in that year.

Apart from the existing weak cooperative structure, the results of our analysis into the reasons for the disinterest of cultivators in availing themselves of the sanctioned amount are:

(a) The amount that the cooperatives advanced to a particular member was not sufficient to meet his requirement. If he wanted more he had to invest more money by buying more shares and cultivators in general were positively against further investment, for in the districts where the agriculture department also provided credit support, cultivators found this an attractive alternative

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[1] Mainly these districts were Varanasi, Amritsar, North Arcot, Nellore, Midnapur, Cuttack, Burdwan, Shahbad and Gaya.

source of credit that supplied any amount at the same rate of interest and without the investment requirements. It may be noted that agriculture departments were expected to advance taccavi loans only to non-members of cooperatives. In practice the departments failed to observe this rule and advanced credit to members of cooperative societies as well. Consequently the agriculture department so dominated the field, that farmers lost interest in joining cooperatives or extending their commitments which therefore weakened the efforts of the cooperative societies, in building up their own resources.

(b) The cooperatives insisted on the acceptance of in kind loans. By and large, cultivators were interested only in the cash component.[1]

(c) In the first instance, the cooperatives insisted on the payment of share capital in cash in advance. Later, for HYV loans, they started deducting the share capital at the time of the release of the amount.

(d) Fixed deposits of Rs. 15/- to 20/- were taken from the borrowing rayot. The rayots were most unhappy in parting with their immediate liquidity.

(e) Heavy overdues of DCCB, and societies.

(f) The member had to contribute the additional share capital of the society at the rate of 20 per cent of the loan required by him in progressive stages commencing with 10 per cent immediately. This contribution was over and above the share capital owned by him and

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[1] The district of Sambalpur was an exception to this.

this meant to him virtually locking up the share capital with the cooperative society.

(g) The member was compelled to market his produce through cooperative marketing society to the extent of the loan taken.

(h) With the preference to (e) above, later when the cooperative department had issued instructions that even the defaulting societies may be provided with loans under the HYVP to meet the credit requirements of their non-defaulting members, these instructions did not become effective and consequently many cultivators and many societies did not realise that under the new rules they were eligible to get funds from the DCCB. The worst effect of this was observed in Amritsar district.

(i) Farmers' past experiences with cooperatives suggested to them that cooperative credit could not be obtained in time and in required volume.

(j) In Sambalpur, shrinkage in cooperative credit was mainly because of abolition of interest free fertilizer loans and compulsory provision of 12.5 per cent share purchase by cultivators desiring fertilizer loans since 1966-67.

(k) In the districts of Trichur and Sambalpur, the officials of the PEO observed that the economic condition of the cultivators, especially the middle group who formed the bulk of the cultivators, and who had once been the buyers of the largest share of the credit societies, had become more prosperous owing to increase in prices of agricultural commodities and they had become reluctant to take further loans. Big cultivators found the credit ceiling

restrictive and the small cultivators could not afford to buy the shares.

Our findings in respect of the disbursement of cooperative loans (component C and D) are that till 1968-69 cooperative credit was advanced on the basis of component A and B only, which means that it was not actually integrated with the marketing of the produce. The cooperative department had in several districts introduced the Control Credit Recovery (CCR) system under which loans advanced by cooperative societies for the HYVP were to be recovered in kind through cooperative marketing societies. This was, however, not implemented, although efforts were made to do so in Shahbad, Bhandra, Palghat, Thanjavur and North Arcot districts. The main negative reasons for this as given by the district and/or cooperative officials were:

(a) It was already difficult to achieve targets set for cooperative societies and if CCR system were enforced the position would further deteriorate. The apprehensions were that members would stop their dealings with the societies and switch over to the agriculture department which advanced taccavi loans without such a restriction and at the same rate of interest.

(b) In some districts, the linking of credit with marketing could not be made effective because of severe competition with the Food Corporation of India which was engaged in buying the produce and paid in cash.

(c) In other districts marketing was no problem owing to acute food scarcity and the official view was that such a scheme found favour with cultivators only in times when there was a buyers'

market. In existing circumstances, i.e. in time of shortages and rising prices the chances of success were fewer.

Apart from these reasons, instances were not uncommon where farmers did not know that the HYVP loan could be repaid in kind. For example, in the three villages of Varanasi, that were under constant observation of the PEO staff, none of the cultivators was aware of the provision, with the result that the quantum of produce handled by all the three cooperative marketing societies in the district had declined over time.

Departmental Credit

According to the cultivators, one of the main difficulties with departmental credit in Uttar Pradesh was the procedure laid for the distribution of taccavi loans. The loan application had to be verified by village level workers, and in some cases either by officials of the revenue department such as Lehkpal or the circle inspectors who were available at tehsil headquarters only on certain days in a month. A visit to tehsil headquarters involved a lot of time and expenditure. Thirdly, unless these officials were tipped they would not verify the loan application.

In some districts there was no dearth of finance at the disposal of the agriculture department, e.g. in the districts of Uttar Pradesh. But since funds were allotted in instalments, it was not clear in the beginning of the season and this caused confusion among block officials and authorities. More important than this was the problem of loan recovery for the staff entrusted with the task was inadequate. These two factors together impeded Block Development Officers who were ultimately responsible for the distribution of the targeted amount.

Despite some of the above discussed shortcomings, departmental loans were more popular and widely used because of their timeliness, less complicated procedure and few restrictions.

This general review of the credit organisation and its working with special reference to the HYVP, owing to the limitations of data, does not give conclusive evidence as to the constraint that the variable credit was in the development of HYV paddy programme, i.e. in affecting the level of participation and the use of recommended inputs and the package of practices. It does offer evidence to support the view that the credit arrangement which existed during the period of this study were not geared to satisfy the requirements of the HYVP for paddy. Despite the inhibiting circumstances such as the defaulting societies and cultivators, the preference amongst growers for financing expenditure from out of their own resources despite the sanctioned and available funds, it does appear that there are possibilities for raising the level of inputs in the cultivation of HYV paddy to the desired and optimum requirement and thus of output through a stronger credit support.

Under the circumstances, the policy question relates to stringent or liberal credit support for the HYVP. There could be three possible approaches: (i) at one extreme cultivators might be left to their own resources, (ii) credit support might remain as flexible and liberal as it is at present in order to allow societies and cultivators to improve their financial position. With greater extension work, cultivators might be persuaded to adopt the recommended package of practices by increased borrowing, or (iii) more liberal and efficient credit support might persuade farmers to take more advantage of credit facilities and in turn this might raise the level of input use. The data in district level notes are inadequate to resolve this choice

clearly, but it seems to this author that the most appropriate policy to deal with the situation might be to liberalise the credit rules and to concentrate on dealing with the problems of particular areas which have been discussed.

(F) DISPOSAL OF HYV PADDY

As stated in Chapter II marketing was one of the aspects to be looked into at the district level in the PEO evaluation study of the BYVP. It was contended that as the programme expands suitable measures would have to be taken by the authorities to facilitate marketing at remunerative prices. In this section we determine whether any problems of marketing arose with the introduction of HYV paddy and whether this affected attitudes towards the HYVs. We also examine efforts made to start processing industries and to develop suitable markets. As background perspective we first consider the general policies and the concerned institution of the Government of India.

1. Internal Procurement

Procurement operations had been proceeding for several years both in the surplus and deficit States with the twin objectives of meeting the public distribution requirements and building up bufferstocks.

Methods of procurement followed in different States have been: (i) monopoly procurement, (ii) graded levy on producers, (iii) levy on millers and traders, and (iv) pre-emptive/open market purchases. The system of monopoly procurement is being followed in Assam, Maharashtra and Orissa in respect of paddy and rice. The system of a levy on

producers is in force in the States of Bihar, Gujarat, Kerala, Mysore and West Bengal for paddy and Maharashtra and Mysore for jowar. The system of a levy on licensed millers and traders is being followed in Andhra Pradesh, Bihar, Haryana, Kerala, Punjab, Madhya Pradesh, Uttar Pradesh and West Bengal for rice. In Tamil Nadu, there is no fixed levy and the stocks of rice and paddy are requisitioned from producers and traders under a statutory order on the basis of stocks declared. Wheat and coarse grains (except jowar in Maharashtra and Mysore) are purchased in the open market at the announced procurement prices. Wheat is purchased in Punjab and Haryana in the open market through the system of pre-emption.

2. Price Policy

In January 1965, the Government of India appointed the Agricultural Price Commission to advise it on a continuing basis on price policy for agricultural commodities, particularly paddy, rice, wheat, jowar, bajra, maize, gram and other pulses, sugarcane, oil seeds, cotton and jute, with a view to evolving a balanced and integrated price structure in the perspective of the overall needs of the economy and with due regard to the interest of the producer and consumer.

Fixation of minimum support prices for major food grains has been an essential feature of government policy over the last several years. These prices are in the nature of a long term guarantee to the cultivators whereby in the event of a heavy fall in market prices consequent on excess production, their incomes will not be allowed to fall unduly. Consistent with this policy, minimum support prices are announced. The minimum support policy for the 1969-70 kharif season had been raised from Rs. 1 to Rs. 3.0 per quintal as compared to those announced for 1967-68.

