



Evaluation Study No. 4

GOVERNMENT OF GUJARAT

**INTENSIVE AGRICULTURAL  
DISTRICT PROGRAMME  
SURAT AND BULSAR-  
EVALUATION STUDY  
OF SELECTED  
ASPECTS**

June, 1966.

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**DIRECTORATE OF EVALUATION  
GOVERNMENT OF GUJARAT  
AHMEDABAD**

*With the Compliments*  
*of*  
The Director,  
Directorate of Evaluation,  
Government of Gujarat, Ahmedabad.

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**DIRECTORATE OF EVALUATION  
GOVERNMENT OF GUJARAT  
AHMEDABAD**

## P R E F A C E

The Government decided to undertake a concurrent evaluation of the first Intensive Agricultural District Programme in the State implemented in the areas now comprising the districts of Surat and Bulsar, because of the importance of assessing the immediate impact of the programme and because the analysis of the experiences in implementation of the programme will provide useful guidance in framing future programmes of agricultural development. The report in the following pages, covers the working of the State Evaluation Committee for the Intensive Agricultural District Programme, for the period April, 1963 to August, 1965.

Dated : 30-6-1966.

V. L. GIDWANI,  
Chief Secretary to  
Government of Gujarat &  
Chairman,  
State Evaluation Committee.

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# CHAPTER I

## Introduction

1.1. The Government in the General Administration Department (Planning) vide their circular number EVL-1062-J dated 7-8-1962, decided to undertake an evaluation study of the Third Five Year plan Scheme—Intensive Agricultural District Programme (Package Plan for Surat district) and constituted a committee for the purpose under the Chairmanship of the Chief Secretary to the Government of Gujarat. Other members of the committee were (1) Secretary to the Government, Finance Department, (2) Secretary to the Government, Revenue and Agriculture Department (3) Director, Bureau of Economics and Statistics, (4) Director of Agriculture and (5) Deputy Secretary to the Government, General Administration Department (Planning). The Registrar of Co-operative Societies, Gujarat State and Superintending Engineer, Surat Irrigation Circle, Surat were also co-opted as members of the Committee.

1.2. In recommending the selection of certain areas for more intensive efforts, the Agricultural Production Team sponsored by the Ford Foundation observed that there were no inherent soil, climatic or other physical reasons for the present low yield. The Team, therefore suggested that those selected crops and selected areas in each State should be chosen which have the greatest increase potentialities. In pursuance of this proposal, the Intensive Agricultural District Programme has been framed for Surat district. The programme is intended to contribute both to rapid increase in agricultural production in the selected areas, and to suggest new innovations and combinations of practices which may be of special value elsewhere. In the district an attempt will be made to provide all the essential elements for increasing production to the extent needed, such as, supplies of fertilisers, pesticides, improved seeds, improved implements and composite scientific demonstrations will be laid out on a large scale. An effort will be made to provide credit on a scale sufficient to reach all farmers, including those previously not considered credit worthy and credit and marketing will be linked. Extension personnel specially in agriculture and co-operation, are being made available on a somewhat larger scale than in other areas so that they can work intensively with Panchayat Samities and Village Panchayats and with Co-operative Organisations.

1.3. The Committee finalised the approach for the evaluation study in its meeting held on 17-8-1962 and 15-9-1962 and decided to take up a selective evaluation of the scheme with an accent

on qualitative analysis and selected the following aspects of the programme for study.

1. (i) The optimum results that can be achieved with an optimum combination of factors of production and (ii) available administrative capacity.

2. Adequacy of staff at different levels for implementation of Package Programme.

3. Efficiency of the field staff in the Package Plan Programme.

✓4. Reasons for lack of response or favourable reaction to the three variables (i) fertilisers (ii) improved seeds and (iii) irrigation.

5. Proportion of agricultural output that is marketed through co-operative societies and the extent of coverage of cultivators by co-operative societies.

✓6. Impact on agricultural productivity of the three variables viz. (i) fertilisers (ii) improved seeds and (iii) irrigation.

1.4. To determine the impact of fertilisers, seeds and irrigation on agricultural production the Bureau of Economics & Statistics was directed to take up the analysis of the crop cutting experiments conducted by the Directorate of Agriculture. For the purpose of studies at (2) & (4) for above it was decided that a sample survey should be conducted by the Bureau of Economics & Statistics. For other items selected for evaluation, sub-committees were appointed as described below.

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| 1. (i) The optimum results that can be achieved with an optimum combination of factors of production and (ii) available administrative capacity. | (1) Dy. Secretary to the Government, General Administration Department, (2) Director of Agriculture and (3) Director of Bureau of Economics & Statistics.  |
| 2. Adequacy of staff at different levels for implementation of the Package Programme.  | (1) Dy. Secretary to the Govt., Revenue and Agriculture Department.<br>(2) Dy. Secretary to the Govt., General Administration Department.<br>(3) Dy. Secretary to the Govt., Finance Department. |

3. Efficiency of field staff
- (1) Dy. Secretary to the Govt.,  
General Administration Department (Planning)
  - (2) District Development Officer,  
Surat.
  - (3) Project Officer, Surat.

1.5. The reports and/or notes of the sub-committees and the reports prepared by the Bureau of Economics & Statistics were considered by the Evaluation Committee in its meeting held on 8-4-1963, 30-7-63, 6-1-1964, 16-3-1964, 22-1-1965 and 31-8-1965. The reports and notes along with the recommendations of Evaluation Committee and the actions taken on these recommendations are reported in the chapters that follow.

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## CHAPTER 2

1. The optimum results that can be achieved with an optimum combination of factors of production and

2. Available administrative capacity.

- 1.1. The Sub-committee on (a) optimum combination of factors of production and (b) available administrative capacity in its meeting held on 23-11-1962 considered the draft note prepared by the Director of Agriculture. The note was discussed by the Evaluation Committee in its meeting held on 8-4-1962, and referred back to the sub-committee for revision. The sub-committee finalised the note, in the light of the observations of the Evaluation Committee in its meeting held on 31-8-1965.

1. The optimum results that can be achieved with an optimum combination of factors of production.

- 1.2. According to the note finalised by the sub-committee the main factors for additional production are variety and fertilisers dose, while the spacing between rows and between plants contribute to some extent to additional yields. For paddy, the experiments from research farms were conducted with varieties K-42, E-70, Z-31, and K-176-2. Each of these varieties has qualitative differences and is acceptable in the market and at the same time do not have significant difference in yield as shown by experiments conducted on research farms. In respect of paddy, higher yield is not only the criterion but size and shape of grain and flavour are also important. The local variety Kada is a coarse type and fetches a lower price. The varieties E-70 and Z-31 released for cultivation are superior to the Kada type. Due to this reason, all four varieties are introduced in the Package Programme district for multiplication. Out of these four types, Z-31, K-42 and K-176-2 are more commonly used in the package programme area. Thus in regard to the increased production of paddy by improved varieties, the optimum yield is obtained by use of these improved types of seeds.

- 1.3. In regard to the date of planting paddy, it has been observed on the research farms that if it is sown earlier by 15 days, higher yield can be obtained while delaying it from normal times reduces yield. Though the practice of sowing paddy 15 days earlier would benefit the cultivators, it is not practicable as water is not generally available. The early planting of paddy is therefore, not advisable.

- 1.4. In respect of spacing between plants, the experiments have indicated that there is no significant difference between 6"×6" planting, 8"×8" planting and 10"×10" planting. 9"×9" planting which is convenient for measurement has been therefore accepted in the package programme district.



1.5. For fertiliser doses, 40 lbs. of nitrogen has given higher yield than no nitrogen or 20 lbs. of nitrogen and therefore fertiliser dosages of 40 lbs. have been supplied under rainfed conditions. Application of dosages higher than 40 lbs. of nitrogen have not yielded significant economic return and therefore the rate of 40 lbs. of nitrogen has been adhered to.

1.6. In respect of phosphate applications, research experiments do not indicate a significant increase by application of phosphate, but continuous application of nitrogen is likely to create deficiencies of phosphate in the soil and therefore as a preventive, 20 lbs of  $P_2O_5$  is introduced in the Package Programme. Thus for fertiliser, 40 lbs. of nitrogen and 20 lbs. of  $P_2O_5$  has been introduced for application in the field. The experiment in demonstration plots by application of these are obtained and result in greater financial returns. The average yield in plots treated with 40 lbs. of nitrogen and 20 lbs.  $P_2O_5$  in the 1961-62 was 3270 lbs. against 2446 lbs. in untreated plots. Likewise in 1962-63, yields in treated plots were higher than the controlled plots.

#### Wheat:

1.7. In the IADP areas, wheat is introduced as a new crop as irrigation water is available in rabi season. There has been no local variety in this area. The results of rust resistant wheat Np. 718 have been considered satisfactory and the variety is therefore introduced. Trials with manurial dosages of 30 and 60 lbs. of nitrogen to wheat with and without phosphate have indicated the suitability of a manurial dose of 30 lbs of nitrogen. The additional yield obtained by application of  $P_2O_5$  is not sufficient to warrant its full application but phosphate is applied as a protection for replenishing the soil. Demonstrations arranged in the fields earlier have shown that application of 30 lbs. of nitrogen and 15 lbs of  $P_2O_5$  gives distinctly higher yield and more economic returns. The results arrived at on the research farms are recommended for adoption in the package plan areas.

#### Cotton:

1.8. In regard to cotton, the Department has tried one particular strain for its superiority over the existing strains. The earlier strains were Suyog and 1027 A. L. F. which when compared with new strain, *Vijalpa*, yielded significantly less and therefore *Vijalpa* strain is widely used in this area. Comparing another variety namely *Digvijay* with *Vijalpa* it was seen that both were almost equal in yield but *Digvijay* was finding ready market and higher spot prices. Consequently, the Department has also encouraged growth of *Digvijay* variety in this area. The two varieties *Vijalpa* and *Digvijay* adopted in Surat district are expected to give highest possible income to the cultivators. The application of 40 lbs. of nitrogen and a seed rate

of 5 kgs. per acre has been found to give higher yields and therefore, these rates have been adopted with the addition of 20 lbs. of  $P_2O_5$  in the Package Programme area as a protection against depletion of soil though it does not give higher income.

### Jowar:

1.9. A variety BP-53 was tried on the research farms and was found to give significantly higher yield over the local type. This variety has been introduced in the Package Programme areas. Fertilising Jowar with 40 lbs. nitrogen and 20 lbs.  $P_2O_5$  is observed to give significantly higher yield and consequently it was introduced in the Package Programme district. The field demonstration by this method, however, indicated that economic return by the application of the higher dose did not leave sufficient margin of income. It was, therefore, felt necessary to reduce the dose of phosphatic fertiliser so as to reduce the cost without significant decrease in yield.

