

## PROCEEDINGS OF THE SYMPOSIUM ON "CROP INSURANCE"

CHAIRMAN : Shri K. N. ARDHANAREESWARAN, *Additional Secretary, Ministry of Agriculture & Rural Development, Government of India, Krishi Bhawan, New Delhi-110 001*

CONVENOR : Dr. SHIVTAR SINGH, *Scientist S-2, Indian Agricultural Statistics Research Institute, Library Avenue, New Delhi-110 012*

A Symposium on "Crop Insurance" was organised during the 39th Annual Conference of the Indian Society of Agricultural Statistics on 30th December, 1985 at Punjabrao Krishi Vidyapeeth, Akola (Maharashtra). Prof. Prem Narain welcomed the Chairman and participants who were representing Research Organisations, Agricultural Universities and State Governments. Prof. Prem Narain stated that the introduction of the Comprehensive Crop Insurance by the Union Government is timely and beneficial to the farmers. However, there are a number of methodological problems involved in it. Its implications and limitations need to be critically examined. It was in this context that the Indian Society of Agricultural Statistics thought of organising the Symposium so as to provide a forum for discussing various problems and suggesting modifications based on sound statistical and actuarial considerations.

The Chairman in his opening remarks enumerated in brief the operational implications of the Comprehensive Crop Insurance Scheme and stressed the need to make the Scheme equitable and more attractive to the farmers. He emphasised the timely flow of credit and early settlement of claims. If the Crop Insurance is to be used as a tool of agricultural development, more investment in dry land farming is called for. The Chairman desired that the possibility of an alternative to crop cutting experiments for estimating crop yields may be explored. He suggested that suitable methodology for working out with objectivity and precision the financial implications of the Scheme may be evolved.

In all 10 papers were received for the Symposium and of which 7 were presented. The statistical, actuarial, procedural and technical aspects of Crop Insurance as well as need of a strong statistical data base for Comprehensive Crop Insurance Scheme were discussed in the papers. The presentations of papers were followed by discussions and questions in respect of the results presented by the participants.

The following recommendations emerged out of the deliberations :

- (i) Methodological investigations for estimating premium and indemnity rates based on the appropriate distribution of crop yields over time and space utilising data on crop cutting experiments may be made.
- (ii) Since the Comprehensive Crop Insurance Scheme is based on 'Area Approach' and in most of the participating States, the unit of Insurance is a block, there is a need to work out the sample size in terms of the number of crop cutting experiments required to be conducted in a block so as to have a precise estimate of the annual block yield.
- (iii) The number of crop cutting experiments conducted at present is to obtain the estimates of crop yield/production at the State and then at the National level. The Crop Insurance Scheme makes use of these estimates for smaller homogeneous areas to determine the threshold yield for each of the areas. This number is not adequate to provide precise estimates. It was, therefore, recommended that steps need to be taken to increase the number of crop cutting experiments.

The detailed summaries of the papers are as follows :

### 1. Statistical Aspects of Comprehensive Crop Insurance Scheme

by

PREM NARAIN<sup>1</sup>, SHIVTAR SINGH<sup>2</sup>, J. N. GARG<sup>3</sup> and  
MAHESH KUMAR<sup>4</sup>

Crop Insurance is a technique of protecting farmers against the element of chance in crop production. The Comprehensive Crop Insurance Scheme announced in this year's Budget is being implemented in the country from Kharif 1985. The Scheme covers farmers availing themselves of crop loans from co-operative credit institution, commercial banks and Regional Rural Banks for growing paddy, wheat, millets, oilseeds and pulses. It is being operated by the Government of India

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- 2, 3 & 4. Scientists, IASRI, New Delhi.

through the General Insurance Corporation of India with the active involvement of the State Governments and Union Territories. The Scheme aims (i) to provide a measure of financial support to farmers in the event of crop failure due to natural calamities like droughts, floods, pests and diseases etc., (ii) to restore the credit worthiness of the farmers in the case of crop failure and, (iii) to seek to support and stimulate the production of cereals, pulses and oilseeds.