3. Food Corporation of India (FCI)

The FCI came into being on January 1, 1965. Its main functions are to undertake purchase, storage, movement, transport, distribution and sale of food grains and other foodstuffs, to promote the production of food grains and to set up or assist in the setting up of rice mills, flour mills and other such undertakings for processing food grains and other foodstuffs. It became the sole agency of the central government for State trading in food grains from April 1, 1969.

4. States with kharif paddy only

During 1966-69 Taichung Native-1 was the main HYV paddy cultivated in these States (Uttar Pradesh, Bihar, Maharashtra and Punjab). In 1968-69, IR-8 was also introduced in certain districts. Both these varieties were regarded as coarse varieties grown in these States. Most cultivators complained that the grains of the HYVs were rough and not palatable to customers. Their other complaint, about TN-1, related to the short period of dormancy (sprouting of the grain causing harvesting and threshing problems), high susceptibility to virus and bacterial disease and low straw yield. The chalky abdomen and boldness of the grain gave an appearance of coarseness to IR-8 variety. But it was more acceptable grain than TN-1 because it was found to be less susceptible to pest and diseases. In Thana district of Maharashtra, however, TN-1 was liked, reportedly because it had better sustaining quality (satisfied hunger for longer periods).

Despite the above mentioned grievances of cultivators the majority of cultivators did not face any serious problems of marketing of HYV paddy during the two years this study refers to. Before we draw inferences it would be appropriate to have in retrospect the conditions prevailing in the districts of these States.

Both districts of Uttar Pradesh and Bihar in the sample had been deficit districts in regard to food. The consecutive droughts in 1965-66 and 1966-67 had worsened the situation. The production performance of HYVs, viz. TN-1 paddy and Mexican wheat introduced in 1966-67, with regard to yield, was encouraging. The cultivators who had raised these varieties or who had seen them on the farm of other cultivators appeared to be convinced of the superiority of HYVs over the local varieties. Therefore, there was a heavy demand for these varieties and for keeping them as seed for 1967-68. Moreover, the agriculture department was a big buyer of these varieties. Hence the marketable surplus available to cultivators was negligible. In both districts of Maharashtra on account of overall shortage of paddy, TN-1 did not meet any marketing problem in that year. In Amritsar district of Punjab, TN-1 did not find a ready market because of the poor quality of the grain. One or two rice mills which purchased and processed it could sell it only after mixing it with other coarse varieties like Jhona-349.

(i) kharif 1967-68. In both districts of Uttar Pradesh the department of agriculture ceased to buy in 1967-68. Nevertheless coverage of area under TN-1 was greater than the previous kharif season. The variety was not much in demand for purposes of seed. Further, as a result of the procurement rate announced by the State government the maximum price which the cultivators could get was not to exceed Rs. 84.0 per quintal. While a majority of small and medium holders accepted this price, the big cultivators who had sown this variety on a sizeable portion of their holding and from whom a sizeable marketable surplus was available were not willing to sell.

It may be of interest to note that the district authorities devoted their entire attention to the HYV paddy programme. In Basti

the HYVs were grown on 33,300 acres, this being 4.4 per cent of the gross sown paddy area. HYV yields in Basti were reported to be three times those of local varieties. But at the same time it was said that government extension services to farmers growing local varieties were neglected, so that non-availability of fertilizers, improved seed, technical advice, proper plant protection measures, etc. contributed to a decline in yields.

In summing up it may be remembered that both the districts were already in deficit. In view of the foregoing it would appear, first, that despite higher yields, the total paddy production might have remained more or less constant. Second, the big cultivators did not release their surplus stocks. As a result the marketable surplus in the two districts has not been large enough to pose serious problems of disposal of the produce.

In both districts of Bihar, acute scarcity of food grains continued with the result that grain of any variety was in demand. No marketable surplus of HYV paddy grain or of other crops was available. As regards price, in Gaya the price of HYV paddy was found to be slightly lower than that of other local varieties. In Shahbad there has not been any marked difference in the prices of TN-1 and local varieties.

In Bhandra and Thana districts of Maharashtra the reaction of consumers was unfavourable and the system of monopoly procurement by Maharashtra State government came to the rescue of cultivators. The district authorities felt strongly that if the procurement system was abandoned, it would be difficult to find an outlet for TN-1 in the open market.

In Punjab, the State government procured 82 per cent of the rice processed by the rice mills and of this, 80 per cent was on behalf of

FCI. The FCI had fixed the following prices for the purchase of rice from rice mills:

TN-1 rice	Rs. 87.36[1]	per quintal with bardana[2]
Begami rice	Rs. 89.47	" " " "
Permal rice	Rs. 102.10	" " " "
Basmati rice	Rs. 111.58	" " " "

The market cost of a bardana was Rs. 2.25 and applied to all rice. Excluding this the corporation offered a price of Rs. 85.11 for a quintal of TN-1 rice. Parmal and Basmati which are superior varieties are most liked and grown by cultivators. Good cultivators obtained a yield between 10.96 and 11.60 quintals per acre. The yield per acre of TN-1 in this area was 10.65 quintals an acre, slightly lower than Basmati and Parmal. Besides this, the quantity and quality of chaff of TN-1 was also very poor. Taking price and yields into account, the HYVs were clearly less profitable.

The FCI had laid down certain specifications for purchase of coarse variety rice. The samples of HYV grain tested by FCI revealed that they contained 4 per cent unripened grain. Discussions with commission agents in the market revealed that TN-1 paddy brought to market contained more foreign matter.[3] Moreover, its short straw created threshing difficulties. The result was that higher charges had to be paid for cleaning this variety of paddy.

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[1] These figures have been put after converting them into quintals' rate, hence they are different from the original rate.

[2] This perhaps is a local term for bags.

[3] Foreign matter includes organic and inorganic matter. The former includes sand, gravel, dirt, pebbles, stones, lumps of earth and mud. Inorganic matter includes chaff, weeds, seeds and other inedible grains. Even paddy is regarded as foreign matter in the case of rice.

In Amritsar, the same rice mills which in 1966-67 had found it difficult to sell TN-1 without mixing it with other coarse grain purchased the produce this year as well. The only other buyer was FCI which up to October 1967 had purchased only 93 quintals of TN-1 paddy. It accepted a moisture content up to 18 per cent.[1] The prevailing market price in Amritsar in the first week of November 1967 was Rs. 42.0 per quintal as against Rs. 48.0 per quintal for Jhona variety. This year again the rice mills sold TN-1 rice after mixing it with other coarse varieties. Naturally the millers were inclined to pay a lower price for it.

(ii) kharif 1968-69. In Uttar Pradesh, the production rose in both the districts over 1967-68 levels owing to HYVs. But the surplus was not large and a large majority of cultivators only had enough to meet their own requirements. The prices fixed for HYVs (paddy) were:

TN-1 at the rate of Rs. 46.0 per quintal
IR-8 " " " " " " " "

Again marketing was a problem for big cultivators. They were not prepared to sell their produce at the above rates and observed that the prices had gone so low[2] that it was uneconomical to raise HYV paddy. In a seminar organised by the district authorities of Basti at the end of kharif 1968-69 progressive cultivators pointed out that the fall in the price of food grains had discouraged them from taking

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[1] As revealed by the Assistant Director of the corporation at Amritsar the policy was to support the price at Rs. 50.0 a quintal at 10 per cent moisture.

[2] In 1967-68 the price for HYV fixed by the State government was Rs. 84.0 per quintal and big farmers were not prepared to sell their produce at that price.

up the cultivation of the HYVs. In the event of a further fall in prices of food grains they stated they might switch to sugarcane.

There was a reference to the sale of produce through marketing societies but in view of the poor and inefficient working of cooperatives the cultivators felt that these societies would not help solve the problem. They wanted the government to fix a reasonable price after working out the economics of different varieties and to purchase the available stocks at that price.

In Bihar, the shortage of food grains persisted. Though the HYVs were not liked by local people in both districts, there was a regular movement of the produce from surplus to scarcity pockets in the State. The price of TN-1, however, was substantially lower than other local varieties in both districts.

The summer crop of HYV paddy which was available for sale in August/September 1968, though in demand in the market price of other varieties. The main problems were harvesting and threshing in this period which corresponded to the rainy season. Cultivators were in a great hurry to sell it on the threshing floor itself.

In Bhandra and Thana districts of Maharashtra there was neither much improvement in the overall food position nor in the rice supply and the preferences of consumers continued unchanged. However, the procurement price of HYV paddy was higher by Rs. 8.0 per quintal as compared to other varieties. This was so because the government had classified TN-1 as medium variety instead of coarse hitherto.

In Punjab, besides TN-1 paddy, IR-8 was introduced during the kharif. Since only a limited quantity of seed of IR-8 was made available, the coverage under this variety was not substantial.