1.10. The level of production of the major crops in Surat District is given in table below, along with the areas under the crop and the per acre yield obtained from crop-cutting experiments. The level of production that can be achieved by adoption of optimum combination of factors discussed above are also shown in the table.

✓ TABLE 1

Name of the crop.	Area in acres	Average yield per acre (in lbs)		Production (in lakh tons)	
		From crop-cutting experiments.	From intensive experiments. Optimum level of production	Based on col. (3)	Based on col. (4)
		Present level of production		Actual production of the entire area	Optimum production of the entire area.
1	2	3	4	5	6
Paddy.	3,17,000	1230.6	3070.0	1.74	4.34
Wheat.	29,346	510.2	1276.5	0.006	0.16
Cotton.	4,34,000	54.8 (Lint)	139.5 (Lint)	0.82 (Bales of 392 lbs. each)	1.54
Jowar. (Kharif)	1,88,602	452.0	981.5	0.38	0.82
Jowar (Rabi)	82,998	383.6	810.0	0.14	0.30

The optimum combination of factors of production for the various crops are summarised below.

**Paddy :**

Varieties : Z-31, *Kada* 176-12, K-42, E-70  
 Seed rates : 7 Kg. per acre.  
 Spacings : Z-31=9"×9", *Kada* 176-12=6"×9".  
 K-42 do  
 E-70 do

Manurial dosages : 10 carts load of farm yard manure or compost or green manuring. 18 Kgs. N in form of nitrogenous fertilisers, and 9 kgs. P<sub>2</sub>O<sub>5</sub> in form of phosphatic fertiliser.

**Kharif Jowar :**

Variety: BP-53  
 Seed rate : 5 Kg. per acre  
 Spacing : 2' to 2½' between rows and 6" to 12" between the plants.

Manurial dosages : 5 carts load of farm yard manure or compost or green manuring 18 kgs. N in form of nitrogenous fertilisers and 5 kgs. P<sub>2</sub>O<sub>5</sub> in form of phosphatic fertiliser.

**Rabi-Jowar :**

Variety : Broach—8  
 Seed rates : 5 kgs per acre  
 Spacing 18"×18" between rows and 6" to 12" between the plant

Manurial dosages 5 carts load, of farm yard manure or compost or green manuring. 9 kgs. N in the form of nitrogenous fertiliser and 4½ kgs. of P<sub>2</sub>O<sub>5</sub> in the form of phosphatic fertiliser.

**Wheat (irrigated)**

Variety : NP—718  
 Seed rate : 20 kgs. per acre  
 Spacings : 12" between rows

**Manurial dosages** 10 carts load of farm yard manure or compost or green manuring, 9 kgs. N in form of nitrogenous fertiliser and 18 kgs. of  $P_2O_5$  in form of phosphatic fertilisers.

**Wheat (Dry) :**

**Variety :** Arnej-206

**Seed rate :** 20-kgs. per acre.

**Spacing. :** 18" between rows

**Manurial Dosages :** 9 kgs. N in form of nitrogenous fertilisers and 9 kgs. of  $P_2O_5$  in form of phosphatic fertilisers.

**Cotton, :**

**Varieties :** *Vijalpa, Digvijay*

**Seed rate. :** 5 kgs. per acre.

**Spacing :**  $4\frac{1}{2}'$  to  $6'$  between rows and  $9" \times 12"$  between plants.

**Manurial dosages :** 5 carts load of farm yard manure or green manure and 18 kgs. N. in form of Nitrogenous fertilisers and 9 kgs.  $P_2O_5$  in form of phosphatic fertilisers.

**Observations :**

1.11. The Evaluation Committee observed that the note on optimum combination of factors of production only yielded broadly the combinations to achieve the optimum results. It suggested that a deeper and more refined analysis of the combination of factors necessary to yield the best results, with respect to each kind of soil and water conditions, the dosage, time and manner of application of water, fertilisers, etc. should be made available to the cultivators.

1.12. The suggestion to introduce more refined analysis of the combination of factors has already been accepted and the experiments are being conducted on cultivators' field to decide optimum dosages of fertilisers as decided by the level of fertility determined by soil tests. About 70 such trials with soil analysis have been carried out during 1964-65 and a larger programme is envisaged in 1965-66. Further research on combination of factors is being done on trial-cum-demonstration farms where more refined method of determining the quantity of water used has been introduced. It would be possible after

some experimentation to recommend interval and quantity to be used more precisely than has been the case so far. The third factor of pest control and the additional yield obtained therefrom is also being worked out specially for cotton where a number of experiments on pest control are laid out. As soon as the results of these experiments, both on the farm and the fields of cultivators, indicates desirability of change of combination of factors, such results will be utilised to revise the present package of practices.

## **2. Available Administrative Capacity :**

2.1. It was clarified by the Evaluation Committee that while the adequacy and efficiency of the staff were to be separately studied and what was further required to be studied in connection with the availability of administrative capacity was the nature and extent of the administrative co-ordination and the strength of the staff required to achieve the best results from the programme. A note was prepared by the Director of Agriculture for consideration of the committee.

2.2. As far as co-ordination in Package Scheme is concerned, the principal departments and institutions concerned are (i) Agriculture, (ii) Co-operation (iii) Panchayat (iv) Irrigation (v) Animal Husbandry (vi) Fisheries and (vii) Central Financing Agency.

The co-ordination between them is examined in detail as below :-

2.3. Government appointed a District Co-ordination Committee, vide G. R. Revenue and Agriculture Department, No. IPC-1064-101316-V, dated 30-9-1964 in which all these departments are represented.

2.4. In regard to cattle development, the Animal Husbandry Department has a programme of evolving suitable types of cows for heavy rainfall areas and have taken the required steps for the purpose. The development of poultry has also been taken up recently. At present no major problem of co-ordination between Animal Husbandry and other Departments exist. However when the programme becomes sufficiently large, problem of co-ordination will arise and this will be taken up in the District Co-ordination Committee as suggested above.

2.5. As for Fisheries, the problem of co-ordination arises between Fisheries and Panchayat, who own inland irrigation tanks, where fish culture is to be introduced. The programme has potentiality of expansion and strengthening of staff for extension work of fish culture under the package scheme is needed. It is understood that in other package districts where such problem exists, staff is provided under the package scheme for development of fisheries. If this is accepted in principle, further steps in this regard will be taken. The potentiality of rearing fish can be judged from the fact that there are as many

as 1,000 tanks which can be so utilised in the area, out of which, at present, only 22 tanks have been utilised for rearing fish on pilot basis. Thus it is obvious that expanding the Programme and strengthening fishery extension staff under the package scheme is essential. Problems connected with marketing of inland fish will also arise when this development is taken up and then co-operative marketing will have to be arranged. In a district like Surat where 65 per cent of the population is non-vegetarian, this development has great potentiality.

2.6. The problems of co-ordination, with the Co-operative Department on the one hand and the other departments, on the other, are many; the major problems of development in co-operative sector which effect agriculture programme in Surat district are :—

- (i) Almost total absence of long term credit due to non-existence of efficient land Mortgage Bank structure,
- (ii) Slow process of recovery which hinder extension of further crop loans,
- (iii) Linking credit with marketing of cereal crops.
- (iv) Decreasing membership of co-operative societies.
- (v) Existence of many money-lenders in pockets where Advasis predominate leading to slower development of co-operatives.

(i) The programme of construction of wells and pumping sets etc. in Surat district is not sufficiently large, as unlike other districts the Land Mortgage Bank was formerly connected with the Bombay Land Mortgage Bank and though in principle, it has been decided that the Gujarat State Co-operative Land Mortgage Bank will open its branches in Surat district, this has not yet been started. It is high time that active steps are taken in this regard or else Government may decide to give long term loans through Revenue Department.

(ii) As regards recovery of old debts it may be pointed out that though the farm production plans for as many as 72,752 members were filled in, only 41,165 got crop loans. As many as 11,842 did not get loan because they were over-due debtors. This emphasises the gravity of the problem and the steps to be taken for early recovery. The existing recovery officers are controlled by the Collector of the district and they are paid from the fund created from recovery and kept with the Co-operative Bank. This programme can be expedited if the recovery officers are attached to the Assistant Registrar (Package). Since the number of recovery officers is small, some increase is also necessary.

(iii) The recovery problem can be eased if suitable steps are taken for linking credit with marketing of cereals. About 18 societies are now pooling paddy produce. The pooling of cotton is very common and the total number of societies pooling their produce is 161 out of about 700 Societies. Necessity of creating a special agency for development of co-operative marketing of cereals seems necessary.

(iv) There are 1.85 lakh Khatodars in Surat district out of which only 1 lakh are members of co-operative societies. Thus about 46 per cent are still to be brought into co-operative fold. About 10 per cent out of these are covered by crop sales societies. Thus 36 per cent are still to be brought under the co-operative fold. The increase in membership was only 19,000 in three years. Thus the problem is sufficiently large and needs attention.

(v) A survey made regarding private money lenders in 8 talukas predominately inhabited by Adivasis revealed the existence of 174 money-lenders, who advance credit of Rs. 14 lakhs to about 9,037 cultivators. In the same area 231 co-operatives give loan of Rs. 52 lakhs to 20,525 cultivators. Thus about one-third of the cultivators in this area receive credit from private money lenders. The number will be actually larger because some of the cultivators take loans from both sources. The real effect is felt when the produce of the cultivators is collected by the money lenders at their door step, who then do not pay their dues to co-operatives.

2.7. The problems of co-ordination between Irrigation Department and the Package Programme do exist. Government have already appointed a committee under the Superintending Engineer, Kakrapara, in which representatives of the Agricultural Department, Co-operative Department and non-officials are included. Though the Project officer maintains constant liasion with the Superintending Engineer Kakrapara, it will be helpful and result in better co-ordination if the Project Officer is also appointed in the Kakrapara water Utilization Committee. A Deputy Collector for water utilisation is also provided under the Superintending Engineer, Kakrapara, Co-ordination between this Officer on the one hand and the Irrigation Department on the other, and the Panchayat administration and the Project Officer is really a problem that needs an early solution. The qualification and experience of the person to be appointed to this post is also an important subject in view of the difficulties experienced in encouraging irrigation water use in Kakrapara area. Better results can be achieved if the Project Officer is made fully responsible for this as the subject of increasing water utilisation has been considered the subject of agricultural extension. There are problems of co-ordination specially in regard to rotation and irrigation according to the needs of the crop under the particular area.