In the Comprehensive Crop Insurance Scheme, the threshold yield is fixed at 80 per cent of the last 5 years average yield and indemnity becomes payable in an area when the actual average yield in the area is less than the threshold yield. The premium has been kept uniform, being two per cent for wheat, paddy and millets and one per cent for oilseeds and pulses. If the insurance scheme is not to make any profit, then the premium collected over a long period of time must be equal to the indemnities paid during the same period. The Pilot Crop Insurance was based on this principle and hence, was self-supporting. The Comprehensive Crop Insurance may not be so as in this, both the coverage and the premium are kept constant.

This paper considers the statistical criteria for determining premium rates, effect of yield variability and level of coverage on premium rates and the financial implications of the Comprehensive Crop Insurance Scheme.

It has been seen that the premium rates for a given homogeneous area depend on two parameters : (i) year to year variability in the average annual yield (measured in terms of coefficient of variation) and (ii) the level of coverage. The premium rates are related to both these parameters. A given crop showing stability in production will indicate lower annual variation in yield in a given area and would therefore, lead to lower premium rates for a given coverage, or alternatively a higher indemnifiable limit for a given premium. On the other hand, the premium rates would go up or alternatively the coverage will come down with unstable production.

The premium and indemnity tables were prepared following Dandekar's Procedure, utilising 5 years taluk/blockwise yield data for the period ending 1983-84 from 15 States for paddy crop, and from 7 States each for millets and oilseeds. The taluk wise/block wise premiums for a crop in a State were pooled to get the State wise average premium rates for paddy, millets and oilseeds at 20 per cent and 10 per cent levels of non-indemnifiable limits.

The average premium rate at country level was 5 per cent for paddy, 10.6 per cent for millets and 9.6 per cent for oilseeds at 80 per cent indemnifiable limits. The corresponding figures at 90 per cent indemnifiable limits were 7.2 per cent for paddy, 13.4 per cent for millets and

12.9 per cent for oilseeds. These rates include 0.3 per cent as administrative costs.

The premium rates for paddy at 80 per cent indemnifiable limits ranged from 2.1 to 2.6 per cent in Kerala, Assam, U. P. and Punjab, from 3.9 to 7.0 per cent in A. P., H. P., Bihar, Orissa, West Bengal, Karnataka, Tamil Nadu and Maharashtra and 9.8 to 15 per cent in Haryana, Gujarat and M. P.

In case of millet crops the premium rates at 80 per cent, coverage were high ranging from 7 to 15 per cent in A. P., Haryana, Karnataka, M. P. U. P. and Maharashtra except for H. P. in which case it was 2.8 per cent. The premium rates were high for oilseeds. Since the comprehensive crop insurance scheme lacks the actuarial soundness, heavy losses are expected in implementing the scheme in its present form.

In the absence of data on crop wise sum insured for each defined area in a State, a reliable estimate of the expected shortfall in premium income using actuarial premium rates for 80 per cent indemnifiable limits vis-a-vis constant rates may not be possible. However, an attempt was made to work out expected shortfall in premium income utilising the State-wise projected crop loan and the premium rates based on 5 years yield data for the period ending 1983-84. In fact, State-wise short-term loans disbursed by Cooperative Banks were available for major crops for the year 1980-81. The projected State-wise quantum of crop loans during 1984-85 was obtained by inflating the crop loans disbursed during 1980-81 by 150 per cent. The expected sum insured was 150 per cent of the expected crop loaning during 1984-85. It was seen that if the sum insured for paddy is of the order of 600 crores, then a shortfall in premium income would be of the order of Rs. 24 crores. Similar shortfalls in respect of millets would be Rs. 14.8 crores and for oilseeds Rs. 8.4 crores. These figures have to be quoted with caution as these are the expected shortfalls and are based on the assumption that the sum insured during 1984-85 for paddy, millets and oilseeds is Rs. 603 crores, Rs. 177 crores and Rs. 96 crores respectively. The expected shortfall in premium income would be much smaller as most of the States are reluctant to join the Scheme. It may be concluded that the Union Government should be prepared to contribute a larger sum to the insurance reserve fund if the Scheme is to take off.

## 2. Actuarial Considerations of Crop Insurance and Related Issues

by

P. K. RAY<sup>5</sup>

This paper discusses broadly the role of Statistics in the determination of insurance coverages and premiums in Crop Insurance.