The FCI had decided to support the price of two varieties at Rs. 50.0 per quintal at 10 per cent moisture content. But they did not,

in fact, enter the market significantly, buying only 3.2 tonnes, even less than 1967-68. This was because of substandard quality. The following rates had been fixed by the FCI:

TN-1 rice at Rs. 89.47 per quintal with bardana
Begami/IR-8 rice at Rs. 91.58 per quintal with bardana
Parmal rice " Rs. 104.21 " " " "
Basmati rice " Rs. 113.68 " " " "

The price of IR-8 paddy in various markets of Amritsar varied between Rs. 45.0 to 48.0 per quintal whereas that of TN-1 was Rs. 2.0 to 3.0 lower than IR-8.

There were no complaints regarding unripened seed of IR-8 and in view of the low marketable surplus there were reportedly no difficulties in its disposal.

No steps were taken to start processing industries in the selected districts of Uttar Pradesh, Bihar and Maharashtra. Reportedly, no need was felt to start such industries for developing suitable markets in view of overall low marketable surplus. In Amritsar, many such industries already existed. In Bhandra also there was one at Poha.

5. States with both kharif and rabi paddy

ANDHRA PRADESH

(i) kharif 1967-68. Officials and cultivators felt that the HYVP had thrown up more marketing problems than any other consumable commodity in the last three years.

HYVs of paddy were not in demand locally because the grain was coarse, glutinous and of poor keeping quality after cooking. Because of the last-mentioned demerit even the labourers and poorest people

did not like it as they usually keep some of the evening meal to be consumed the next day.

In Nizamabad only ADT-27 among the HYVs of paddy had gained some popularity. During the peak marketing season (October-November) it was sold at the rate of Rs. 46.0 to 47.0 per quintal, which was more or less equal to the price offered for similar local coarse varieties of paddy, e.g., Bassangi and Akkullu. The growers complained that even though the FCI offered a reasonable price, it applied substantial cuts on account of moisture, foreign matter, etc. Market arrival from October to December 1967 was 6,973 tons of ADT-27 paddy. Of this the FCI purchased only 460 tons for it did not meet the specifications laid down by the corporation. The officials complained that in the seed procured from Yellaready block of Nizamabad district and Karimnagar district the level of germination had fallen even below 20 per cent.

In Krishna, cultivators argued that higher yields viewed in the context of higher cultivation costs produced a net return little larger than the local varieties.[1]

Table 4.14 shows the procurement price of paddy in West Godavari district.

Table 4.14: Procurement Price of Paddy in West Godavari 1967-68

Sl. No.	Variety	Price per quintal (Rs.)	Remarks
1	Fine varieties	45.50 - 49.50	Later in the year these prices were revised as Rs. 54/-, 45/-, 45/- per quintal respectively.
2	Coarse varieties	41.50	
3	HYVs	41.00	

[1] The difference between procurement price of exotic varieties of paddy and available finer varieties was about 25 per cent. It was generally felt that HYVs should be subjected to a discount of only about 10 per cent.

Though the revised prices brought HYVs on par with local coarse varieties the problem of marketing could not be solved for want of local demand. Although the official minimum prices were the same the local varieties in the market fetched higher prices. The HYVs had no buyers other than local millers who tried to buy at a price lower than the official price under one pretext or another.

In Nellore, there were general complaints from the cultivators about the high operational costs of HYV cultivation, lower prices, the risk involved in the cultivation of HYVs and the constant attention these varieties required. They argued with officials that they justifiably preferred well tried local varieties which fetched them a sizeable higher price and more or less the same net returns as compared to TN-1, ADT-27 and other exotic varieties. Approximate market prices for various HYVs of paddy and other local varieties were as shown in Table 4.15.

Table 4.15: Market Prices for HYVs (paddy) and other local varieties in Nellore (1967-68)

Sl. No.	Variety	Rate per quintal (Rs.)	Remarks
1	BCP-1, BCP-2	60.0	Long duration, fine variety
2	TkM-6	55.0	Medium find, of short duration
3	Culture 6522	52.0	
4	Kesari	45.0	Coarse, short duration. Preferred in consumption for its keeping quality
	HYVs		
5	TN-1		a. No local demand.
6	ADT-27		b. There was no regular procurement agency.
7	Chainan-2		
8	Tainan		

Referring to the classification of paddy into so many varieties/ grades with differential prices the Deputy Director (Agriculture) observed,

> The Administration has committed a fatal mistake in classifying paddy into so many varieties with differential price. Differential prices for various artificial classifications are very much out of tune in the context of national shortage.

There was an additional problem of milling HYV paddy. The existing milling machinery at Nizamabad, West Godavari, Krishna and Nellore was neither adequate nor appropriate for HYVs and mills there gave greater percentages of broken rice. It was observed, however, that HYVs of paddy were suitable for parboiling. Parboiled rice was in demand in Kerala and Madras States. However, no such facilities for this existed in Nizamabad and Nellore districts. In West Godavari there were facilities but they were inadequate. There were parboiling mills at all important places in Krishna district. The only efforts to start processing industries to develop suitable markets were made in Krishna district by establishing cooperative rice mills and processing industries which were reaching completion.

(ii) rabi 1967-68. In Krishna and Nellore districts the agent millers of the FCI were not effective in procurement despite the fact that the corporation had advanced them adequate money for the purpose. In a large number of cases the producers had thrust the stocks at the godowns of millers without first settling the price. The millers in the meantime were free to utilise the stocks for their working capital and kept the cultivators in continued suspense pending settlement of price.

In West Godavari though demand for IR-8 could be developed to some extent for local consumption, it was only marginal and the larger

part of the marketable surplus had to find an outlet outside the State. Owing to the late planting for want of irrigation water and rains at the time of harvest, serious problems of threshing and drying arose. The produce was sold at a discount in the market. The price fixed for IR-8 was Rs. 49.0 per quintal.[1] The rice millers did not buy the produce in the beginning of the season. But subsequently when the District Magistrate permitted export for parboiling, they did buy. However, cultivators had to face two major problems:

1. increased cost on account of transport because they had to deliver to rice mills, and
2. payment was not immediate.

(iii) kharif 1968-69. The general observations were that the average yield of IR-8 per acre ranged between 25 and 30 quintals[2] in Nizamabad and was 20 quintals[3] in Nellore district. The per acre yield of ADT-27 was found to be around 21 quintals. Other varieties like TN-1, Tainan-3, and Chinan-2 had more or less disappeared from the scene.

Table 4.16 shows the prevailing prices in the districts of Nellore and Nizamabad.

It will be seen that in Nizamabad the prices offered for HYVs were comparable with those for similar coarse varieties but these were invariably low. Reportedly, the situation was similar in Nellore district.

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[1] The actual price fixed was Rs. 46.0 per quintal. A bonus of Rs. 3.0 per quintal was allowed, thus making the price Rs. 49.0 per quintal.

[2] Against 18 to 20 quintals per acre of ordinary coarse variety paddy.

[3] Against 12 quintals per acre of local fine varieties.

Table 4.16: 1968-69 kharif Prices of Paddy in Nizamabad and Nellore Districts

Sl. No.	Varieties	Prevailing Price per Quintal (Rs.) Nizamabad	Nellore
1	HYVs (Coarse)		
(i)	TN-1	49.0	N.A.
(ii)	ADT-27	51.0	N.A.
(iii)	IR-8	53.90	49.0
2	Local Varieties		
(i)	Akkurulu (ordinary coarse)	54.0	-
(ii)	Basangi (" ")	52.0	-
(iii)	Motoculu (fine)	62.0	-
(iv)	BCP (")	-	55.0

The FCI at its office at Nizamabad offered officially fixed prices and bonus under three broad classifications as shown below:

Quality	Paddy	Rice
1. Superfine	Rs. 70.0 per quintal	Rs. 109.0 per quintal
2. Fine	Rs. 55.0 " "	Rs. 86.42 " "
3. Coarse	Rs. 46.0 " "	Rs. 72.69 " "

This year the FCI ceased direct purchasing from cultivators at Nizamabad. This was a major deviation in the procurement policy of the corporation from the previous year. Reportedly, the corporation had relaxed the rejection limits. It collected only 80 per cent levy in the form of milled rice from the millers of paddy.

In Nellore, the official rate of IR-8 paddy was Rs. 49.0 per quintal and that of local fine varieties was Rs. 55.0 per quintal. However, it made all the difference when local market rates and preferences of consumers were considered for the two varieties. The demand for fine quality of paddy rose up to Rs. 75.0 per quintal whereas local demand

for IR-8 was negligible and the private traders did not offer more than Rs. 46.0 per quintal.

Six of ten cooperative rice mills in Nellore district were selected for procurement of paddy by the FCI. Only one of them which had a daily capacity of three tons was active in the field. The remaining five were inactive mainly because they did not find the terms and conditions of the FCI (to purchase paddy at open market rates and sell 80 per cent of the output to the corporation at procurement rates) attractive.