2.8. Before the introduction of Panchayati Raj, Block Development Officers and Taluka Development Officers were under the administrative and technical control of the Project Officer so far as package programme work was concerned. When the Panchayati Raj was introduced, this arrangement continued. However, after bifurcation of Surat district, the Project Officer having jurisdiction of more than one district, is under the control of the Department. Obviously the problems of co-ordination between him and the Taluka Development Officers and the Block Development Officers arise frequently. It, therefore, appears that line of command from the Project Officer downward is disturbed. According to the principle accepted by Government in regard to Gram Sevaks and Extension Officers -*visa-vis* the District Agricultural Officer, it is necessary to introduce suitable control of the Project Officer on the extension staff at the district level and the Taluka Level. It is suggested that so far as Surat and Bulsar districts the annual confidential reports of the District Agricultural Officers and the Taluka Development Officers, so far as technical side is concerned, may be written by the Project Officer. For transfers, leave, training etc. of the Extension Officers, it would be desirable to consult the Project Officer and the District Agricultural Officer. The Project Officer would be the proper person to decide such cases.

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## CHAPTER 3

### 1. Adequacy of staff at different levels for implementation of the Package Programme.

1.1. A sub-committee was appointed to examine the adequacy of staff at different levels for implementing the package programme. It held three meetings viz. 7-2-63, 13-6-63 and 10-10-63 and also toured some of villages of Palsana Mahal of Surat district, some villages in the interior areas of the district, which are considered backward and the Bulsar block in the district in connection with this work. The sub-committee had discussions with the villagers regarding the assistance they obtained from the personnel of the Packages Plan Programme and held discussions with the Gram Seveks, Extension Officers, Block Development Officers and non-officials connected with the programme. The findings of the sub-committee alongwith the suggestions of the sub-committee were incorporated in the minutes of the meeting of the sub-committee. These minutes were considered by the Evaluation Committee, in its meetings held on 8-4-63, 30-7-63 and 6-1-64.

1.2. The following paragraphs give a "resume" of the findings and suggestions of the sub-committee, the observations of the Evaluation Committee and the action taken thereon.

### 2. Village Level Staff :

2. The sub-committee observed that at the village level there was no agency for implementation of the programme as the officer at the bottom rung of the ladder in the staffing pattern was the Gram-Sevak a group level worker. The sub-committee therefore, considered the possibility of assistance from the Village Panchayat Secretary and the Secretary of the village co-operative society in implementation of the programme.

### 3. Village Panchayat Secretary :

3.1. The sub-committee felt that the Village Panchayat Secretary (Talati-cum-Secretary) was already overburdened and hardly could cope up with his duties. It would therefore, not be possible, for him to take up any additional duties regarding development work, unless the seja was reduced by increase in the number of posts of the Talati-cum-Village Panchayat Secretaries. It was however felt desirable that there should be a functionary at the village level for development work since the Village Panchayat was made responsible for development of the village under the democratic decentralisation scheme. An experiment could be tried out under which the duties of the Gram Sevak and the Talati-cum-Secretary were combined and discharged by one common functionary who should function for one

Village Panchayat only. In fact an experiment of this nature was being tried out as per Government orders where under one Gram Sevak in each block was entrusted with the duties of Talati-cum-Secretary. A second experiment of entrusting only one village to a Gram Sevak was also being tried. The sub-committee felt that the results of these two experiments should be evaluated to arrive at the optimum combination of duties. It was also suggested that in one taluka, an experiment may be carried out whereunder for each Panchayat, there would be one multipurpose worker, who would be discharging duties as Talati-cum-Secretary and as Gram Sevak. The Project Officer should work out a proposal for the experiment and submit the same to the Government through the District Development Officer.

#### 4. Secretaries of Village Co-operative Societies :

4.1. The Secretary of the village co-operative society had an important role in the implementation of the Package Plan because provision of credit through co-operative societies was an integral part of the programme. There was no Government control over the secretaries of the co-operative societies and some measure of control was considered necessary.

4.2. The sub-committee felt therefore that a scheme of creating a district level cadre of Secretaries of co-operative societies should be worked out and considered for implementation. The non-official and also the Taluka Development Officers do not favour the formation of such a cadre especially if the Secretaries were to be made Government servants. The alternative of creating a common pool of Secretaries which may be operated by the District Federation of Co-operative Societies was also considered. The non-official opinion was that the successful functioning of Co-operatives depended in main on the faith of the members in the personnel of the society and the members were not likely to have faith in a person they did not know, and was an outsider. It was essential that locally known person whose honesty and integrity were accepted by the local population was made the secretary of the co-operative society of an area. The sub-committee decided that in the light of these well-grounded views of the non-officials and officials the question of creating a common cadre of co-operative societies need not be pursued.

4.3. The question of obtaining efficient Secretaries for Co-operative Societies in backward areas, however demanded special consideration because the programme of advancing credit for productive purposes was handicapped in the absence of efficiently run-co-operative societies. The sub-committee felt the difficulties experienced in the backward areas were not so much the lack of trained secretaries-a trained pool of Secretaries was available in Surat District at least-but the inability of the societies in these areas to offer emoluments to their Secretaries which would attract trained and qualified persons.

4.4. The Co-operative Department should therefore, examine the problem with a view to vitalize the societies in the backward areas. The current scheme of subsidizing the managerial expenses could be modified to suit the conditions in the backward areas and special concessions both by way of large share capital contribution and larger managerial subsidy on expenses may be considered by the Government in Co-operative Department. The forest labour's Co-operative have benefited by such a scheme and if similar benefits could be extended to co-operative societies in the backward areas, the position would become easier.

#### **Gram Sevaks :**

5.1. The sub-committee examined the dairies of some of the Gram Sevaks in relation to the job-chart for Gram Sevaks and came to the conclusion that the quality of the output of the Gram Sevaks was far from satisfactory. This was attributable primarily to the low calibre of Gram Sevaks who in some cases were "untrained" and in some cases did not possess aptitude for development work or had any background of agricultural knowledge. Besides calibre that needs improvement, what requires to be emphasised is the approach to be developed to bring desired results-while it has repeatedly been pointed out that it is only the individual approach or the group approach which should be relied upon, it was found that this advice remained a mere theoretical precept that was accepted but was not practiced. The preparation of the village production plans, for instance, showed that the plans were prepared more on the basis of arithmetical splitting up of targets prescribed from above rather than being built up on the basis of a working plan for the farmers in a village which took account of the potential of production of the area and the requirements and the capacity of individual cultivators. The approach to increase production in individual fields by getting the cultivator to utilize improved seed, apply proper dosages of fertilisers and adopt improved cultural practices was lacking.

5.2. The sub-committee was of the opinion that the calibre of Gram Sevak, in view of this general educational background and experience, could not be expected to be such as could enable them to discharge efficiently the functions assigned to them. A smaller number of Agricultural Extension Officers could perhaps prove more useful in the extension work. The sub-committee therefore, suggested that an experiment of appointing a smaller number of Agricultural Extension Officers in the place of the prescribed number of Gram Sevaks should be tried out least in one taluka .

5.3. For qualitative improvement of the cadre of Gram Sevaks in the district, the sub-committee suggested (1) proper selection of personnel by weeding out those elements who did not have aptitude for development work and returning them to their parent department

i.e. the Revenue Department and (ii) proper training and cultivation of proper approach and method of work.

5.4. Based on the findings of its tour of the district and discussions with various officials and non-officials, the sub-committee came to conclusion that the most satisfactory unit for determination of the adequacy of the number of Gram Sevaks in the package area should be the number of cultivators families but other consideration such as cropping pattern in a particular area, the state of communications in the area of operation and the backwardness or otherwise of the agriculturists should also be taken into account in deciding the requirements of Gram Sevaks.

5.5. Surat district can be divided into two distinct tracts (i) the area where communications are good, the cultivators are advanced and grow a variety of crops either continuously or in succession and the people are more receptive to new ideas and (ii) the area inhabited predominantly by scheduled tribes, where the communications are difficult and the population is sparse. In the advance areas while the communication were satisfactory, the work load of the Gram Sevak in relation to a cultivator family was likely to be more due to the multiplicity of cropping pattern which will necessitate more frequent visits to the villages. In the backward areas on the other hand, though communications were difficult, the frequency of visits to the villages was likely to be less because of the simple cropping pattern. The conditions in both the areas thus balanced out and the sub-committee felt that it would not be inappropriate to adopt a common standard for the entire district in deciding the requirements of Gram Sevaks for the programme. Taking account of the various duties that are prescribed for the Gram Sevak according to the job chart, the sub-committee felt that a Gram Sevak circle should be so decided as to cover about 500 families in an area of 10 to 15 square miles. There may be pockets where conditions were particularly difficult and the Package Plan Officer should be authorised to make marginal adjustments within the district by allocating additional Gram Sevaks in such areas by withdrawing them from areas where the work could be handled by a smaller number.

5.6. The project aims at covering 65 per cent of the cultivating families by the end of the fifth year. This would mean that a Gram Sevak will have to help in preparing 350 farm production plans if his jurisdiction covers 500 cultivator families. In a period of four months at his disposal for this work, a Gram Sevak should be able to reach the target at the rate of about 100 farm production plans per month, and to perform various other services required of him for the purpose of efficient implementation of the programme. The total number of cultivating families in Surat District is estimated at about 2,90,000 and the target of coverage is therefore 1,56,000 families, excluding sixty Gram Sevaks earmarked

for Tribal Development Blocks. There are 452 Gram Sevaks in the districts. The existing strength of Gram Sevaks in the district was therefore deemed to be adequate according to the criteria decided by the committee.

5.7. The committee was also of the view that the distinction between Gram Sevaks of the Community Development Blocks and of the Package Project should be done away with and all the Gram Sevaks should be considered as integrated and placed under the control of the Project Officer.

5.8. It was suggested to the sub-committee that the jurisdiction of a Gram Sevak should be co-extensive with that of the Village Panchayat and if possible, with that of one or more co-operative societies. The sub-committee felt that keeping in view the broad criteria mentioned above, it should be possible for the Project Officer, to re-arrange the jurisdictions accordingly.

