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assessment and collection of data on pre-harvest foodgrain losses due to pests and diseases

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FOREWORD

The manual is intended to serve as a guide to the statistical methodology for assessing and collecting data on pre-harvest foodgrain losses due to pests and diseases. It should be useful to those developing countries which plan to launch foodgrain losses reduction programmes but find themselves seriously handicapped because of lack of basic data. The manual will go a long way in assisting those who will be charged with the responsibility of planning and implementing surveys for estimating pre-harvest foodgrain losses due to pests and diseases.

The manual, at the request of the FAO, was prepared by the Indian Agricultural Statistics Research Institute under the technical guidance of Dr. D. Singh, Director and Mr. R.K. Khosla, Senior Scientist. This Institute has a long tradition of developing and testing statistical methodologies as applied to agricultural research and development. A number of its senior officers have served FAO in several projects for the improvement of agricultural statistics in the developing countries. It should, however, be borne in mind that the methodologies suggested in this manual are offered only by way of guidelines which need further study and adaptation to suit the conditions prevailing in specific countries. The issuance of the manual in its present form should be considered as an invitation to the countries to communicate to the FAO their own experiences in this field, particularly taking into account the methodologies suggested therein. The initiation of such dialogue will indeed be very helpful for effecting further improvements in the techniques and methods which could be incorporated in subsequent editions of this manual.

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1. INTRODUCTION

1.1 It is well-known that pests and diseases cause appreciable crop losses all over the world. However, reliable and objective estimates of such losses are hardly available in any of the countries. Only guess estimates are available, their credibility depending upon the agency making the estimates.

1.2 All our efforts to produce more foodgrains by using costly inputs go to waste if such losses are not controlled in time. Economic and effective control measures can be planned on a sound footing only if reliable estimates of crop losses due to pests and diseases are made available. Such reliable estimates of crop losses have become very important with the increasing use of fertilizers, manures and pesticides, introduction of high yielding varieties, adoption of better irrigation facilities and cultural practices, etc. For the planners, policy makers, administrators and other experts engaged in improving the crop yield, estimates are not only important but are rather a pre-requisite for discharging their respective duties with optimum efficiency. The scientists would also be guided by these findings in carrying out improvements in the crop production and protection programmes.

1.3 The problem is of much relevance to the developing countries where the production of foodgrains per head is much less as seen in Table 1 below:

Table 1 - Population and production of cereals in different regions [1/]
(Average of 3 years - 1974-76)

Region	Total annual Production of cereals (million tons)	Population (millions)	Annual production of cereals per head (kilograms)
Developed countries	470	757	621
North America	274	236	1 161
West Europe	149	364	409
Oceania	18	17	1 059
Developing countries	414	1 958	211
Africa	45	319	140
Latin America	82	324	253
Near East	52	195	266
Far East	235	1 116	210

1/ FAO Yearbooks on Production.

1.4 The availability of reliable information on crop losses is, therefore, of great importance in developing countries, where, mainly due to lack of effective plant protection measures, the crop losses at pre-harvest stage in the cultivators' fields are substantial

and affect their economy adversely. Moreover, the average yields of crops in the developing countries are much lower than those obtained in the developed countries. The crop loss due to incidence of pests and diseases at the pre-harvest stage is one of the major causes of lower yield in less developed countries.

1.5 The crop losses in the developing countries which run to billions of dollars affect adversely their economic and nutritional standards. The condition is all the more critical considering the fact that all the efforts made by these countries in producing more food-grains are vitiated by substantive pre-harvest crop losses due to pests and diseases.

1.6 The necessity of estimating reliable crop losses has been felt for some time. In 1967 the FAO convened a symposium on crop losses to emphasize the need for the development and us of experimental methods to estimate crop losses quantitatively. Consequently a manual of "Crop Loss Assessment Methods" was prepared by Dr. L. Chiarappa. Again in 1977 a workshop on "Assessment of Crop Losses due to Pests and Diseases" was organized by UN/FAO/ICAR at Bangalore (India) where important work on the subject completed during the last decade was presented. Particularly the studies made by the Indian Agricultural Statistics Research Institute regarding the development of statistical methodology for assessment of crop losses was much appreciated.

1.8 To achieve the above objective it would be desirable to study the work done by variou researchers and institutions in this field so that the problems concerning pre-harvest losse of foodgrains due to pests and diseases could be examined and identified and suitably studied to develop appropriate statistical methodology, keeping in view the conditions prevailing in developing countries. In this regard, various experts and organizations were contacted through correspondence. An attempt has been made to review all the published literature on the relevant subject, not only relating to the food crops but other crops alsc The review cannot be claimed to be very exhaustive as the material reviewed was selected out of the material received.

1.9 It was noticed that uniform concepts, definitions and measurement techniques have not been adhered to in different studies. It was, therefore, felt necessary to devote one chapter to this subject so that all the organizations could follow uniform concepts, definitions and measurement techniques to obtain comparable and reliable data over larger space and time.

1.10 Since the statistical methodology involved in the estimation of crop losses is not as simple as in the case of other studies like estimation of yield or area under crops, it has been dealt with in more detail in one chapter. The layout plan and execution of surveys for estimating the incidence of pests and diseases and consequent foodgrain losses with special reference to developing countries and the possibility of integration of such surveys