Data in respect of Krishna and West Godavari districts for this season were not available. However, the government fixed a procurement price in Krishna at Rs. 46.0 per quintal and it was feared that marketing problems would be more serious this year due to damaged grain.[1]

(iv) rabi 1968-69. In general, local demand for HYVs could not be developed to any appreciable extent. There was no change in the prices fixed by the government and the problem of finding markets outside the State still existed.

In Krishna district, 75 per cent of the produce was damaged by severe gales and heavy rains. The Minister for Agriculture of Andhra Pradesh arranged for paddy purchases by the FCI at a fixed price of Rs. 35.0 per quintal. The former rejection limits were converted into a tolerance limit. But the FCI centres could not procure any significant quantities because the paddy was discoloured and in most cases had become chaffy giving off a foul odour.

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[1] The produce was damaged by cyclone. In some cases germination in the field had taken place.

In West Godavari, the cultivators felt that the price fixed at Rs. 53.0 per quintal was tolerable provided the payment was immediate.[1]

KERALA

In both districts Tainan-3 had virtually failed during 1966-67 and cultivation in 1967-68 was on a very small scale. In general there was acute food shortage in the State. The HYVs grown in the State were IR-8, ADT-27, TN-1 and Tainan-3.

(i) kharif 1967-68. In both districts marketing of Tainan-3 was a serious problem, but there was no serious problem of marketing other HYVs. According to the amended rules of paddy procurement of 1967, all cultivators with five acre holdings and above had to sell their paddy (all varieties) to the government or its authorised agency. The cultivators were, however, disappointed with the price offered by the government, especially for the HYVs which involved higher costs of cultivation.

(ii) rabi 1967-68. In general, marketing was no problem owing to acute food scarcity conditions which prevailed in the State. However, Tainan-3 growers did face disposal problems.

According to the latest paddy procurement rules during 1967-68 rabi cultivators had to give levy to the government as detailed below. There was an exemption for the first two acres. The government price for these fixed deliveries was Rs. 65.0 per quintal.

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[1] The rice millers took no less than three to four months in making payments.

A Class areas (Palghat, Chittur and Allathur taluks) rates

Up to 5 acres	2.5 quintals for every acre in excess of 2 acres
5 to 10 acres	For the first 5 acres at the above rate. For every acre in excess of 5 acres the rate was 5 quintals of paddy.
Above 10 acres	For the first 10 acres at the above rate. For every acre beyond 10 acres the rate was 7 quintals of paddy.

B Class areas (Ottapalam, Perinthalmanna and Poonami area taluks) rates

For all three blocks the fixed delivery rates were 2.5, 3.5 and 5.5 quintals per acre instead of 2.5, 5 and 7 quintals per acre in A Class areas.

After giving a levy at the above rates the cultivators were free to sell the remaining paddy in the open market at competitive prices which ranged between Rs. 80.0 and 85.0 per quintal in Palghat. In Trichur the prices ranged between Rs. 90.0 and 150.0 per quintal depending upon the variety. Tainan could not be sold even at a rate of Rs. 60.0 per quintal.

There were complaints among the producers that the procurement rate was very low and did not give any incentive to them, especially when they had been noticing a steady increase in the cost of production over the last three years.

(iii) kharif 1968-69. There were no marketing problems in this season owing to an acute food shortage and abnormal prices of paddy in the open market. Unlike Tainan, IR-8 and Culture-28 varieties were in demand in both districts for seed as well as for consumption.

The Civil Supplies Department fixed the price for HYVs at Rs. 65.0 per quintal procured under the levy system. But in the open market farmers could obtain Rs. 90.0 per quintal. The FCI did not make any purchase in the market, and there was absolutely no price variation between HYVs and local varieties.

(iv) rabi 1968-69. In Palghat district, owing to inter-district restrictions on the movement of paddy and also to higher production of paddy during this season, the prices of all varieties of paddy had fallen by Rs. 20 to Rs. 25/- per quintal compared with rabi 1967-68. Since the government was procuring all paddy from the farmers there was no problem of marketing. However, cultivators complained of the low price paid to them under the procurement system. The same was true for Trichur district.

It was reported that because of the increased production and fall in the open market price of paddy, the resistance to the system of paddy procurement by levy declined. Persons who had cultivated paddy in an area up to and including two acres in aggregate were exempted from the procurement scheme. Those who had cultivated paddy in an area of more than two acres had to sell paddy to the government according to a single rate of Rs. 65.0 per quintal.

In areas categorised under 'A', fixed deliveries of paddy were set at 2.5 quintals for every acre in excess of two acres, 6 quintals for every acre in excess of five acres and 7 quintals in every acre in excess of 10 acres. In 'B' type areas the corresponding levy rates were 2, 4.5 and 6.5 quintals and in 'C' category they were 1.5, 3.5 and 5.5 quintals per acre.

The officials observed that in view of the increased production cost and fall in the free market price of paddy, if the average yield per acre of paddy fell below 20 quintals, cultivation of HYVs would not be economical and attractive.

There were no processing industries in Palghat but there were many rather old fashioned rice mills in the district. There was scope for starting modern rice mills. In Trichur also there were no processing industries. Rice mills in the district and adjoining districts were many.

MYSORE

Shimoga. Both in kharif and the summer season of 1967-68 there was no local demand for HYV paddy because the grain was coarse and of poor quality, but reportedly the varieties were good for parboiling for which facilities in the district existed. There was an assured market for parboiled rice in neighbouring districts of coastal Mysore and also in Kerala State.

The price of TN-1 per quintal was lower by Rs. 5.0 than other local varieties, but the yields were reportedly high enough to compensate.

Data for the year 1968-69 were not available.

TAMIL NADU

All three districts in the sample were in deficit. In view of procurement and shortage of food grains by and large no serious problems in marketing of HYV paddy were reported.

The district of North Arcot is noted for the production of fine varieties of rice, viz. Kichili, GEB-24. In comparison ADT-27 is in reality below that standard, but since it was classified by the State government as Category I its fixed procurement price was higher than that of the local varieties (Table 4.17).

The cultivators felt that the government price was not commensurate with the high cost of cultivation of the HYVs. Moreover, local varieties fetched much higher prices on the open market than the HYVs. Their experience with ADT-27 was good. They reported that the cooking quality was not bad but they were prone to sell ADT-27 for cash instead of using it for consumption. The straw yield was also satisfactory. However, consumer preference in this area was for IR-8. The cultivators felt that IR-8 was more susceptible to bacterial blight.

Table 4.17: Paddy Prices by Varieties and Seasons, 1967-68 and 1968-69

Season/Year	Variety	Price fixed by the government for procurement (Rs. per quintal)	Open market price (Rs./ quintal)	Remarks
k 1967-68	ADT-27	48.0	N.A.	The rayots preferred local varieites for their own consumption.
	Local varieties	42.66	N.A.	
r 1967-68	ADT-27	48.0	50.0-55.0	
k 1968-69	ADT-27) IR-8)	48.0	60.0-67.0	
r 1968-69	ADT-27) IR-8)	48.0	70.0-80.0	

Note: k and r refer to kharif and rabi respectively.

In Coimbatore (1967-68), HYV paddy was in demand for consumption purposes and marketing problems had not arisen. There were price variations for different varieties, e.g. locally popular exotic variety TkM-6 fetched a higher price than ADT-27. Reportedly TkM-6 was a finer quality. Amongst five HYVs, viz. ADT-27, IR-8, TN-1, Tainan-3 and CO-25, ADT-27 was most popular. In this district IR-8 did not sell well.

In 1968-69 the HYVs were Rs. 10.0 to 15.0 below the price per quintal of the local varieties of TkM-6. Though the demand for consumption of HYVs was less than local varieties, the HYVs were finding a market in the lower class hotel industry and among poorer sections of people on account of their lower price.

Reportedly, the only motivation for the HYV paddy grower was higher yields compared to certain hitherto popular local varieties like TkM-6. But net returns compared with traditional varieties were only

marginally more profitable and the quality of grain did not compare favourably with local varieties. It was feared that with given high yield rates, these varieties may bring about a situation within a couple of years where over-supply may begin to pose marketing problems.

In Thanjavur district in both years marketing was no problem as, under government regulations in force in the district, all rice had to be sold to State agencies authorised to handle procurement, viz. Civil Supply Agency, Thanjavur Cooperative Marketing Federation Limited (TCMF) and FCI.

The fixed price of paddy was Rs. 48.0 per quintal for fine varieties, Rs. 45.0 per quintal for medium varieties and Rs. 43.0 per quintal for coarse varieties. There were no complaints that the procurement rates were low from cultivators contacted by PEO staff, but in relating it to the general cost of living index, they felt that the rates could have been a bit higher.

One major problem of farmers was non-settlement of dues by the procuring agencies.

In Coimbatore, paddy was processed for direct food consumption in the form of boiled or cooked rice. There were 227 major rice mills working in the district. A modern rice mill in Thanjavur was being built on the recommendation of the Ford Foundation. Besides it, five more cooperative rice mills were under construction in the district. The officials reported that there was much scope for starting processing industries in North Arcot district.