5.9. The sub-committee's conclusions in respect of Gram Sevaks are (i) an experiment of appointing a smaller number of Agriculture Extension Officers in place of the prescribed number of Gram Sevaks Should be tried out at least in one taluka (2) proper selection of personnel by weeding out those elements who do not have aptitude for development work and returning them to their parent department i.e. the Revenue Department (3) proper training and cultivation of proper approach and method of work (4) The present strength is adequate (5) The jurisdiction of each Gram Sevak should be rearranged so as to given him 500 cultivating families (6) The Project Officer may be authorised to make marginal adjustments wherever necessary and (7) that the strength of Gram Sevaks should be distributed uniformly all over the District irrespective of the state of each Block.

## 6. Extension Officer (Agriculture) :

6.1. The sub-committee found that there was greater emphasis on the supervisory aspects of the work of those officers than on their direct contribution of the development effort by contacting cultivators to achieve concrete results. The greater part of their time was devoted to issuing instructions, checking forms and exercising other supervisory duties for controlling the Gram Sevaks. The Extension Officers seem to be depending on Gram Sevaks for field action. The sub-committee felt that the job-chart of Extension Officer (Agriculture) needs a revision so as to provide some direct field work by these officers. The sub-committee suggested therefore, that three villages should be allotted to each Extension Officer (Agriculture) for direct work and concentrated action in the case of these village being deleted from the charge of the concerned Gram Sevaks. The sub-committee found that the suggestion of allotting 3 villages to each Extension Officer (Agri.) should

enable him to tender efficient services to about 2,500 cultivating families covering on an average five Gram Sevaks circles. The present strength of 97 Extension Officers in the district was therefore, considered adequate in the context of the total number of cultivating families in the district.

#### **7. Extension Officer (Co-operation) :**

7.1. As in the case of Extension Officer (Agri.) there was greater emphasis on the supervisory aspects of the work of the Extension Officer (Co-op.) also and the job-chart of this officer should also be revised to provide a measure of direct action. The sub-committee suggested that Extension Officer (Co-op.) should be made responsible for ensuring that the credit required for implementation of the production plans of the villages in his charge is actually made available by the co-operative to the concerned individual cultivators. The sub-committee felt that the Extension Officer (Co-operation) or a Co-operative Supervisor should be able to service about 12 co-operative societies with a total membership about 2,000 taking into account the fact that the persons who had not yet come within the co-operative field will also have to be approached by them and enrolled as members if possible. The present strength of these functionaries was 19 Extension Officers and 38 Co-operative Supervisors, for a total number of 640 societies with a total membership of 1,18,000. Taking the above standard into consideration the present strength was considered as adequate. The current arrangement under which the Extension Officers look after the larger co-operative societies and distribute smaller societies among the Co-operative Supervisors, the sub-committee felt was satisfactory and should be continued.

#### **8. Block-Taluka level ministerial staff :**

8.1. According to the staffing pattern for Intensive Agricultural Programme there is provision for one senior clerk for each block unit. There were 19 talukas in Surat district having 39 C.P.A. pattern blocks at the time of inception of the Package Project. The Agriculture Department had found it convenient to adopt talukas as a unit in place of a block and had therefore proposed staff for 19 instead of 39 units. Subsequently, 2 Mahals viz., Nizar and Uchhal were added to the district on the formation of the Gujarat State. There were 21 talukas and mahals in the district. The sub-committee felt that 2 posts of senior clerks for 2 units should be sanctioned.

#### **9. Taluka Development Officer :**

9.1. The sub-committee gathered an impression that after the inception of the Panchayati Raj much of the Taluka Development Officer's time is taken up by the secretarial duties of the Taluka Panchayat. The Taluka Development Officer is also expected to

attend the meetings of various committees of the Taluka Panchayat. All this takes a great deal of his time and he is not able to pay as much attention to intensive agricultural production as is expected of him. The sub-committee felt that it was necessary in the Project area to relieve the Taluka Development Officer of some of his duties. The sub-committee was of the view that the Taluka Development Officer may be given the assistance of an officer of the rank of a Mahalkari who may also function as the Secretary of the Taluka Panchayat and attend to the routine administrative work of the Panchayat. In the alternative, one of the Extension Officers may be appointed as Secretary of the Taluka Panchayat so that the Taluka Development Officer can devote his full attention to the work of the package project.

#### 10. District Level Staff :

10.1. The Project Officer has proposed a post of senior clerk for his office. It was noted that Government has directed that the Project Officer should submit proposals in the month of March after watching for a period of six months, the working of his office with the staff so far sanctioned. The Project Officer was, therefore, requested to submit his proposals with necessary justification in March, 1963.

#### 11. Observations and Recommendations of the Evaluation Committee :

(1) *Panchayat Secretaries.*—The suggestion of making the Panchayat Secretary an instrument of implementing the Package Programme at the village level would not work in the interest of efficiency of the programme and the Gram Sevak should be able to convince the agriculturist by extension methods, the need for implementing the various programmes.

(2) *Secretaries of Co-operative Societies.*—The suggestion for giving special consideration to co-operative societies in backward areas in the matter of share capital contribution and subsidy towards managerial cost was endorsed for further action by the Registrar of Co-operative Societies.

(3) *Gram Sevaks.*—(i) The proposal for trying out an experiment in one block of appointing Extension Officer (Agri.) to replace Gram Sevaks was accepted. The committee directed that the scheme should be examined by Revenue and Agriculture Department for implementation (ii) Intensive agricultural courses may be arranged for the Gram Sevaks with special emphasis on approach and method of work. (iii) Jurisdiction of Gram Sevaks in one block may be reorganised taking into consideration his capacity to contact the cultivators effectively and the frequency of such contacts. (iv) The

suggestion of the sub-committee of allotting three villages to each Extension Officer (Agri.) where he would work independently of Gram Sevak was endorsed for action by the Project Officer.

#### 4. Other Staff :

The recommendations of the sub-committee regarding the posts of clerks for Nizar and Uchhal Mahal and Taluka Development Officers; the Extension Officer (Agri.) and Co-operative Supervisor and the district level staff were approved subject to,

(i) The suggestion of providing the assistance to Taluka Development Officers in Surat district of an officer of Mahalkari's rank who may also function as Secretary of the Taluka Panchayat and attend to the administrative work of the panchayat so that Taluka Development Officers (who are agricultural graduates) may be able to devote sufficient time for Package Programme may be examined by Rural Development Department.

(ii) Regarding the suggestion of the sub-committee of appointing the Project Officer as District Agricultural Officer, Surat in order to enable him to associate with the Statutory Committee on Agricultural Production appointed by the District Panchayat, it was observed that the Project Officer, need not be the Secretary of the statutory committee constituted under the law, but he should be invited to attend the meetings regularly. It was decided that Revenue & Agriculture Department may examine this point further.

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## CHAPTER 4

**1. Efficiency of Field Staff in the Package Plan Programme :**

1. With a view to assessing, as to whether each category of field staff comprising the Village Level Worker, Extension Officers (Agri.) Co-operative Supervisors and Extension Officers (co-op.) had been able to discharge the different functions assigned to them, and examining the reasons for shortfalls in their performance the sub-committee designed a field survey which was organised and conducted by the 'District Panchayat'. Conclusions arrived at by the study were to be compared with the confidential reports in order to judge the co-relation between the two types of assessment.

1.2. The performance of the field staff was evaluated for the period 1962-63, the second year of the programme. The assessment of actual performance was more in terms of quantity rather than in terms of quality.

1.3. A detailed report of the survey is being published separately. A broad picture of the results of the study is given in the following paragraphs.

**2. Village Level Workers :**

2.1. The Village Level Worker is required to prepare village plans for all the villages in his charge in the package plan area. The village plans represent the total of individual farm, production plans and programme based on self and village community efforts. The findings of the sub-committee in this respect are that the village plans prepared by the V. L. W. were not properly co-ordinated with the individual farm production plans prepared in the villages. The checking of the village plans by the Extension Officer (agri.) was also not with reference to individual plans. The sub-committee recommended therefore that steps may be taken to provide proper direction to the Village Level Workers and extension staff with regard to proper preparation of village plans and thereby overcome the lapse noticed.

2.2. In respect of farm planning the Village Level Worker, is required to formulate the farm production plans for individual farmers according to targets given to him and follow-up these plans. In the later aspect, the study indicates that the results are not upto the mark. The sub-committee suggested imparting of proper knowledge of the practical aspects of the effective follow-up, to the Village Level Workers and extension staff. Furthermore, the sub-committee suggested that the Block Development Officers may draw-up a programme of follow-up for each Village Level Worker and Extension Officer under them to ensure that the programme is implemented.

2.3. The Village Level Workers are required to organise at least two meetings of cultivators for showing the objects of each demonstration laid out. The achievements indicated that in a majority of cases in the demonstrations organised even two meetings were not arranged for showing the benefits. The sub-committee was of the opinion, that adequate supervision is necessary by the extension staff, Block Development Officers and the district technical staff to ensure that the minimum number of meetings prescribed are organised for each demonstration. It further suggests, that incentive should be provided to Village Level Workers for encouraging them to cover each demonstration by arranging the minimum number of meetings.

2.4. The Village Level Worker is required to organise meetings in the village in his charge for advocating the acceptance of package of practices. The sub-committee's investigations in this respect showed, that in a majority of cases less than 50 per cent of the meetings targeted to be organised in a year, were actually organised. The sub-committee felt that the target set for the organisation of meetings was high and should be suitably revised.

2.5. The Village Level Worker has also to take steps for securing maximum participation in the Package Programme areas from village teachers, Village Panchayat Secretaries and leading cooperators. The study showed that the non-participation in the programme is more marked in the case of village teachers and Panchayat Secretaries. In order to make the village teacher participate in the programme, the sub-committee has recommended that a more tactful approach by the Village Level Worker would be necessary. The Panchayat Secretaries can be made to participate in the programme by the Village Panchayat by organising periodical meetings of cultivators for reviewing the progress of package plan programme in relation to the targets fixed and extending assistance in removing the difficulties.

2.6. The Village Level Workers are to render assistance to the cultivators in the Package Plan area by conveying problems and difficulties of cultivators to the block staff. The sub-committee has observed that the difficulties and problems of cultivators conveyed to the Village Level Workers and reported by Village Level Workers to the block authorities need to be kept on record. It was suggested that register showing such difficulties and steps taken to remove them be maintained at the block level. Maintenance of such records would provide useful material for judging the difficulties experienced in implementing the programme at village level and steps required to be taken to obviate them.

2.7. In addition to some of these responsibilities referred to above

Village Level workers are required to (i) maintain diaries indicating the cultivators contacted by them for follow-up action with regard to implementation of farm production plans as well as assistance rendered in this regard, and (2) undertake touring for 25 days with 10 night halts in a month. The diaries maintained by the Village Level Workers did not indicate the cultivators contacted for follow-up action with regard to implementation of farm production plans as well as assistance rendered by the Village Level Workers in this regard. It seems desirable that record showing names of cultivators who are contacted for follow up should be maintained by the Village Level Workers.