### *Determination of Insurance Coverage*

The actuarial methods in crop insurance have basically two components : first, the establishment of the amount of insurance or cover; second, the determination of the premium rates. But the two components are closely inter-related. The amount of the insurance cover often also depends on the premiums to be charged and vice-versa. Both depend on the variability of crop yields over space and time or, in other words, losses to be expected in the future in respect of each major crop for insurance on individual crop basis, usually, or of combined crops, usually minor crops grouped together, during their growing period or at the harvesting time. But the determination of the variability of crop yields or its corollary the crop losses in any particular season bring in certain new elements in the statistical or actuarial considerations in crop insurance as compared to most forms of conventional insurances.

### *Guaranteed Yield or Value*

First, in the case of fire insurance, for example, the recognised basis of loss determination is the principle of indemnity, that is, the property subject to loss is already in existence, and the function of loss determination is the restoration to the insured of the 'status quo ante'. But in the case of crop insurance the loss will refer to something which will come up in the future, that is, crop yield, which depends on many factors, both insurable (e.g. natural hazards) and non-insurable (e.g. negligence and bad management). The loss in case of crop insurance would have therefore to be related to a shortfall in the actual yield in a particular season from an assumed or guaranteed yield of the crop usually valued at the current or at a predetermined price.

The assumed or guaranteed yield, in kind or cash (which is the insurance cover), is generally based on the calculation of the average yield of a crop per unit area (hectare or acre) over a sufficiently long period, which should be a minimum of 5 or 10 years, so that the yearly fluctuations (in the yield) balance or come towards the average yield in that period. Obviously

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the longer the period the better. Then the cyclical fluctuations in yield will tend to even out around the average.

The guaranteed yield or insurance cover is made to conform to the benefit that a farmer would have got from the yield of an insured crop on his land if there was no crop failure. But in order to reduce the 'moral hazard' as well as to keep the administrative expenses low and the premiums reasonable and within the paying capacity of the farmers the insurance cover does not usually guarantee the full value of the average yield. Generally, there is an upper limit and sometimes also a lower limit. That is, the insurance begins when the yield falls below a maximum percentage, say 90% or 80%, that is, the loss of crop yield is more than 10% or 20%. And the insurance ends with a maximum guarantee of 75% to 80% or 90% of the average yield.

The idea behind these provisions is to induce the farmers to share a part of the risk of crop production so that he takes adequate care of his crops and refrains from making frivolous claims for small losses.

#### *Insurance and Technological Changes*

Second, another new element in crop insurance, especially where the crop insurance coverage is determined on the basis of the long period average yield of crop, is the need for an adjustment in the insurance coverage when rapid technological changes are taking place in the production of crops resulting in a progressive increase in yields per unit area. Under such circumstances the simple average yield would amount to under-insurance in face of a general trend of increase in yield, making the insurance unattractive to farmers. But this problem could easily be solved by taking into account a moving average of yield of 3 to 5 years (in place of simple average) or by interpolating a 'trend value' for the yield by working from the recent past records and projecting the future trend. Such upward adjustments of the insurance coverage consistent with a progressive increase in crop yields or crop values is not, however, absolutely novel for crop insurance. In almost all forms of insurance the insurance amounts, the indemnities paid as well as premiums are frequently adjusted upwards or downwards consistent with the increase or decrease in the frequency, intensity and the value of the insured objects as well as of the anticipated losses.

#### *Unit of Insurance—Area or Individual Farm*

The third new element in crop insurance is : what should be the unit of insurance, that is, the basic area for determining the crop insurance cover and the premium? Should it be homogeneous area, individual farm

or (what has been called in USA) the insurance unit, that is, a group of farms owned or operated by a single farmer. There may be different combinations of these three different bases, and also different amounts of insurance cover in terms of percentages of area average or farm average yield.

Area basis meant all the farms in specified homogeneous areas will have the same insurance cover, same premium per unit area and also the same indemnity per acre/hectare, if a loss is declared for the area. Under individual farm basis, on the other hand, such calculations will be made according to each individual farm. Under insurance unit basis, losses or indemnities will be determined for the total of insurable crop lands held by one person in as big an area as a county or district or by smaller homogeneous geographical areas.