ORISSA

No serious problems of marketing occurred in either district or year. In Cuttack the production was small; in Sambalpur there was a scarcity of rice owing to successive droughts.

In Sambalpur the selling price fixed by government and HYV strains were sold at the rate fixed for coarse paddy. There were no variations in the price between the strains of HYV and other coarse strains of non-HYV paddy.

In Cuttack at an earlier stage in 1967-68 there was some dissatisfaction among cultivators growing HYV paddy which was treated on a par with other local varieties of coarse quality for the purposes of price fixation. But later the government declared HYV paddy as fine quality and reportedly paid a higher price for it than for the local ones.

There were no processing industries in either district.

WEST BENGAL

The State possesses a producers' market for paddy and the cultivation of HYV paddy posed no significant problem of disposal during the two years of this study. There were price differentials between the various HYVs of paddy depending upon the quality of grains, but such price variations were considered normal. The FCI was procuring grains at the price fixed by the government. The government had been assisting the FCI in procuring food grains by promulgating a levy at one fixed price.

In the districts of Hoogly and Burdwan in 1967-68 kharif rates for HYVs of paddy were lower than for local varieties and for this reason cultivators did not have much enthusiasm for growing HYV paddy.

In rabi 1967-68, prices of HYV paddy were reportedly higher than local varieties in Hoogly district.

In kharif 1968-69, again in both these districts there was no problem in marketing HYV paddy. The prices of HYV paddy in Burdwan were at Rs. 61.0 per quintal, whereas the same ranged between Rs. 58.0

to 60.0 per quintal in Hoogly district. In rabi of the same year the price of HYV paddy in Burdwan was Rs. 70.0 per quintal and it ranged between Rs. 65.0 to 70.0 per quintal in Hoogly.

In Midnapur, the prices of HYVs were lower than local varieties because the latter were high quality. The open market prices prevailing since 1966 were much higher than the procurement prices and the government had to promulgate a levy order to procure food grains. Table 4.18 shows the procurement prices fixed by government in 1968-69 for paddy, including an incentive bonus.

Table 4.18: Procurement Prices of Paddy Varieties in Midnapur (1968-69)

Grade of paddy	Procurement price/quintal (Rs.)	Bonus/quintal (Rs.)	Total price/quintal (Rs.)
Common variety(ies)	56.25	5.36	61.61
Fine	58.95	5.36	64.31
Superfine/Aromatic	61.60	5.36	66.96

To encourage cultivators, IR-8 was exempted from purview of the levy order, and IR-8, for the purposes of price fixation, was treated as a fine variety. After kharif 1968-69 the gap between procurement and market price was considerably narrowed.

While existing milling facilities in Burdwan were adequate, in Hoogly only one processing industry was working. No efforts to start processing industries in the district of Midnapur were made, though there is scope for a well-equipped modern rice mill in the district.

CHAPTER V

SUMMARY AND CONCLUSIONS

The Indian High Yielding Varieties Programme, a major field programme of 'New Strategy' of agricultural development, was designed and implemented in an emergency situation of a critical food shortage caused by two major consecutive droughts. The two principal objectives of the 'New Strategy' (as envisaged by the Central Ministry of Food, Agriculture, Community Development and Cooperation, Government of India) were to:

(a) apply scientific techniques and knowledge of agricultural production at all stages, particularly in fields;

(b) select a few areas with assured rainfall and irrigation for concentrated application of a package of practices based on improved strains of seeds responsive to heavy doses of fertilizer, and availability of inputs, and to fix special targets of production of food grains for such areas.

Basically this was to enlarge the IADP concept of a package of inputs and practices to farms in specific areas of relatively high production potential, but additionally to augment the package with a number of new varieties which had been shown to be responsive to heavy applications of fertilizers under irrigated conditions.

The main issues relevant for 1967-68 and 1968-69 PEO studies on implementation of the HYV programme were:

(i) examination of the union and State policies on this programme;

(ii) the approach to planning and programming of the schemes with particular reference to the principles laid down in the

selection of areas and farmers, fixation of targets for different crops and the basis for fixation of such targets;

(iii) measures contemplated for the timely and adequate supply of required inputs such as quality seed, fertilizers, pesticide and credit and an examination of the extent to which these were made available to the programme areas;

(iv) technical aspects of the programme such as the development of crop strains, conduct of experiments, trials, demonstrations etc. in determining the suitability of the varieties recognised as high yielding under varying agro-climatic conditions, and finally,

(v) the extent of adoption of practices and reasons for non-participation.

The first report on the HYVP in India prepared by Lockwood, Mukherjee and Shand (1971) painted a bleak overall picture of results from the HYVP with respect to rice and hybrid crops and pointed out the urgency and importance of the tasks of identifying constraints which have inhibited progress in the past and of devising measures to overcome them. With the aid of 1967-68 and 1968-69 PEO studies on implementation of the HYV programme discussed above an attempt in this study has been made to assess the factors which influenced the adoption of the HYV paddy programme. Because paddy is one of the principal staple crops and because the spread of the paddy programme by 1969-70 had been so limited, it was decided in this study to concentrate on this crop only. In what follows we draw inferences from our analysis presented in Chapters III and IV and broadly consider their implications.

In terms of fulfilment of official targets the programme has progressed from 1966-67 to 1968-69. But the progress has been slow,

and the targets, by and large, remained unfulfilled in both years. There has been a great diversity in performance between the districts, and in some cases even between the seasons in the same year in the same district.

The targets fixed for HYV paddy programme were ambitious to the extent of being unrealistic. Broadly speaking, the experiences of 1966-67 HYV paddy programme did not receive due consideration in setting of the targets in 1967-68 nor were the lessons learnt in 1968-69. This was because of the pursuit by the policy of self-sufficiency in food grain production and of the reduction of imports so as to improve balance of payments. They took into consideration the results of the trials on the HYVs conducted in several research stations in India and on these results built up their hopes in the HYVs. The fact that these strains are much more exact and demanding on inputs than the traditional varieties and that their demand varies considerably in different local conditions was not properly recognised. The district and block authorities had no involvement in the planning aspects of the programme and in the key question of target setting. They were only expected to implement and execute the programme conceived at the State level. This led to (i) an approach which was not selective enough with regard to areas and participants in HYV paddy districts, (ii) ineffective extension work and its follow-up at all stages, and (iii) questionable statistics of achievement.

Under pressure to achieve the targets imposed on them the extension agencies at the field level were unable to apply the criteria for selection of areas and farmers. They were forced to mount an all-out drive to involve as many cultivators and as much area as possible in the programme. In places, exaggerated figures on area coverage were

reported by those concerned with the implementation of the programme at field level.

Taichung Native-1 (TN-1) was released as the major variety in the rice high yielding variety programme in 1966 though without unanimous support from the scientific community. With a few exceptions the variety failed owing to production problems such as attack of pests and diseases, difficulties in threshing, etc. Even where it fared relatively well, it lost its initial popularity with the introduction of IR-8. Other varieties that failed owing to production as well as marketing problems were Tainan-3 and Chinan-2. The failure of these varieties can be attributed to their unsuitability under varying agro-climatic conditions. Experiments, trials and demonstrations were conspicuously missing from the paddy programme. A few demonstrations that were carried out in some districts were neither scientifically organised nor was the package of inputs and practices correctly applied with the result that yields were far from satisfactory. Concomitantly such demonstrations proved to be a disincentive to the farmer. It is, therefore, not surprising that in 64 per cent of the sample districts the farmers were not convinced of the superiority of the HYVs over the local varieties even after two to three years of their introduction.

Experiments, trials and demonstrations are essential for any new programme and are a continuous necessity even in the areas where certain variety(ies) might have gained popularity. Such observations from the officials of the districts of Basti, Varanasi and Trichur that the stage of conducting experiments, trials and demonstrations had already passed are unconvincing.

The participating farmers were mostly ignorant of the package of inputs and practices to be applied to HYV paddy. In the initial year (1966) technical officers themselves did not possess adequate knowledge

about the technical aspects of the varieties and gained little more in the following years. With two exceptions the follow-up programme and corrective measures could not commence because findings of evaluation studies were not made available to the districts concerned.

The consequences of unrealistic targets imposed from above, failure of varieties and ignorance of technical aspects of the programme combined not only to obstruct to a very great extent the implementation of the paddy programme but also influenced the confidence of the participating cultivators.

Apart from the above consequences of the approach to planning and programming of the schemes and the technical aspects of the programme other factors inhibiting progress during 1967-69 and influencing the adoption pattern are revealed by our analysis of the measures contemplated for timely and adequate supply of required inputs and marketing of the produce.

The 1967-69 period was unfavourable for agriculture in some parts of the country. Failure of monsoons, drought and near famine conditions prevailed. In some other areas natural hazards such as heavy rains and cyclones or floods caused devastation. In certain parts of some areas both rainfall and irrigation were more or less assured and natural hazards were uncommon. Conditions during the two years were unusual and imposed severe restrictions upon the full attainment of HYV yield potential. In many cases the crop barely survived.