2.8. The prescribed level of touring was also not complied with by most of the Village Level Workers.

2.9. The targets set for number of days of touring for Village Level Workers appeared to be rather high and the sub-committee suggested that it should be suitably revised.

2.10. The Village Level Workers are required to accord priority in their work first to fulfill the targets allotted for bringing area under intensive cultivation, than to fertilisers, improved seeds etc. Such priority was not reflected in the findings of the survey. The sub-committee was of the view that more efforts are required to be made by the Village level Workers and extension staff to achieve these targets fixed for intensive cultivation, fertilisers, etc. by allotting these functions proper priority. It should be the responsibility of Block Development Officers to communicate the villagewise targets for each item to the extension staff and Village Level Workers.

### 3. Extension Officers (Agriculture) :

3.1. The allotment of work as envisaged at the time of inception of the programme had not been made in the case of some departmental (NES) Extension Officers (Agri.). The allotment of work is required to be made uniformly among all the Extension Officers (agri.) by the Block Development Officers.

3.2. The Extension Officers (agri.) has supervisory responsibilities over the Village Level Workers in matters related to agriculture. Some of the important duties he has to perform under the programme are to supervise the preparation of village plans, check and follow-up some farm production plans, organise and conduct at least one demonstration in each crop season for each major crop grown in the block, organise meetings for advocating Package Plan practices, help the villagers to get Government grant-in-aid for several agricultural programmes under implementation in the package areas solve and get solved the difficulties brought to his notice by the Village Level Workers and the cultivators. As incidental to his

duties he is required to maintain a diary of the work done, registers and undertake touring.

3.3. The findings in respect of checking of the village plans and follow-up of the farm production plans by the Extension Officers (Agri.) and the steps to remedy the position have already been discussed earlier. The sub committee also suggested that the follow-up of farm production plan by Extension Officers (Agri.) should be allotted societywise.

3.4. The survey revealed that other functions of the Extension Officer (Agri.) were not discharged to the extent prescribed. For improving performance in regard to these functions of Extension Officers (Agri.) the observations of the sub-committee are mentioned below :

(i) It must be the responsibility of Block Development Officer to ensure that at least one demonstration for each major crop grown in the block is organised and conducted by the Extension Officers (Agri.) personally. It should also be ensured that each demonstration by the Village Level Worker is inspected by the Extension Officers (Agri.) at least the minimum number of times as laid down and during each visit the observations relating to progress of demonstration plot is recorded in the plot book. This record for successful demonstrations could be used by the extension staff to a great extent as informative material for approach to other farmers.

(ii) Efforts are also required to be made by the Extension Officers (Agri.) to cover each Village Level Worker under their jurisdiction during monthly inspections, as laid down.

(iii) The monthly progress reports received from Village Level Workers are required to be regularly scrutinised by the Extension Officers (Agri.) keeping in view the targets allotted. Wherever short-falls are noticed in this respect, the Extension Officers should personally attend to these.

(iv) The Extension Officers (Agri.) are required to ensure that the indents are submitted in time by the different sources for items like improved seeds, insecticides, fertilisers etc. Records showing the sources from which such indents are to be collected and the extent to which these are actually collected should be maintained by each Extension Officer (Agriculture).

#### 4. Extension Officer (Co-op.) and Co-operative Supervisors:

4.1. In case of regular Extension Officers (Co-op.) the sub-committee found that the Package Programme work had not been allotted to them. The question as to whether the package work

should be allotted to the regular Extension Officers (Co-op.) should be examined. In some cases, all the work that were contemplated to be entrusted to Co-operative Supervisors when the Programme was initiated, had not been allotted to them. The Block Development Officers, the Committee has expressed should in the circumstance ensure that allotment of work is done as envisaged.

4.2. The Co-operative Supervisors and Extension Officers (Co-op.) have the responsibility to check some individual farm production plans prepared by the societies in their charge. The survey showed that this was not being done in most of the cases. The sub-committee has proposed that the allotment of checking farm production plans to these extension staff should be made societywise.

4.3. Referring to the duty of Co-operative Supervisors and Extension Officers (Co-op.) which requires them to ensure that normal credit statements are prepared and sent to the union in time by the co-operative societies so that members may obtain the finance and supplies without delay, the sub-committee has suggested that the co-operative staff should maintain records showing the dates on which normal credit statements are sent by societies to the union. In the case of such societies that are late in submission of the statements, necessary steps must be taken to ensure that the statements are sent in time.

4.4. The co-operative extension staff are required to see that the cash loans advanced to the members are properly utilised. The required follow-up is however not being undertaken. The sub-committee felt that this function of the extension staff was important as it helped in proper utilisation of the co-operative credit. It suggested that records showing details of cases of cultivators where follow-up has been done should be maintained.

4.5. The Co-operative Supervisors and Extension Officers (Co-op.) are required to bring each family of cultivators in their jurisdiction under co-operative fold, organise service co-operative societies and organise meetings of members of co-operative societies and to explain to them the role of co-operative societies in the package plan programme. It was found that in most of the cases, additional membership enlisted was less than 10 per cent and no special general body meetings were organised for Package Plan Programme. The sub-committee observed that reasons for slow increase in membership of co-operative societies can be attributed, more to economic factors. Still however greater efforts should be made to bring as many of the remaining cultivators families under co-operative fold as possible. As for meetings to be organised to explain the role of co-operatives in the Package Plan Programme, the sub-committee was of the opinion that the targets set appear to be rather high and should therefore be suitably revised.

4.6. Other suggestions of the sub-committee relating to the activities of co-operative staff are :

(i) Efforts should be made by the co-operative staff to visit each society during their monthly tours.

(ii) In order to co-ordinate co-operative activities with agriculture and irrigation greater efforts are also required to be made towards persuading the members of co-operative societies to undertake digging of field channels, purchasing of improved implements, insecticides etc. through the societies.

(iii) Steps should be taken to ensure that the scheme for training members of co-operative societies in Intensive Agricultural District Programme is implemented in the district without any delay.

## 5. Observations of the Evaluation Committee :

5.1. The Evaluation Committee considered the report at its seventh meeting held on 22nd January, 1965.

5.2. The Committee observed that suggestions emanating from the report are very useful and they should be considered by the Director of Agriculture, the Registrar of Co-operative Societies, concerned Secretariate Departments, the Development Commissioner and the District Development Officer of the Package Plan area.

5.3. The efficiency of field staff covered by the report, presented to the committee, related to the efficiency that prevailed in 1962-63, when the programme had completed its first year and when the staff covered by the check was not sufficiently instructed and familiar with their duties. Project Officer, Surat, therefore, felt that a follow-up survey with another year was desirable. The Committee agreed with this suggestion of the Project Officer and decided that a study about the efficiency of the field staff be taken up for the year 1964-65. The Evaluation Committee indicated that the study may be taken up immediately after 1964-65 is over. For the follow-up survey it was decided to retain the same sample frame and approach that had been chalked out for the survey now completed. The results of the 1964-65 survey can be checked up with the current report to determine how far the efficiency of the staff had improved.

## 6. Follow-up action taken by the Department :

6.1. The Agriculture and Co-operative Department at a meeting on 21-7-1965 attended by the Secretary, Agriculture and Co-operative Department, Societies, Director of Agriculture, Registrar of Co-operative Project Officer, Surat, Under Secretary (P.W.D.)

and Under Secretary (P. & H. D.), examined the report and has taken the following steps to improve the efficiency of the field staff covered by the study.

(i) It has been made incumbent on the Gram Sevaks to contact the individual cultivators and record their names in the diary for verification.

(ii) The Job-chart of the Gram Sevaks has been revised and a circular has been issued that the Extension Officers should check up the work of Gram Sevaks in view of the revised Job-chart.

(iii) A circular has been issued for Block inspection by the Project Officer and a form has been prescribed for the purpose.

(iv) For those Gram Sevaks who were below average, intensive training has been given. In all 63 Gram Sevaks have been trained.

(v) A special training programme of two years duration has been arranged at Baroda so that such Gram Sevaks who will be able to deliver the goods effectively and efficiently can be put in charge of package areas.

(vi) A closer co-operation between the package machinery and the normal machinery of Co-operative Department is achieved. Co-operative Inspectors are to follow up the inspection carried out by the District Co-operative Banks.

(vii) The Extension Officers (Co-op.) are instructed to check up the farm production plans with a view to see that the credit is utilised more for increased agricultural production.

(viii) The improved agricultural implements and insecticides are channalised through the society.

(ix) For avoiding frequent transfers of the Gram Sevaks the Package Officer was advised to take up the issue at the District Co-ordination Meeting.

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## CHAPTER 5

**Reasons for lack of response or favourable reaction  
to the three variables (i) fertilisers, (ii) improved  
seeds and (iii) irrigation.**

1.1. In order to gauge the responses of cultivators in the Package Plan district to the use of chemical fertilisers, improved seed, irrigation water and co-operative credit, a field survey was conducted by the Bureau of Economics and Statistics. The survey was started in July, 1963 and the field work connected with it, completed in December, 1963. The full text of the report on the survey is being published separately.

1.2. When the survey was organised in about the middle of 1963, the Package Plan Programme had completed 28 months since its inception. Even before the programme was initiated, a large part of the district had the benefit of going through the various stages of the Community Development Programmes.

1.3. The survey of attitudes was confined to the rural areas of the district and members of the Primary Co-operative Credit Societies as a co-operative credit was assigned an important role in the programme. The survey did not extend to members of marketing societies (cotton, banana, sugar cane, vegetables etc.) who are not members of Primary Credit Society and the marketing societies undertaking credit operations.

1.4. The findings of the survey, the observations of the Evaluation Committee and the follow-up action taken by the departments concerned are given in the following paras.

## **2. The Survey :**

2.1. Attitudes to chemical fertilisers: The responses of the cultivators to the use of chemical fertilisers were obtained with reference to the statements that its use (1) leads to increased yields which at least compensates for additional expenditure, (2) is not risky to rainfed crops and (3) does not deplete soil fertility. A section of the cultivators about half the community recognised the possibility of higher yields compensating the expenditure on the fertilisers. The other half yet remains to be convinced about this fact admitted by the first half. Among the cultivators recognising the possibility of higher yields, by the use of fertilisers, a large section fear that its use is risky to rainfed crops and that it depleted the soil fertility. Attention of the extension agency has to be devoted to eradicate such beliefs. It is a matter of satisfaction to know that even for the cultivators with distinctly negative attitudes, those believing in an irrational way that the use of fertilisers is sinful, is extremely small. There



is no evidence of attitudes being influenced by the size of holdings of cultivators. Whether or not a cultivator possesses irrigation does not also appear to make any material difference to the extent of favourable attitude among the cultivators.