The determination of insurance amount, premiums and indemnities on individual farm basis is most sound actuarially and is also most equitable as they reflect most accurately the actual conditions relative to each farm, namely, its normally yield and yield variability or losses. Individual indemnity also appeals most to the farmers. But the individual farm basis is harder and more expensive to operate, as it has been found even in the case of the United States and Sweden. Data of yield and losses by individual farms are obviously much more difficult to obtain and, even if available, would be much more expensive to collect, store and process thereby making the cost of administration of insurance very high. Moreover, under "area basic" the average yield data for the area do not reveal insurance liability to individual farms. The process of averaging assumes that there would be a transfer of yield from the farmers with above average yields to those below. Where indemnities are paid to individual farmers it is not. Farmers with above average yields would keep their "surplus" while those with yields below the coverage level would receive indemnity payments.

While it may be recommended that developing countries should adopt area plan for determining insurance coverages and premiums, there are reservations with regard to its application for the determination of indemnities. For, as in the case of Swedish experience, the determination of indemnities on area basis leads to certain gross anomalies which are likely to cast a serious doubt as to the value of insurance among those farmers who usually suffer losses above the area average. In addition, if those farmers in the area who suffer little loss are paid an indemnity on the basis of the area average loss, obviously an absurd situation arises which cannot be justified on any ground. Under these circumstances, two alternative methods can be adopted for determining insurance indemnities. First, the area insurance can be supplemented by individual farm insurance in the case of those farms in the areas which are affected by special calamities such as hail and locust,

The second, and an alternative, way of determining the insurance cover (and also of losses) for crops would be to work out from the basis of cost of production or cultivation per acre or hectare. But the determination of the cost of production of a particular crop raises many practical problems and policy considerations.

A third way of determining the insurance cover (and also of losses) in crop insurance would be to relate it to a loan or loans taken by a farmer from recognised credit agencies for production of crops, as in the case of crop loan insurance. The extent of insurance may cover the loan only, or the loan plus the interest charged by the credit agency for it, or any other variable amount related to the loan and the interest. This is a limited and relatively safer and perhaps less costlier way of applying insurance to crops.

However, a decision as to whether a country should have a limited crop-loan insurance or a more comprehensive crop insurance for all eligible farmers in need of such insurance is a matter of policy decision to be made by each country depending upon its particular situation.

It was observed that the relative amounts of insurance protection and the premium rates are to be determined not only by technical considerations alone such as the average yield of the crop and its crop loss probability but also by economic and social considerations like the paying capacity of the farmers, the resources that the Government is willing to allocate and the desirability and the feasibility of income transfer from the non-agricultural to the agricultural sector or within the agricultural sector itself.

Higher coverages are no doubt attractive for the larger protection but lower coverages are attractive for the lower premium cost. At the same time the insurance, to be really worthwhile, should protect atleast the investment value of the crop at different stages of production. But it should be remembered that for each extra bushel of insurance, there is a more than proportionate increase in risk. For example, out of a coverage of 15 bushels an acre, the fifteenth bushel has the least chance to be produced and is, therefore, the most expensive to insure. The fourteenth has a little more chance to be produced and is a little less expensive to insure. The thirteenth has even more chance to be produced than the fourteenth and is less expensive to insure. Following this logic 10 bushels can be insured for a premium less than two-third the premium for insuring 15 bushels, probably for half or less. Therefore, any increase of coverage beyond the minimum required to protect the investment value of the crop should be considered with due caution,



### 3. An Analysis of Crop Insurance Using Time Series Models

by

P. G. BISWAS,<sup>6</sup> V. P. MANGLIK<sup>7</sup>, and B. PRASAD<sup>8</sup>

Time Series models have been used for analysing and forecasting yield and area data of major crops in Gorakhpur district. Premium and Indemnity is calculated on the basis of historical and forecasted values. The area selected for the present study, namely Gorakhpur district, forms a part of eastern Uttar Pradesh. Agriculture is the main stay of this fertile Gangetic Plain but at the same time, is subject to frequent natural calamities. The results are based on the yield and area data of past 32 years (1950-51 to 1981-82). Autoregressive models (AR), Winter's model and periodogram analysis have been used to analyse the available data. AR model was found adequate to represent the area allocation of different crops in the district. The yields also may be represented by AR model for forecasting. It was observed that the yields projected through the models are having accuracy of about 75 per cent. Premium rates and indemnities have been calculated separately for all crops. These have been calculated by using 5 years preceding yield data and 5 years projected yield data of 8 major crops of the study area.