Broadly speaking, the districts chosen for the HYV paddy were favourable areas with maximum irrigation facilities and minimum risk of natural hazards. However, our analysis suggests that their capacity for providing the desired conditions and facilities for the demanding HYV paddy programme were overestimated. It appears that the irrigated area as a percentage of total cultivated area and average annual

rainfall in the district were the guiding principles in planning the HYVP (paddy). The former, however, does not correctly represent the area capable of being cultivated with assured intensive irrigation. In practice, it was almost universally true that the area with the assured water for intensive irrigation was much less than the figures might suggest. In kharif the crop almost everywhere was either dependent upon direct rainfall or canals, reservoirs, river tanks, etc. fed by it. This is not to deny that irrigation received attention from the government but rather the attention was inadequate. In the past a great emphasis and heavy reliance had been laid on long term major and medium irrigation projects and during the two years many of them were not yet in operation or their command area was still small. The fact that they were not designed for the sort of intensive agriculture involved in HYV crop production was overlooked.

It was only when the possibilities of diverting the normal flow of rivers into irrigation canals had been almost exhausted, that the development of minor irrigation, particularly with exploitation of ground water resources was recognised as being important. This source was all the more important in dry areas which did not have or could not have the benefit of canal irrigation. Minor irrigation was also important within the command of canal irrigated areas because it helped to ensure more intensive use of land and water. At the time the HYVP was introduced (kharif 1966) the construction and development of minor irrigation, though current, was on a very small scale. The drought of 1965-66 and 1966-67 underlined the importance of minor irrigation, particularly wells, tube wells and pumpsets which provide quick and assured irrigation. Accordingly stress was laid during 1967 on the development of minor irrigation. It was too late, however, to assist the HYVP during the period under study. Progress during the

two years was slow since the existing tubewells needed deep boring and energisation, and newly constructed ones were not sufficient in number to meet the requirement.

Some improvement in the existing situation was possible in some districts, e.g. in Shimoga, Sambalpur and Cuttack, with proper management of this scarce factor. In some other districts, e.g. Coimbatore and Palghat, malpractices could have been eliminated by strict vigilance. In Sambalpur a dispute between the cultivators and the government should not have been allowed to stand in the way of the HYV paddy programme. But these were minor problems of implementation which any nationwide programme such as the HYVP is bound to experience. Even in the absence of these shortcomings, however, coverage and yields could not have been substantially increased. Irrigation water has been a major constraint on the HYVP (Paddy), and will probably remain so until the present plans of the Government of India for the future development of irrigation materialise. These increasingly aim at (i) impounding by dams the surplus river flow during the monsoon for use in dry weather and (ii) in areas unsuitable for flow irrigation, the construction of minor irrigation works such as tanks and wells and installation of water lifting devices.

The arrangements made for the supply of other inputs, viz. seed, fertilizers, pesticides and credit to enable the farmers to buy these inputs were interdependent. The government's contention was that judicious application of fertilizers could not be undertaken unless efforts were made to provide credit to the farmers. The State governments had facilitated the requisite amount of credit (on the basis of scale of finance for different crops) through cooperatives and/or the department of agriculture. The short term production loan to individual members of the cooperatives has split into four components. One of these components was provision of loan in kind, i.e. inputs in the shape of chemical

fertilizers, seeds and pesticides. The cash portion of the loan was given only if the farmers availed themselves of the loans in kind.

Later it was realised that the cultivators were reluctant to borrow and also in certain districts supplies of fertilizers fell short of demand. The government then introduced decentralised distribution of fertilizers and pesticides by allowing private agencies to sell them in the open market. But this was allowed only up to 50 per cent of the total expected sale of these items. Although the credit rules were subsequently relaxed, farmers have still had to have at least a portion of their loans in kind (if not in the proportion fixed by the government) in order to qualify for the cash portion of the loan.

In the States with kharif paddy only the situation with regard to supply of HYV seed was quite satisfactory in both years (1967-69). In the States where paddy cultivation extends over both kharif and rabi season either the districts were self-sufficient or the demands were generally met by departmental supplies from outside the districts or by the supply from cultivators' farms in the district. However, there were districts where supplies were either inadequate or untimely. Generally such exceptions were not always the same in different seasons and/or years. But in 1967-68 Burdwan and Palghat and in 1968-69 Burdwan and Krishna were the districts where the quantities of seeds supplied were inadequate in both seasons. The main reason for the short supply in most of the districts was non-availability of proper and adequate storage facilities.

While in general there was apparently no problem so far as seed availability in adequate quantity and timeliness, in most of the districts nucleus seed without which foundation seed cannot be raised was not supplied nor were seeds replaced after the third generation. In

some places there was a lack of awareness regarding purity and quality of seeds. In other places there was a lack of confidence in the superiority of government farm seeds. This is again not surprising, first, because the seeds had not been pretested and pretreated and second because (with a few exceptions) sponsored programmes of seed multiplication and seed processing centres had been lacking.

In general, the prices charged for HYV seed have been lower than the open market price. It is essential to maintain this price relation so that the farmers do not turn to privately produced grain of lesser quality. It is also essential that quality incentives to farmers are not offset by delay and deficiencies in procurement. There were complaints from some districts, i.e. Trichur and Sambalpur, about the difference between procurement and sale price of seeds (the government purchased seeds from the cultivators on procurement price fixed by it and when cultivators needed seeds the same were made available to them at a higher price than what they were paid for the seeds produced by them). The evidence suggests that it is not the variation in government price and price of seed in the open market that would adversely affect the programme. However, discrimination in procurement rates announced by the government and sale price at which farmers could buy seeds from the government has acted as a disincentive and has contributed to a lack of confidence among users of the quality seeds.

In States where paddy cultivation is restricted to the kharif season only, it was difficult, from field reports, to determine the situation as to adequacy and timeliness of supply of fertilizers. The supplies of fertilizers were received throughout the year and these were stored in available godowns in the districts. In the absence of adequate care on the part of agricultural authorities and the lack of proper records, it became difficult to maintain the balance of N, P and

K at different stores. In one instance only one type of fertilizer was received. Thus, while fertilizer of a particular type was available in adequate quantity it had become difficult to distribute it for want of requisite combination of other fertilizers. Secondly, very serious problems of storage both on account of available storage capacity and transport facilities were experienced by the districts. In broad terms, however, and excepting Amritsar district the programme did not suffer because of scarcity of fertilizers, and over time there was an improvement in the supply position.

In States with both kharif and rabi paddy, from the kharif 1967-68, no shortage of any kind of fertilizer was reported from the majority of districts and in general the supply was timely. A few districts had some problems of availability of appropriate combination of fertilizers, transport facilities and credit for non-members and defaulting members of cooperative societies. From the rabi season of the same year following the revision of policy for supply of fertilizers through private trade channels an overall improvement in the supply position of all kinds of fertilizers was observed. However, some bottlenecks in respect of a particular kind of fertilizer were reported from two districts out of 15 in the sample. In 1968-69, in both seasons, by and large the HYV paddy programme did not suffer from any maladjustment, delay or inadequacy in supply of fertilizers. But reports of malpractices such as adulteration, underweighting, discrimination in favour or against a few, overbilling, etc. came from three districts.

A common feature of both paddy growing areas was that in almost all the districts the application of fertilizers to the HYVs was far below the recommended dose. This was particularly so in States where paddy cultivation is restricted to kharif season. There has been a

disproportionately low application of P and K (as against N fertilizers) because their impact on crops was not as obvious to them as in the case of N fertilizers. In some areas short supply of a particular kind of fertilizer caused some dislocations as the substitutes recommended and made available were not acceptable to farmers. In general, cultivators judge the price from the point of view of volume and not content. Hence, psychological disincentives had worked in the growth of preferences for types of fertilizers.

In the State where paddy cultivation extends over both kharif and rabi seasons, on the average, overall demand for chemical fertilizers has been increasing since 1967; their consumption also showed a parallel increase (in earlier years often fertilizers were purchased by the farmers but they remained unused. They had to avail themselves of fertilizers in order to be eligible for the cash portion of the loan from cooperatives.) Similar observations were also made in Amritsar district of Punjab where paddy cultivation is restricted to the kharif season. However, in both paddy growing areas disproportionate application of P and K against N fertilizers continued.

For HYV paddy it is not so much the total supply of a particular fertilizer as dictated by the targets that is important but rather the availability and application of all the three types of fertilizers at a particular time. Our analysis suggests that the shortfall in the use of fertilizers was not so much due to scarcity or non-availability of the fertilizers as it was to poor comprehension of the technical content of the programme, the availability of irrigation water, failure of the extension agency to attach adequate importance to different sub-programmes (e.g. soil analysis, application of balanced dosages), lack of demonstrations on cultivators' farms and lack of farmers' confidence owing to malpractices, discrimination etc.