2.2 Attitude towards the use of improved seeds : An overwhelming majority of cultivators believe that improved seeds result in betterment of both yield and quality. The difference in the size of holdings whether or not a cultivator possessed irrigation facilities did not effect the extent of favourable responses. The points to which the extension agency should pay attention are (1) there is yet a belief among a fairly large number of cultivators that the element of risk associated with improved seeds is more than those with the use of deshi seeds and (2) there is wide spread feeling that improved seeds are not available in time and in sufficient quantities.

2.3. Attitude towards irrigation : The key statement for determining the attitude was that "through the use of irrigation water, improvements can be attained in yields." The survey shows that the attitudes of a large proportion of cultivators in this respect remains undecided. This position obtains even among those who have some facility of irrigation. Such an attitude may be the result more or less of assured and evenly distributed rainfall and the moisture retaining fertile soils of the district. Even so the reason why cultivators with some irrigation facility have an undecided attitude would need further probe. As against this, large proportion of these who seem to have a favourable attitude towards this programme, have no irrigation facility. This points up scops for extending necessary assistance in providing irrigation facilities to cultivators with the right type of attitude towards irrigation.

2.4. As for canal irrigation, there are signs, among those who have this facility of irrigation and who possess favourable attitude, of disquiet as regards official harassment. The word harassment can be variously interpreted and even where justifiable demands are made on a cultivator, he may consider these to be a harassment if he does not want to pay up or act according to such demands. Whether there is infact such harassment in the surveyed area is another thing. Since the feeling is there, it is necessary to take note of it, because all such feelings do make themselves felt on the success or otherwise of a programme.

2.5. Also, there are a considerable number of cultivators, with favourable attitudes who feel that (i) continuous use of canal water depletes the soils, (ii) well irrigation is superior to canal irrigation and (iii) that canal irrigation is costly. Such beliefs not only limit the use of irrigation waters but also come in the

way of extension of the net work of canal irrigation. To the extent that these beliefs are at variance with facts and to the extent that they are irrational beliefs, they need to be corrected through better extension methods.

2.6. There are no marked difference in the attitudes in differing size groups, except that in the smallest group of holdings below 5 acres, proportion of cultivators with favourable attitude is larger than in other groups.

2.7. Attitudes towards co-operative loans: Although attitudes towards co-operative credit was not specifically named by the Evaluation Committee for survey, yet it was covered as the programme is assigned a pivotal role in the implementation of the Package Plan. Basic attitude towards loans through co-operative societies was determined with reference to the two statements (1) because loans required for social and family occasions are available from friends, relatives and money lenders, major part of the loans required should be obtained from these persons and (2) the traditional family relations should be maintained and continued and all financial transactions should be confined to money lenders. Negative response to these statements were considered indicative of a favourable attitude. It is to be noted in the case of this programme that the respondents were all members of co-operative societies.

2.8. A large majority of cultivators showed a favourable attitude to co-operative loans. Almost all with favourable attitude feel that there is no official harassment in obtaining loans, that loans are not confined to influential persons or their relatives and the co-operative loan finance encourage thrift. But many among these feel that co-operative loans are not available to the extent required and that loans should be given for approved use rather than only on approved security or surety. A substantial proportion of the cultivators believe that loans from source other than co-operative credit may also be availed of according to exigences of the circumstances.

2.9. Common to all the programmes favourable attitude seem to be at lower levels in the South-eastern region of the district than among the other areas covered by the plan. North-eastern region shows the highest proportion of cultivators with favourable attitude in respect of all the four programmes.

### 3. Concluding observations:

3.1. The survey thus highlights specific areas where the extension agency has to take action. The many doubts and fears

which seem to prevail among those who recognise the economic benefits flowing from adoption of improved practices need to be removed. A more challenging task is to convert those who are yet unconvinced and undecided or are negatively inclined-there are quite a large number of such cultivators as the survey reveals-towards programmes of improved practices.

3.2. It has also to be borne in mind that a substantial number of cultivators, who are not members of the co-operative societies, are not covered by the survey. It is only by greater efforts on the part the extension agency can the community be infused with favourable attitudes towards development programmes for agricultural production.

#### **4. Observations of the Evaluation Committee on the findings of the survey.**

4.1. "From the report it was evident that favourable attitudes already existed with regard to the programmes of distribution of improved seeds and co-operative credit. It was now for the administrative organisations concerned to step up their extension work and activities to meet the demands arising in this field."

4.2. "In order to ensure timely and adequate supply of improved seeds, compact areas may be chalked out and a closer and direct relationship be brought about between the seed growers and its users in such areas. Such an arrangement would enable the growers to get to know in advance the needs of the users and also the time when the users require the seeds. Co-operatives can play a vital role in the matter. Construction work of godowns on an adequate scale may be taken up side by side with the programmes."

4.3. "As regards irrigation water, it was necessary to take steps through intensified extension activities to convince the people that canal irrigation is not inferior to well irrigation."

4.4. "The report and its suggestions may be studied by the Agriculture, Co-operation and Irrigation Departments and a line of action chalked out by discussions to follow up the recommendations contained in the report."

#### **5. Action taken on the observations of the Evaluation Committee:**

5.1. The Agriculture and Co-operation Department discussed the report at a meeting held on 21st July, 1965 at which all the Departments referred to by the Evaluation Committee were represented. The Project Officer, Surat also participated in the discussions. The committee discussed at length the recommendations contained

in the Attitude Survey Report and observed that the following steps are already taken in the matter.

(a) Supply of improved seeds :

- (i) Necessary arrangements have been made for procurement of seeds.
- (ii) Seed Inspectors have been appointed in each district.
- (iii) The scheme for supply of improved seeds as per recent G.R. is implemented.
- (iv) Premium is paid to "A" and "B" class seed growers and subsidy is given to the Co-operative Societies to meet the cost on account of godown rent and managerial cost etc.
- (v) Seed treatment is given at the seed farms.
- (vi) Seed testing laboratory has been established.
- (vii) A scheme of bagging and seed certification is introduced.
- (viii) 75 to 80 per cent area has been covered under improved seeds of paddy and 100 per cent area under improved seeds of wheat.
- (ix) 100 per cent area is covered with improved cotten seeds.
- (x) 100 per cent area is covered under improved sugar cane.
- (xi) 80 to 90 per cent area under groundnut has been covered with improved seeds.
- (xii) Training classes are regularly held for Seed Inspectors for field inspection.

(b) Fertilisers :

- (i) The total number of fertiliser centres has been increased from 82 to 220
- (ii) The total off-take of fertilisers has gone upto 25,000 tons form 10,000 tons. The demand (which is 34,000 tons) is much more than the supply.

(c) Uria.

- (i) The demand for uria has shot up from 200 to 6000 tons.

## (d) Godowns :

- (i) In all 160 godowns were sanctioned for the package area of which 125 have been constructed and the rest are under construction. In addition to this, the Panchayat Department has sanctioned 59 godowns in the tribal block areas, of which 23 are constructed.

## (e) Irrigation. :

- (i) A circular has been issued by the Project Officer to carry out propaganda for more use of canal water and to convince the farmers that canal irrigation is not inferior to well irrigation. The well irrigation is popular since it is available to the farmers easily and is under their control.

However, people are gradually using more and more canal irrigation as is evidenced by the area under irrigation now. The area under irrigation has gone upto 80,000 acres. Irrigation for sugarcane increased from 11,000 to 15,000 acres and in wheat to 5,000. In addition, various tanks are fed with irrigation water from Kakrapara Dam and irrigation of wheat from such tanks has gone upto 17,000 acres. The total area under irrigated wheat has increased from 4,000 to 38,000 acres.

## (f) Co-operation. :

- (i) As regards co-operation increasing propaganda is done to enlist more members and special meetings are held for enlisting members. Intensive drive was made in 47 villages, where 100 per cent coverage is attempted. Investigations are also being made regarding the quantum of increased production on account of increased credit.

- (ii) A line of action has been chalked out by the Director of Agriculture, by the Panchayat Department, by the Project Officer and by the Registrar of Co-operative Societies with a view to follow up the recommendations contained in the report. The further line of action is as under-

(a) The water course should be constructed on the border of the kyari land by declaring it a "pot khatedar" so that after paddy is over, irrigated wheat can be sown.

(b) The scheme for levelling of land for making it fit for kyari is being sanctioned.

(c) Demonstration plots have been increased and the total number is 300.

(d) For water use and water management in 16 Blocks, each Block consisting of 80 acres will be taken up for demonstration.

## CHAPTER 6.

**Proportion of agricultural output that is marketed through co-operative societies and the extent of coverage of cultivators by co-operative societies.**

1.1. Side by side with the survey of attitudes towards fertilisers, improved seeds, irrigation water and co-operative credit, surveys were also conducted at the instance of the Evaluation Committee to assess the proportion of cultivators covered by the co-operative movement and the proportion of cotton and paddy (the major crops of the area) marketed through co-operative societies. The results yielded by the survey are briefly given below :

2. Coverage of primary co-operative societies and marketing societies.

2.1. According to the data received from the Registrar of Co-operative Societies, there were 1,08,322 registered members in the 640 primary agricultural credit co-operative societies as on 30th June, 1962. From the analysis of the initial lists carried out in respect of the selected primary co-operative societies it was estimated that of these 1,08,322 registered members, 91,946 were khatedar cultivator members, the remaining being either members of khatedars' families not having an independent holding or non-cultivating persons.

2.2 There were 104 marketing societies with a registered membership of 59,154 on 30th June, 1962. Of these 59,154 registered members about 50,204 were khatedar members, the remaining being either non-cultivator members or the members of the khatedar's family not having an independent holding.

2.3. As against the registered memberships of primary and marketing societies totalling to 1,67,486, there are 1,11,650 individual members, the rest of the membership being accounted for by multiple membership.

2.4. There are 2,89,000 cultivators (khatedars) in Surat district. On the basis of the estimates indicated above, the coverage of primary co-operatives and the co-operative marketing societies in the district comes to about 38.63 per cent of these cultivators.