### 4. Comprehensive Crop Insurance Scheme in Tamil Nadu

by

R. KRISHNASAMY<sup>9</sup> and A. SRINIVASAN<sup>10</sup>

The Government of India introduced the Crop Insurance Scheme in 1979-80 with a view to protect the interests of farmers in the event of crop failure due to natural calamities such as drought, floods, cyclone, and also due to pests and diseases to crops, etc. The Scheme is based on "Area Approach" instead of "individual approach". A "Block" is adopted as the 'Unit of Area' under the New Comprehensive Crop Insurance Scheme introduced from 1985 Kharif season. This paper discusses the limitations in adopting the Block as a unit of Insurance and suggests that adoption of a firka will be a better alternative.

The data collected from the Crop cutting experiments under Crop Insurance Scheme during 1984-85 when Block was the unit and those collected from General Crop Estimation Surveys with block as strata, have been analysed for the above purpose. The analysis has shown that the inter-variability of major crop yields within a block generally ranged from 30% to 60%, the variation also being statistically significant. These results

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indicate that there is lack of homogeneity in a block mainly due to variations in soil types, climatic conditions and application of inputs within a block. It is, therefore, suggested that "Firka" which is a smaller unit, with less of heterogeneity besides being an administratively convenient unit, may be considered as the unit of Insurance, after building up necessary data base.

##### 5. Crop Insurance : Some Problems and Issues

by

M. G. CHANDRA KANTH<sup>12</sup>, R. S. DESHPANDE<sup>12</sup>

K. N. NINAN<sup>13</sup>, and H. CHANDRASHEKAR<sup>14</sup>

The discussion suggests that crop insurance is an inappropriate welfare tool from the point of view of redistribution of income among farming classes whether it is subsidised or unsubsidised. The performance of crop insurance is successful in developed countries like USA or Canada mainly because of the lesser inequality of resource (land) distribution; this is not the case in India where a high degree of concentration of land and other resources exists. For instance, nearly 14 per cent of the medium and large farmers account for 61 per cent of the total area operated. On the other extreme 51 per cent of the sub-marginal and marginal farmers operate only 9 per cent of the total area operated. Therefore, for the scheme to be successful land inequalities should be atleast reduced if not eliminated through effective implementation of already existing social and institutional reforms, such as tenancy reforms. While the paper does not argue against the very idea of crop insurance, it calls for a careful consideration of facts in assessing the feasibility and efficiency of the Plan in redistributing income among the farmers.

Unfortunately, in all the actuarial structures, hitherto employed by various crops insurance schemes operated all over the world, the premium rates are computed considering the univariate distribution of crop yield against its frequency whether it is the structure involving the use of normal curve theory (Batts and Boles, 1958), or Poisson Distribution (Yamauchi, 1973), or Fourier Series; (Yeh and Wu, 1966) or the latest sophisticated technique using Pearsonian distribution (Yeh and Sun, 1980) utterly failed to measure risk premium appropriately in developing countries like India where huge magnitude of inequalities in resources exist. Therefore, we suggest a phase-wise development of actuarial structure incorporating the farm size component, atleast, if not all other inequalities. It would be worthwhile to compute premium with a bivariate (or even

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a multivariate) distribution of crop yield frequencies with farm size (and other scale parametres) with the assumption of a statistical frequency distribution consistent with reality. Unless this is done, we fear, we would be ending in what is called 'Pseudo Insurance'. While it is easy to make such recommendations, we also understand the underlying difficulties in the actuarial framework and premium computations. Nevertheless, we feel, for want of such expertise which can be acquired we should not discount the primeness of the above argument. Though the ready-made loss cost formula is not available, we hope that it is not impossible to develop such a scheme suited to the specific situations of agriculture.

#### 6. Procedural Aspects of Crop Insurance

*by*

P. P. RAO<sup>15</sup>

The author has dealt with the functions of various institutions participating in the implementations of the Crop Insurance Scheme and also the procedures adopted by them.

While discussing the data base for Crop Insurance he suggests that crops and areas for which no crop cuttings were conducted in the past but for which data based on eye estimation are available should also be brought under the Scheme subject to the conditions : (I) The crops should be of crucial importance for the State's economy., (II) Crop cuttings should be conducted in adequate number from the insured season onwards., (III) Threshold yield should be based initially on eye estimation data but progressively an eye estimation data plus available crop cutting data and from the 6th year onwards only crop cutting data may be taken into account., (IV) Claims to be settled on the basis of crop cutting data only, and (V) This method should be tried on pilot basis initially.