Field observations showed that cultivators in general were not conscious of the need for plant protection, and the use of chemicals for preventative as well as curative purposes was restricted to a few big and progressive cultivators. They were also ignorant of the exact quantity and type of pesticide which should be applied and timing of its application. There were positive exceptions to these observations only in the States of Maharashtra, Tamil Nadu and Andhra Pradesh.

While the position regarding availability of pesticides and equipment and the implementation of measures was initially disappointing, there appeared to be a slowly growing consciousness of the need for plant protection measures in most of the sample districts. There was also some improvement over time both in the supplies of pesticides and chemicals and the demand for them, but lack of equipment remained a constraint in their use and application.

Other weak links in the operation of the plant protection programme were a lack of storage, servicing and repair facilities for equipment and a lack of specific responsibility at the block level for the maintenance and use of the equipment. In some places staff was inadequate. Some insecticides were found to be ineffective either from adulteration or because of immunity of pests.

Although it was well known that the HYVs were more susceptible to pests and diseases and that plant protection was therefore an integral part of the HYVP, this section of the programme got the least attention. In consequence, crops were badly damaged in most districts in one or the other season which prejudiced cultivators against the HYVs of paddy.

In kharif 1967-68 the sale of pesticides and equipment was conducted at subsidised rates. In the rabi season these subsidies were withdrawn in Orissa and in the kharif of 1968-69 in West Bengal and Andhra Pradesh

as well. The withdrawal of subsidies in West Bengal was partly an attempt of the State government ot check unfair practices adopted by different agencies in the sale of plant protection material and equipment but its main effect was on cultivators and it proved to be a disincentive to the adoption of plant protection practices. Secondly, the cost of plant protection material reportedly was rising over time. But despite all these problems, there were districts, for example Nizamabad and Cuttack, where even without subsidy, cultivators were purchasing pesticides, and their interest in plant protection was growing. However, unless plant protection measures both preventative and curative are taken up effectively, by the majority of farmers, the very future of HYV paddy may be at stake.

In reviewing the supply of credit, out analysis shows that in terms of official target area and the level of recommended inputs, total credit requirements were greater than the available supply in both years under review. However, in terms of actual demand, available credit seemed to be in excess of requirements. Also beneficiaries of credit support were generally few in relation to the number of cultivators who had participated in the HYV paddy programme. This was partly because widespread defaulting on previous loans precluded many cultivators from obtaining fresh credit and partly because they were not enthusiastic about obtaining loans from cooperative institutions since to them the terms and conditions of loans were not attractive. It is evident from our analysis that despite some shortcomings departmental credit, wherever available, was more popular and widely used than cooperative credit because of its timeliness, a less complicated procedure and fewer restrictions. In 1967-68 when the programme was confined to prosperous cultivators, the demand for credit was lower than in 1968-69, for these growers could depend more on their

own resources, and those who could not preferred to go without cooperative loans. This in turn affected the level of use of recommended inputs.

In 1968-69 the financial position of most of the District Central Cooperative banks and credit societies had improved considerably and a majority of them were successful in reducing their outstanding dues over time (because of liberalisation of credit rules), yet they lagged in extending adequate support to the programme and to participating cultivators. The criteria used in the allocation of cooperative credit appeared appropriate and rational because:

(i) apart from meeting the credit requirement of cultivator for production purposes, some provision was made for consumption items, and

(ii) credit was linked with marketing of produce through cooperative societies. Moreover, the credit rules were liberalise-, maximum credit limits were enhanced and increasingly funds were made available to extend adequate support to the programme. The crop loan system was introduced to provide reasonable and adequate credit to the participating cultivator to meet his increased agricultural expenses on account of HYV cultivation.

But the fact remains that all these efforts failed to yield the desired results. Contrary to expectations as shown by the comparison of supply and disbursement of loans in later years there was a considerable shrinkage of credit disbursed in many districts.

Though the importance of cooperation for economic development of the rural community and especially the weaker sections, has been stressed in all the Five Year Plans, achievements have been disappointing. Cooperative banks at the State and district levels were heavily in debt because a large number of credit societies were defunct or were hampered by outstanding dues. Unfavourable attitudes of farmers to cooperative loans

were also known to the authorities, and thus the expectation that the cooperative organisation could meet the credit requirements of the HYVP was unrealistic. A conference of the State Ministers in charge of cooperation was held in June-July, 1969 which reviewed the main trends in the growth of the Cooperative Movement, stressed its need to reorient policies and programmes in the context of the 'New Strategy' of agricultural development and outlined measures for strengthening and diversification of cooperative activities. However, such recommended reforms could only take effect after the period of this study.

Credit arrangements that existed during the period of this study were not geared to the requirements of the HYVP. However, despite the above inhibiting circumstances - defaulting societies and cultivators, preference among growers for financing out of their own resources in spite of sanctioned and available funds - it does appear that there are potentialities for raising the level of input use in the cultivation of the HYV paddy with credit, provided the cultivators are encouraged through extension work to adopt the recommended package of inputs and practices through increased borrowing.

Introduction of HYV paddy posed serious marketing problems in the State of Punjab and Andhra Pradesh. Despite the fact that there were critical food shortages and that food grains of any quality were in demand in the States of Utta r Pradesh, Bihar and Maharashtra, marketing of HYV paddy was still a problem in these States. The difficulties, however, were not acute, partly because the programme was adopted on a small scale and partly because of the then existing food shortages. In Kerala marketing of Tainan-3 in particular was a serious problem, even the government which had assured the procurement of the available marketable surplus did not buy it because the quality of grain was very poor. In Mysore there was no local demand for HYV

paddy. However, the market for parboiled rice in neighbouring districts of coastal Mysore and Kerala State was more or less assured. There were no significant problems of disposal in the States of Tamil Nadu, Orissa and West Bengal - again, because of the small scale of the paddy programme and because of a general food shortage and a shortage of paddy in particular. Although in the States of Uttar Pradesh, Bihar, Maharashtra, Tamil Nadu, Orissa and West Bengal no significant marketing problems had been encountered in most of the sample districts, there were fears that in a couple of years the HYV paddy could pose disposal problems. One more contributory explanation as to why there were no serious problems in these States was procurement by government. Had the conditions been normal and procurement not been undertaken, HYV paddy would not have found any market.

The prejudices of cultivators against the HYVs were many. Most of the earlier introduced varieties were considered less productive, had less market value, needed more inputs than local varieties and besides, they created threshing and labour problems during peak seasons. Quality and quantity of straw of the HYV paddy compared unfavourably with local varieties, as was the case for later introduced varieties like IR-8 and ADT-27. But in general, these latter two were more acceptable, mainly because of their higher yields. Cultivators had strong consumer prejudices against the grain of the HYV paddy and did not use it for household consumption. In the market, the HYVs were not preferred by better off consumers. Neither were traders inclined to buy these grains, and if they did, they offered low prices. In most of the cases these varieties also fell below the specifications laid down by the procuring agencies.

Prices of the HYV paddy were generally lower than the local varieties on the free market. There were exceptions to this in 1967-68

(Shahbad and Nizamabad districts) where there were no market differences between the prices of the HYVs and local varieties of paddy. In 1968-69 such districts were Palghat, Trichur, Sambalpur and Cuttack. Procurement prices were also generally lower than expected by farmers. However, in 1968-69 in the districts of Bhandhra and Thana, they were higher than the open market price and they also were in the rabi of the same year in Hoogly. The reason was that the HYVs were classified as medium/fine varieties by the Maharashtra State government. Even in the districts where the marketing of the HYVs had not posed any serious problems, the cultivators felt that at procurement price levels it was uneconomical to grow the HYVs of paddy which involved much higher costs of production than the traditional varieties. Not only were the procurement prices lower than their expectations but the procurement process was unsatisfactory and ineffective.

The growers of the HYV paddy and officials (in some places) observed that the only motivation for growing HYV paddy seemed to be the higher yields compared to certain hitherto popular local varieties. Their observations were, however, that the benefit cost ratio for the HYVs compared unfavourably with local varieties. As a result there was a tendency among large landholders to replace paddy with commercial crops like sugarcane. This tendency was most distinct in the sampled districts of Uttar Pradesh, Andhra Pradesh and Punjab States.

Other variables that influenced the adoption and performance pattern for paddy HYVs arose from the implementation stage of the programme. The complement of staff was reported to be inadequate in the States of Uttar Pradesh, Bihar, West Bengal and Tamil Nadu. In general specific and precise responsibilities had not been fixed for officials at various levels in respect of HYV paddy programmes. Partly for this reason and because of administrative difficulties,

extension and supervisory work in most of the States was inefficient and ineffective.

Within the limitations imposed by the data used for this study and the qualitative nature of this analysis, it is possible to derive certain general conclusions.