3. Quantity of paddy and cotton marketed through co-operative societies.

3.1. It is estimated that the marketed surplus for paddy works out to 19.74 per cent of the total production for 1961-62 and 21.01 per cent for 1962-63. Of this marketed surplus, 10.42 per cent in

1961-62 and 30.08 per cent in 1962-63 are marketed through co-operative societies. The marketing of paddy through co-operative societies works out to 2.01 per cent in 1961-62 and 6.32 per cent in 1962-63, of the total output in respective years.

3.2. For cotton, the marketed surplus is estimated at 99.41 per cent for 1961-62 and 99.24 per cent for 1962-63. The quantities marketed through co-operative societies works out to 92.08 per cent and 84.24 per cent respectively.

#### 4. Observations of the Evaluation Committee:

4.1. The Evaluation Committee decided that the District Development Officer and Project Officer should examine the two reports in detail, draw out a concrete programme for extension and furnish the results of their examination to the Director of Agriculture.

4.2 According to the note prepared by the Project Officer, following introduction of the Package Plan Programme there was increase in the utilization of fertilizers. The intake of nitrogenous fertilisers in terms of ammonium sulphate showed a rise from, 5,947 tons in 1960-61 to 10032 tons in 1961-62 and to 12,060 tons in 1962-63.

4.3. There was greater use of godowns of all sizes and demand for new godowns. Before the introduction of the Package Programme construction of 45 small, 7 medium and 7 large size godowns to stock seeds, manures and fertilisers had been sanctioned to the co-operative societies in the IADP areas. In 1961-62 alone 44 small sized and 1 medium sized godowns were sanctioned and during 1962-63 activity in this field was construction of 35 small sized godowns.

4.4. The use of co-operative credit, both in cash and kind increased with the introduction of the programme, which showed that the co-operative societies had stepped up their business in this respect and the gaining in popularity of co-operative credit. Credit which was largely confined to non-agricultural use prior to the introduction of the programme had changed to farm production and from cash basis to cash and kind basis.

4.5. From 1-7-1961 to 30-6-1962 loans to the tune of Rs. 73,66,071 were provided to members, of which Rs. 17,84,457 were in kind. The corresponding figures for the period 1-7-1962 to 30-6-63 were Rs. 85,07,623 and Rs. 60,74,791. It was however noticed that overdues were considerable and required reduction.

4.6. The committee noticed the progress made in "co-operation" after the introduction of the Package Programme and suggested.

(i) That the construction of godowns programme be stepped up by arranging loan finance from Surat District Co-operative Bank.

(ii) The problem of recovery (of overdues) is much more in the backward areas of Surat district. It was therefore suggested that rules under the statutory provisions may be finalised as early as possible, so as to authorise the Extension Officers to exercise the powers of the Recovery Officers.

(iii) The Director of Agriculture may examine the feasibility of organising co-operative societies for levelling of land and utilising these for bringing in the irrigation facilities.

4.7. The first suggestion of the Committee was followed up by the Co-operative Department by issuing necessary instructions to the Central Financing Agency to undertake this activity.

4.8. The Co-operative Department examined the second suggestions and found that such authorisation of the Extension Officers was not possible under the Co-operative Societies Act. but, being an issue pertaining to recovery of overdues as arrears of land revenue, such an authorization could be made by the Collector. It was decided by the Evaluation Committee that the Revenue Department may examine the position.

4.9. The Director of Agriculture reported that there are no possibilities of organising labour co-operative societies in Surat District for levelling land. The Co-operative Department was therefore asked by the Committee to examine the possibility of organising labour co-operative societies which can take up such work during slack seasons when the labourers are in need of employment. The Committee further expressed that the Co-operative Department should also examine the extent of success attained by the societies established for the purpose and find out ways of making it possible for these societies to undertake such work.

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## CHAPTER 7

**Impact on agricultural productivity of the three variables viz. (i) fertiliser, (ii) improved seeds and (iii) irrigation.**

1.1. The Evaluation Committee had decided that sample surveys should be initiated with a view to study the impact of three variables (a) fertilisers, (b) improved seeds and (c) utilisation of water resources on agricultural productivity.

1.2. The Directorate of Agriculture has been conducting crop-cutting experiments for the Institute of Agricultural Research Statistics, Government of India, New Delhi for the Bench Mark and Assessment Surveys in I. A. D. P. Areas. The data collected by the Directorate of Agriculture were examined with a view to avoid duplication of surveys. The Evaluation Committee decided that the Bureau of Economics and Statistics should utilise the data collected by the Directorate of Agriculture in 1962-63 for assessing the impact of these variables.

1.3. The Bureau analysed the data obtained in crop-cutting experiments conducted in 1962-63 by the Directorate of Agriculture for paddy and cotton crops. The number of cuts for which yield data were available totaled to 297 and 213 for paddy and cotton respectively. The distribution of crop-cutting experiments not having been designed according to treatment combinations, there were a number of Talukas where no observations for particular treatment combinations were available and in many cases the number of observations was only one. For the purpose of analysis of variance therefore, contiguous Talukas were taken to form Zones and the District was thus divided into seven Zones as under :—

<i>Zones.</i>	<i>Areas covered.</i>
I.	(1) Umbergaon, (2) Padri, (3) Chikhli and (4) Bulsar.
II.	(1) Bansda, (2) Dharampur, (3) Nanivahial and (4) Dharampur (M. D. P.).
III	(1) Navsari, (2) Gandevis (3) Chorasi and (4) Olpad.
IV	(1) Mahuva, (2) Valod (3) Palsana and (4) Bardoli.
V	(1) Mangrol (2) Kamrej and (3) Mandvi.
VI	(1) Sonagadh and (2) Vyara.
VII	(1) Uchhal and (2) Nizar.

1.4. In view of the nature of data available the analysis of variance was carried out to test the significance of the following treatments on crop yields.

(a) No treatment versus improved seeds in all the seven zones, in order to test the impact of improved seeds on yield.

(b) Improved seeds versus improved seeds and fertilisers in five of the zones, to test the impact of fertilisers on yield.

1.5. As the crop-cutting experiments in 1962-63 were not specifically designed to study and estimate the impact of the three variables under consideration, the analysis of variance had certain limitations arising from the distribution of the data e.g. unequal number of observations in zones and treatments and lack of observations or insufficient observations in some zones and treatments, etc. The results of this crop-cutting survey can be made use of for ascertaining the extent to which the different improved practices recommended under the Package Programme are adopted, but the use of such experiments for ascertaining the effect of each individual factor under consideration on crop production is subject to serious limitation on account of the non-orthogonality in the data. Further the effect of other factors not included in the study may not be to the same extent over the different factors studied.

**Cotton :**

1.6. Out of 213 observations available from crop-cutting experiments for cotton, 189 observations were for plots with improved seeds only, 17 were for plots with improved seeds and fertilisers, 5 for plots with no treatment and one each for plots with improved seeds and irrigation and improved seeds, irrigation and fertilisers. In view of this inadequacy of data for treatment combinations, analysis was not carried out to examine the impact of different factors on yield of cotton crop. The observations on crop-cutting experiment for paddy classified according to different treatment combinations are as under :—

Sr. No.	Treatment.	No. of Observations Paddy
1.	No treatment .. .. .	161
2.	Improved seeds only .. .. .	62
3.	Irrigation only .. .. .	3
4.	Fertilisers only .. .. .	12
5.	Improved seeds and irrigation .. .. .	12
6.	Improved seeds and fertilisers .. .. .	35
7.	Irrigation and fertilisers .. .. .	3
8.	Improved seeds, irrigation and fertilisers .. .. .	9
Total .. .. .		297

1.7. The following inferences may be drawn from the analysis of data of crop-cutting experiments with the limitations mentioned above (Details of calculations are given in Appendix-III to the report.)

(a) (i) **No treatment versus (ii) Improved seeds only in seven zones.**

1.8. The variation in yield due to use of improved seed is statistically not significant. The differences among the different zones, as is to be expected, are statistically significant because of external environmental differences. Improved seeds do not, thus, appear to affect the yields in a significant measure.

(b) (i) **Improved seeds versus (ii) Improved seeds and fertiliser in five of the zones.**

1.9. Variations in yields between zones are highly significant stressing the differences in soil fertility, etc. of different zones.

1.10. Variations in yields, due to the two treatments i.e. improved seeds only and improved seeds and fertilisers are statistically highly significant. The fertilisers do therefore have a significant impact on the yield. The impact of fertilisers is estimated at over 60 per cent inasmuch as, the yield per unit of land under the crop is over 60 per cent higher when improved seeds are used with fertilisers than when improved seeds are used without fertilizers.

## **2. Observations of the Committee :**

2.1. As the analysis did not indicate fully the impact of three variables on agricultural productivity, it was decided that the Director, Bureau of Economics & Statistics should prepare proposals in consultation with the Directorate of Agriculture for conducting a fuller survey.

## **3. Action taken :**

3.1. The Director, Bureau of Economics & Statistics prepared the sampling design and schedules for conducting special crop-cutting surveys in consultation with the Directorate of Agriculture. A detailed time table for conducting the survey was also drawn up. Since most of the area under paddy was covered by improved seeds the Evaluation Committee accepted the suggestion of the Director, Bureau of Economics and Statistics and Director of Agriculture to drop the part of the survey relating to the impact of improved seeds on paddy. The special crop cutting survey, designed by the Bureau could not however be organised in 1964-65 by the Director of Agriculture. An analysis of the crop-cutting experiments conducted in 1964-65 under the Institute of Agricultural Research Statistics, Bench-mark and assessment survey programme has been undertaken by the Directorate of Evaluation on lines similar to the analysis of 1962-63 data.