Results of the Pilot Study should be analysed and modifications made before trying on a large scale.

Another suggestion is that in North Eastern areas where crop cutting system does not exist at all for many important crops, a beginning be made by empowering the village chiefs to assess and certify yields.

The author suggests that crop insurance should be made available to farmers even though they do not obtain crop loans. A time limit should be worked out to reduce the size of stratum to a village or at best a group of limited number of villages initially for one or two major crops. For this purpose appropriate administrative and statistical techniques have to be devised.

15. General Insurance Corporation of India, Bombay.

The author suggests (a) further simplification of Banks declaration form (b) Banks to be allowed to submit one declaration per season instead of one declaration per month (c) One declaration for entire office instead of for each notified area (d) more efficient procedures for State Govt's disbursement of (i) premium subsidy for small/marginal farmers and (ii) their share of claims and (e) prompt submission of yield data by State Govts immediately after harvest.

The other major suggestions are (a) that RBI/NABARD should institute inspection procedures for ensuring that Banks declare all crop loans eligible for crop Insurance protection and (b) Crop Insurance should be made financially viable by charging premium at adequate rates, by adopting computerisation and by operating the Scheme on commercial basis.

## 7. Comprehensive Crop Insurance Scheme in Maharashtra

by

A. R. DESHMUKH<sup>16</sup>, N. K. PURANDARE<sup>17</sup> and M. G. SAWANT<sup>18</sup>

The progress of Pilot Crop Insurance Scheme which was implemented from 1981-82 to 1984-85 has been discussed in this paper. The number of talukas in which the Scheme was implemented was 10 during 1981-82 and it increased to 188 during 1984-85. The crops initially covered were Paddy, Kharif Jowar and the crops subsequently added were Groundnut, Cotton, Rabi Jowar and Wheat.

The compensation paid during 1981-82 was 1.81 lakhs and during 1984-85 it was Rs. 34.44 lakhs. In 1985-86 the Comprehensive Crop Insurance Scheme was implemented in the State in place of Pilot Crop Insurance Scheme. The crops covered under this scheme during Kharif are Paddy, Bajra, Jowar, Groundnut and Tur and during Rabi season Rabi Jowar irrigated and unirrigated, wheat, irrigated and unirrigated, Gram, Saflower, Linseed and Sesamum. So far the sum insured during Kharif 1985-86 is about 80 crores and the premium received by General Insurance Corporation of India is Rs. 1.35 crores.

It is suggested that threshold yield should be 100% of the average yield for the last 3 normal years. It is also suggested that those cultivators who are willing to participate in the scheme but have not taken crop loan or are defaulters may also be considered.

## 8. Need of a Statistical Data Base for Comprehensive Crop Insurance in India

by

B. B. P. S. GOEL<sup>19</sup>

Agriculture in India is subject to serious hazards due to factors like whether, drought, floods, pests and diseases, hailstorms and so on. Therefore, the importance of Crop Insurance in India needs no over emphasis. Insurance is a well accepted practice of socializing the risks due to unforeseen causes, distributing the loss on account of a mishap among a large group of individuals and saving an individual from complete ruin in such an eventuality. It is heartening to note that the Government of India is implementing a Comprehensive Crop Insurance Scheme in the country from Kharif, 1985. The basic purpose of a crop insurance should be to attract adequate public and private investments in agriculture with a view to give a boost to production, commensurate with the agricultural resources' and production potential in the country. The insurance should also protect the farmers from being ruined by natural calamities.

The acceptability of the Comprehensive is very poor as it fails to protect an insured farmer against crop losses. The farmer will not get any indemnity, even in case of a total crop loss in his holding, unless the average yield in his area (Tehsil/Taluk) is less than the guaranteed yield which itself is far less than his own expected yield. It is not understood that in such an eventuality how the Scheme will protect the agricultural credit also? Development of technically sound and practically acceptable insurance scheme for crops is needed.