1. Above all, the limited spread of HYV paddy (as shown by Lockwood, Mukherjee and Shand study) appears to be explained by limited profitability of the new technology and the consequent limited interest shown by farmers towards its adoption. The substantial returns with experiment station data have not been reflected at the farm level in most areas. For many small farmers the actual or anticipated returns (with the high costs of inputs involved) have not been high enough to compensate for the risks involved. For many big holders of land the returns have been less attractive than available from alternate enterprises. In view of this fact the tendency among big farmers to replace paddy with commercial crops like sugarcane which was very distinctly observed in the sample districts of Uttar Pradesh, Andhra Pradesh and Punjab States is not surprising.

2. The study has shown that a wide variety of factors have singly or in combination, influenced this performance and these have varied greatly between States and between districts, even in some cases between the seasons in one year in the same district. This pattern is suggestive of interdependency of the factors involved and as such would need equal attention in a particular area at a particular time.

3. (a) A major factor has been the lack of suitability of seeds to local conditions (with a few exceptions like ADT-27 in Tamil Nadu). The yield was not as impressive as was expected. Besides, these

varieties were very susceptible to pests and diseases and created problems in threshing and labour shortage during peak seasons. This will require further breeding and testing of newly developed strains of paddy in varying local agro-climatic conditions. More attention in this regard is required for the kharif season partly because of greater importance of the paddy crop in this season and partly because of greater irrigation potential in kharif than the rabi season.

(b) The lack of suitable HYV paddy seeds to local conditions has been magnified by the limits of water availability even in these areas which were favoured than most. Admittedly the process of area selection was in error in many instances but even where it was ocrrect the exacting requirements of the HYVs found the existing facilities wanting. In kharif the crop almost everywhere was either dependent upon direct rainfall or canals, reservoirs, rivers, tanks etc. fed by it. In rabi the situation was much less certain because flooding was achieved by tapping monsoon rain to provide water from canals. Thus irrigation water was a further factor limiting yield in both seasons.

(c) The problem of fertilizer availability could largely be viewed as short term but it was clear that once solved, there was still a major gap between recommendations and utilisation. In fact this was because the former have not been worked out for local conditions but probably, more important, local conditions were not such in most places as to justify the high dosage rates for example, where HYV seeds were not well adapted to local conditions of production and where water availability and control were inadequate.

(d) Vulnerability of HYVs to pest and disease attack was a further limiting factor, particularly in the kharif season. This

placed a cost burden in preventative and curative measures upon producers and a requirement of their provision as part of the overall HYV programme. It was clear that in this respect the programme was wanting in most areas. In consequence crops were badly damaged in most districts in one or the other season which prejudiced cultivators of the existing HYVs of paddy.

(e) Popularity of the existing HYVs was also reflected in the market - lower prices because of their coarseness, poor keeping quality after cooking, high proportion of moisture and foreign matter content, etc. This factor again reduces their attractiveness and then contributes to the disappointing record of adoption in the early years.

(f) Lack of knowledge of appropriate techniques of cultivation and use of new inputs on the part of farmers as well as extension agencies has resulted in low yield and loss og frowers' interest.

(g) The high input costs of the HYVs involved heavier cost outlays which were expected to involve pressure on farmers' own financial resources and on supplies of credit. The measures taken to provide credit were in some instances less than satisfactory (for example, in Amritsar, Nellore, Midnapur and Sambalpur districts). But the strong general impression given by the data was that the demand for credit by no means reached supplies. This was not so much because needs were financed from farm savings but rather it reflected the limited spread of HYV adoption for reasons outlined above. To that extent, the credit system was not fully tested. Nevertheless, it can be assumed that there will be greater demands, and weaknesses already shown up should be remedied.

The major drawback in using PEO field reports for analysing the paddy programme was that they frequently referred to the High Yielding Varieties Programme as a whole which meant that often more than one crop was involved. In addition, the reports varied in coverage and in the quality of the observations. Nevertheless they did provide much valuable information which elaborated upon and corroborated the findings of Lockwood, Mukherjee and Shand's report on the High Yielding Varieties Programme (Part I) with respect to the spread of the new technology and complemented them by highlighting the factors which influenced the adoption performance, or more accurately, inhibited the development of the paddy programme. Many weak links were revealed which are suggestive of policy aspects to be investigated in order to strengthen the programme.

APPENDICES A1 - A3

Appendix A1: List of Selected Districts

State	Names of selected districts, cropwise				
	Paddy	Maize	Bajra	Jowar	Wheat
ANDHRA PRADESH	W. Godavari Nizamabad Nellore Krishna	-	-	Krishna	-
MADRAS/ TAMIL NADU	Thanjavur Coimbatore North Arcot	-	-	-	-
KERALA	Trichur Palghat	-	-	-	-
MYSORE	Shimoga	-	-	Raichur	-
MAHARASHTRA	Bhandra Thana	Poona	Ahmednagar Aurangabad	Sholapur Nagpur Poona Aurangabad	Ahmednagar
GUJARAT	-	-	Banskantha Mehsana Rajkot	Mehsana	
HARYANA	-	-	Hissar	-	Hissar Rohtak
PUNJAB	Amritsar	Ludhiana	-	-	Ferozepur Amritsar Ludhiana Patiala
RAJASTHAN	-	-	-	-	Ganganagar
UTTAR PRADESH	Basti	Meerut	-	-	Basti Muzaffarnagar Aligarh Saharanpur Sitapur Allahabad
MADHYA PRADESH	-	Shivapuri	-	Ujjain	-
BIHAR	Shahbad Gaya	Monghyr	-	-	Gaya
WEST BENGAL	Burdwan Hoogly Midnapur (West)	-	-	-	-
ORISSA	Sambalpur Cuttack	-	-	-	-
TOTAL	22	6	6	8	15

Appendix A2: General Instructions - Selection of Areas and Cultivators

1. Initial Year (1966-67)

Only such cultivators who have assured irrigation facilities are to be selected. Further care has to be taken to select only compact areas so as to facilitate supervision and arranging the supply of inputs and taking necessary plant protection measures.

2. kharif 1967-68

"This is by far the most important aspect of the programme and should be attended to very carefully. The area selected should be most favourable having a network of assured irrigation facilities at the cultivators' command. For this purpose areas covered with tube wells or where minor irrigation works have come up may be given preference. The area so selected should be in compact blocks suitable for a particular crop. In brief it may again be stressed that the success of this important programme will depend mainly on proper selection of area and farmers and this work should be attended to with necessary caution and the care it deserves."

3. kharif 1968-69

The instructions for selection of areas/cultivators during 1968-69 had been that only those cultivators who have suitable soil for cultivation of high yielding varieties and have irrigation facilities should be selected.

Appendix A3: Principal Paddy Varieties Included in HYVP

Variety	Origin	Bred at	Description	Adapted for	Released
ADT-27	Norin 8 (Japonica) x GEB 24 (India)	International Rice Hybridization Project (ICAR and FAO), Cuttack, Orissa.	Short duration (105 days); moderately responsive to fertilizer; yield about 1,600 kg/acre.	Tamil Nadu and Andhra Pradesh	1964
TN-1 (Taichung Native - 1)	Tasi Yuen - chung (tail indica) Dee-gee-Woo-gen (dwarf indica)	Taiwan - introduced into India in 1963; accepted as having the physiogenetic qualities on which to base a breeding programme in 1965; released under HYVP in 1966 without unanimous support from the scientific community.	Indica cross with (a) stiff upright leaves, (b) dwarf plant height, (c) synchronous tillering habit, (d) photo-insensitivity, (e) drought resistance, and (f) lack of seed dormancy. Primary defect is very high susceptibility to virus and bacterial disease. Duration 120 days; yield about 1,800 kg/acre.	Most rice growing areas of India during kharif season in well drained areas	1966
IR-8	Peta (tall indica from Philippines) Dee-gee-Woo-gen	IRRI Philippines during 1962-63; seed multiplied in India on large scale in rabi 1967.	As for TN-1 above; duration 120 days; yields about 2,100 kg/acre; more acceptable grain quality than TN-1	Most rice growing areas of India	Dec. 1966
CO-29	CO13 x CO4	Rice Research Institute, Coimbatore, Tamil Nadu.	Duration 110 days, resistance to blast, stem rot, root rot, smut; yield about 1,800 kg/acre.	Tamil Nadu	Dec. 1967
CO-25	ADT-10 x CO4	Rice Research Institute, Coimbatore, Tamil Nadu.	Duration 165-185 days; resistance	Tamil Nadu	Dec. 1967
PADMA CR28 - 25	Selected from F141 x TN-1	Central Rice Research Institute, Cuttack, Orissa.	Duration 110-115 days in kharif and 120-125 days in rabi; resistant to lodging but susceptible to blight; yield about 2,000 kg/acre.	Orissa, Bihar, West Bengal, Andhra Pradesh and Tamil Nadu	Dec. 1968
JAYA IFT 723	T(H) x 141 (Orissa)	All-India Coordinated Rice Improvement Project, Rajendrapur, Hyderabad.	Duration 130-140 days; resistant to leaf blight and blast; yields higher than Padma.	Punjab, Uttar Pradesh, Bihar, Assam, West Bengal, Orissa, Madhya Pradesh, Madras and Kerala.	Dec. 1968