## APPENDIX I

*Statement showing the progress made under the Scheme for Intensive Agricultural District Programme in Surat and Bulsar districts.*

Item.	Achievements in.				Target for 1965-66.
	1961-62	1962-63	1963-64	1964-65	
1	2	3	4	5	6
<b>1. Area brought under intensive cultivation method (in acres).</b>					
(a) Paddy .. .. .	132112	149018	172730	194311	272000
(b) Jowar (Kharif) .. ..	44794	50172	64065	73845	134000
(c) Jowar (Rabi) .. ..	4646	8006	8811	10964	—
(d) Wheat .. .. .	4413	7173	7338	16733	11000
(e) Cotton .. .. .	59601	109596	132490	193430	275000
(f) Groundnut .. .. .	2860	25536	21936	53636	40000
(g) Sugarcane .. .. .	4027	7620	8013	10663	70000
(h) Banana .. .. .	3276	5005	6615	9016	7500
(i) Vegetables .. .. .	7160	9613	10468	10408	6500
(j) Fruit trees .. .. .	—	3865	11021	14063	7000
<b>2. Estimated additional production by crops (tons/bale) :—</b>					
(a) Paddy .. .. .	48560	53646	62142	69952	81000
(b) Jowar (kharif) .. ..	4479	5117	6406	7385	9000
(c) Jowar (Rabi) .. ..	465	801	881	1096	1100
(d) Wheat .. .. .	618	1005	1034	2342	2520
(e) Cotton (No. bales).. ..	14900	27399	33122	48357	62500
(f) Groundnut .. .. .	288	2563	2193	5364	5500
(g) Sugarcane (ton/gull) ..	6040	9674	9215	16002	15000
(h) Banana .. .. .	12117	18518	24775	33359	37000
(i) Vegetables .. .. .	7876	10576	11515	15469	19800
<b>3. Use of fertilisers (tons) :—</b>					
(a) Nitrogenous fertilisers in terms of Ammonium Sulphate .. .. .	10032	13452	16083	23233	30000
(b) Superphosphate .. ..	2954	3062	4180	6113	12000
(c) Murate of Potash .. ..	..	410	447	1048	1200

## APPENDIX I—(contd.)

1	2	3	4	5	6
(4) Green Manuring (in acres)	47946	79552	94405	120573	140000
(5) Sale of improved seeds (in Quint) .. .. .	9408	13637	10897	17706	142(tons)
(6) Sale of improved implements (in nos.) .. .. .	12134	4952	4679	6926	2500
(7) No. of scientific demonstrations conducted.. ..	900	1090	1200	1100	1286
(8) New Kyaries prepared (in acres). .. .. .	3141	2187	2861	3319	—
(9) Fish rearing (in no. of ponds)	2	12	19	20	25
(10) No. of soil samples analysed. .. .. .	423	1021	1556	2692	1000
(11) Tractor ploughing (in acres) .. .. .	—	—	499	1047	5000
(12) Levelling of land by bulldozers (in acres) .. ..	—	—	489	1022	2000
(13) Irrigation by canal (in acres). .. .. .	63025	81764	77963	86538	—
(14) Field channels constructed (in acres) .. .. .	17149	22263	44900	31320	125000
(15) No. of societies .. .. .	641	658	673	704	—
(16) No. of farmers' plan prepared .. .. .	52058	70770	87429	99495	155000
(17) No. of godowns constructed .. .. .	38	78	102	141	—
(18) No. of members financed..	31005	21131	41165	34251	—
(19) Plant protection equipment.	462	10050	552	176	400

## APPENDIX II

*Table showing the total area and existing production of major crops based on average yield per acre from crop cutting experiments alongwith increased production based on average yield per acre from intensive methods in the Package Programme of Surat district.*

Name of the Crop.	Year.	Area ('00 acres).	Actual level of production (lbs./acres)	Optimum level of production (lbs./acres)
Paddy	.. .. *According to note.	3170	1230.6	3070.0
	1961-62	3381	1229	
	1962-63	3036	1001	
	1963-64	3343	1185	
	1964-65	3404	1241	
Wheat	.. .. *According to note.	293	510.2	1276.5
	1961-62	290	386	
	1962-63	293	451	
	1963-64	263	596	
	1964-65	327	596	
Cotton	.. .. *According to note.	4340	74.8	139.5
	1961-62	3809	83	
	1962-63	3783	164	
	1963-64	3603	113	
	1964-65	3694	90	
Jowar	.. .. *According to note.	2716	835.6	1791.5
	1961-62	2399	425	
	1962-63	2516	777	
	1963-64	2566	715	
	1964-65	2397	675	

\* According to the note on optimum combination of factors of production prepared by the Director of Agriculture.

## APPENDIX III

## Details of analysis of variance :

- I. To test the variation in paddy yield due to use of improved seeds.

The table below gives the number of crop-cutting experiments in each of the seven zones and the corresponding yield.

TABLE—1.

Zone.	Without any treatment.		With application of improved seeds.	
	Number of observations.	Yield.	No. of observations.	Yield.
I ..	53	1132.65	14	347.36
II ..	56	1052.95	8	187.83
III ..	6	116.84	8	119.06
IV ..	5	87.82	9	166.53
V ..	10	165.99	13	206.04
VI ..	20	193.92	8	48.69
VII ..	11	47.08	2	29.24
Total ..	161	2797.25	62	1104.75

The total sum of squares, which is not obtainable from this table as it stands, is 27965.92. The zonal means and reciprocals of zonal frequencies are given in Table 2 below :

TABLE—2.

Zone.	Without any treatment.		With application of improved seeds.		Unweighted mean of means.
	Mean.	$1/n_{jk}$	Mean	$1/n_{jk}$ .	
I ..	21.37	0.0188	24.81	0.0714	23.09
II ..	18.80	0.0178	23.48	0.1250	21.14
III ..	19.47	0.4667	14.88	0.1250	17.17
IV ..	17.56	0.2000	18.50	0.1111	18.03
V ..	16.59	0.1000	15.85	0.0769	16.22
VI ..	9.69	0.0500	6.08	0.1250	7.89
VII ..	4.28	0.0909	14.62	0.5000	9.45
Unweighted mean of means	15.39	0.6441 (Total)	16.89	1.1344 (Total)	16.14

Taking first the classification of yields without improved seeds and with application of improved seeds, we find from the relations.

$$\frac{l}{N_j} = \frac{l}{q^2} \frac{M}{k} \frac{l}{n_{jk}}$$

$$N_1 = \frac{49}{6441} = 76.07 \quad N_2 = \frac{49}{1.1344} = 43.19$$

The estimate of  $\nu$ , with one degree of freedom is given by

$$M (N_j \bar{x}_j^2) - C^2 (\sum N_j)$$

$$\text{where } C = \frac{M N_j \bar{x}_j}{M N_j} = 15.93$$

The estimate of  $\nu$ , with one degree of freedom works out to 74.82. Similarly for 7 zones the estimate of  $\nu$  with 6 degrees of freedom is  $\frac{5502.69}{6}$  i. e. 917.11.

Considering the 14 subclasses as a one way classification the preliminary analysis is as under : (Arithmetical details are omitted).

TABLE—3.

*Analysis of variance table for data in Table 1.*

Sum of squares.				d. f.	M.S.S.	
Between Classes	..	..	..	6248.84	13	480.68
Residual	..	..	..	21717.08	209	103.91
Total				..	27965.92	222

The value of F at 5 per cent level is in between 1.74 and 2.28. Thus the data are not homogeneous.

It is now to be decided whether the departure from homogeneity is due either to zones or to treatment or to a combination of the two. For treatment differences, the estimate of  $\nu$  is equal to 74.82 with one degree of freedom comparing this with an independent residual from table 3 of 103.9 with 209 degrees of freedom it is seen that the effect of improved seeds is not significant at 5 per cent level. The estimate of  $\nu$  for zones is 917.11 with 6 degrees of freedom, comparing this with an independent residual from table 3 above, it is seen that the effect of zones is significant. It is concluded therefore that while the variation in yield due to use of improved seeds is statistically not significant, the differences among the different zones, as is to be expected, are statistically significant.



(2) To test the variation in yield due to the application of improved seeds and fertilisers against improved seeds only.

The table below gives the number of crop-cutting experiments in each of the 5 zones and the corresponding yield.

TABLE—4.

Zone.	With improved seeds only.		With improved seeds and fertilisers.	
	Number of observations.	Yield.	Number of observations.	Yield.
I .. .. .	14	347.36	21	672.25
II .. .. .	8	119.06	3	92.89
III .. .. .	9	166.53	5	139.92
IV .. .. .	13	206.04	2	44.70
V .. .. .	8	48.69	4	67.60
Total.. .. .	52	887.68	35	1017.36

The total sum of squares, which is not obtainable from this table as it stands, is 12641.46.

The zonal means and reciprocals of zonal frequencies are given in the Table 5 below :

TABLE—5.

Zone	With improved seeds.		With improved seeds and fertilisers.		Unweighted mean of means.
	Mean	1/n <sub>jk</sub>	Mean	1/n <sub>jk</sub>	
I .. .. .	24.81	0.0714	32.01	0.0476	28.41
II .. .. .	14.88	0.1250	30.96	0.3333	22.92
III .. .. .	18.50	0.1111	27.98	0.2000	23.19
IV .. .. .	15.85	0.0796	22.35	0.5000	19.10
V .. .. .	6.08	0.1250	16.90	0.2500	11.49
Unweighted mean of means ..	16.02	0.5094 (Total)	26.04	1.3309 (Total)	21.02

Taking first the classification of yields with improved seeds and improved seeds and fertilisers, we find from the relations

$$\frac{1}{N_j} = \frac{1}{q^2} \sum_k \frac{1}{n_{jk}}$$

$$N_1 = \frac{25}{0.5094} = 49.07, N_2 = \frac{52}{1.3309} = 18.73$$

The estimate of  $\nu$ , with one degree of freedom is given by  

$$\frac{\sum (N_j \bar{x}_j^2)}{\sum N_j} - C^2$$

where,  $C = \frac{\sum N_j \bar{x}_j}{\sum N_j} = 18.79$ .

The estimate of  $\nu$ , with one degree of freedom works out to 1381.43. Similarly for 5 zones the estimate of  $\nu$  with 4 degrees of freedom is  $\frac{2421.87}{4} = 605.47$ .

Considering the 10 sub-clauses as one way classification, the preliminary analysis is as under. (The arithmetical details are omitted)

TABLE-6.

*Analysis of variance table for data in Table 5.*

	Sum of squares.	d. f.	M.S.S.	
Between classes	.. .. .	5839.28	9	648.81
Residual	.. .. .	6802.18	77	88.34
Total	.. .. .	12641.46	86	

The value of F at 5 per cent level is in between 2.05 and 2.07.— Thus the data are not homogeneous.

It is now to be decided whether the departure from homogeneity is due either to zones or to treatments or to a combination of the two. For treatment differences the estimate of  $\nu$  is equal to 1381.43 with one degree of freedom. Comparing this with an independent residual from table 6 of 88.34 with 77 degrees of freedom, it is seen that the effect of fertilisers is significant at 5 per cent level. The estimates of  $\nu$  for zones is 605.47 with 4 degrees of freedom. Comparing this with an independent residual from table 6 above, it is seen that the effect of zones is significant.

It is concluded therefore that the variation in yield due to the two treatments *viz.* improved seeds only and improved seeds and fertilisers are statistically significant. The differences among the zones are also significant.

*Reference :* The Advanced Theory of Statistics, Volume-II by, M. G. Kendall, Pages--220 to 225.