Recently, professional bodies like IASRI and the ISAS have been associated with the work of the preparation of premium tables using the yield data provided by the various States and continuously updating them on the basis of new data supplied after each crop season. This will provide an opportunity to the scientists and professionals working in and associated with these premier professional bodies to acquaint themselves with the problems of crop insurance in India and the research efforts needed for the purpose. While they possess all the professional competence needed to tackle the methodological issues of Crop Insurance, they are seriously handicapped to go ahead with this for want of right type of data. Moreover, they have neither the funds nor freedom to generate the much needed data. Concerted research efforts by statisticians, actuaries and other professionals based on real comprehensive data and whole hearted support of policy makers, administrators and insurance

19. Agricultural Statistician, FAO, Kathmandu, Nepal.

practitioners are necessary. To begin with methodological studies need to be undertaken immediately to get over the weaknesses of the available methodology to the extent possible for working out premium rates. It is suggested to introduce homogeneous farmers grouping within the homogeneous areas adopted at present. The variation between farmers may be several times the variation between years in the same area. The number of crop cutting experiments should be increased substantially so as to have precise estimates of annual crop yields. The collection of data for the purpose of crop insurance has to be done by G. I. C. of India through the field organisations entrusted with the implementation of insurance scheme.

It is concluded that while it is necessary to go ahead with the programme of crop insurance in the country the way it should go, the scale on which it should be implemented need a little more caution. The dimensions of agriculture in the country, the number of people involved in agriculture, directly or indirectly, the implications of an approach not based on sound principles and scientific methodologies in the short and long run should not be overlooked. Perhaps the biggest handicap in arriving at the right type of crop insurance approach for the country is the absence of a comprehensive statistical data base. This needs urgent attention from all quarters concerned with the agricultural development and implementation of crop insurance.

#### **9. Comprehensive Crop Insurance Scheme—Technical Considerations in Determination of Premium Rates**

by

K. SUBBA REDDY<sup>20</sup>

The Government of Andhra Pradesh evinced keen interest in implementation of a crop insurance scheme as early as, 1958. Originally, the State Government thought of implementing a compulsory crop insurance scheme based on area approach. But it could not be implemented as insurance is in the Union list and legislation of implementing a compulsory scheme of crop insurance is to be enacted by the Parliament. The Pilot Crop Insurance Scheme was implemented in the State of Andhra Pradesh only from Kharif, 1981 in respect of 3 crops, Paddy, Jowar and Groundnut. From 1983-84 onwards 3 additional crops of Sugarcane, Tobacco and Cotton were included in the scheme. Under the Comprehensive Crop Insurance scheme implemented from Kharif, 1985 in Andhra Pradesh with Mandal as the unit of insurance. Taluks have been abolished and Mandals have been set up in their places.

20. Department of Agriculture, Govt. of Andhra Pradesh, Hyderabad.

In view of the Mandal (one-third or one-fourth of a Taluk) as the unit of insurance there is a need to determine the exact sample size needed for the Mandal for each insurable crop. It has been seen that at 10% standard error, the required sample size is varying from 8 to 36 crop cutting experiments in respect of Groundnut crop. For Paddy, the sample size varies from 2 to 30 crop cutting experiments for the same level of standard error. For Jowar, the sample size requirement is ranging from 6 to 46 experiments. As the above results are based on a study done only for a few Mandals and that too for one season, definite conclusions cannot be drawn on the required sample size. Probably this exercise has to be done for all the Mandals, where the insurable crops are grown extensively for a few years to work out the sample size to be adopted uniformly for the insurable crops.

#### 10. Crop Insurance

by

S. W. GOVITRIKAR<sup>21</sup>

Economically weaker section of the Society needs protection against risk of all kinds viz. death, accident, unemployment etc. In agriculture sector we have weaker section of landless labourers and small and marginal farmers. In Maharashtra employment guarantee scheme is in operation for some years, which can be considered as protection to landless labourers. Crop Insurance can be a protection to small and marginal farmers against crop failure. The premium rates for each crop strata are fixed taking into account the (i) Non-indemnifiable limits and, (ii) Variation in Annual average yield. For this purpose, it is necessary to have pre-stratification according to high yielding varieties and traditional varieties and further according to irrigated and unirrigated crops. It is suggested that the stratification in respect of Paddy, Wheat and Rabi Jowar may be done on the basis of irrigated and unirrigated areas. However, in the case of Kharif Jowar and Bajra the stratification should be on hybrid and traditional variety basis. Moreover, the number of crop cutting experiments may be enhanced sufficiently and the supervision should be increased in order to have a better quality of data.

21. Department of Agriculture, Nasik Division, Maharashtra.